

**COSEWIC**  
**Assessment and Update Status Report**

on the

**Eastern Prairie Fringed-orchid**  
*Platanthera leucophaea*

in Canada



**ENDANGERED**  
**2003**

**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:

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Eastern prairie fringed-orchid *Platanthera leucophaea* formerly listed by COSEWIC as eastern prairie white fringed orchid *Platanthera leucophaea*.

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Eastern prairie fringed-orchid — From Mitchell and Sheviak 1981.

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## COSEWIC Assessment Summary

### Assessment Summary – May 2003

**Common name**

Eastern prairie fringed-orchid

**Scientific name**

*Platanthera leucophaea*

**Status**

Endangered

**Reason for designation**

This is a perennial species of scattered remnant wetland habitats and of mesic prairies that has undergone significant declines in population size and is at continued risk from further habitat change due to successional processes, land development, water table impacts and spread of invasive species.

**Occurrence**

Ontario

**Status history**

Designated Special Concern in April 1986. Status re-examined and uplisted to Endangered in May 2003. Last assessment based on an update status report.



**COSEWIC**  
**Executive Summary**

**Eastern Prairie Fringed-orchid**  
*Platanthera leucophaea*

**Species Information**

The Eastern Prairie Fringed-orchid (*Platanthera leucophaea*) is a tall orchid with alternate lanceolate leaves and a spike of 10-40 creamy-white flowers, each with a prominent fringed petal and a long spur.

**Distribution**

The species once occurred widely in the northeastern United States, particularly in the southern Great Lakes region and extended northward into southern Ontario.

**Habitat**

It is a species primarily of mesic prairies, fens and old fields.

**Biology**

This orchid produces numerous tiny seeds, up to 10,000 per capsule. Seeds must first form an association with a soil fungus that forms mycorrhizae before they can germinate and develop into seedlings. Plants become reproductively mature in approximately 3 to 7 years. A new bud is produced on a fusiform underground tuber in late summer or early fall; from this a stem will grow the following year. Growth begins early in the year and plants usually achieve full size by June. The flowering period in southwestern Ontario extends from about 25 June to 20 July, but this depends on the weather. Capsules ripen in late August and early September.

Plants are adapted to withstand periodic drought and may exist in subterranean, dormant or mycotrophic state (relying on root fungi for nourishment) for one or more years. Following periods of apparent absence lasting several years, the orchid is known to produce dramatic, mass flowerings.

**Population Sizes and Trends**

With increased search effort since the original report was prepared in 1984, there are now a total of 34 known records for this species with only about 20 populations

currently extant (14 extirpated, 13 newly located populations). Most populations are small with the current number of flowering plants documented totalling just over 1000. The population at site 31, once numbering between 1000-1500, is currently nearly extirpated with only a few plants counted in 2000. Not all populations have been surveyed recently for changes in size. Some of the formerly larger populations have declined significantly with those at sites 2 and 3 having decreased in size by 60-80% over the last 20 years.

### **Limiting Factors and Threats**

Habitat has been severely reduced with notable losses over the past decade. Other actual and potential limiting factors include loss of habitat for pollinators, successional change, competition with invasive alien species, human impacts on water tables, deer grazing and natural hybridization.

### **Special Significance of the Species**

This species of orchid is one of the most spectacular and popular in North America. It has a very high profile in the United States due to its listing as a federally threatened species. No Aboriginal uses for this plant have been found in the literature but several other species in the genus are known to have been used for medicinal purposes.

### **Existing Protection or Other Status Designations**

The orchid is recognized as globally imperilled (G2) and was designated in 1989 as threatened under the United States Endangered Species Act of 1973. It is considered as very rare (S2) in Ontario but the species has not been listed under the provincial Endangered Species Act.



## COSEWIC MANDATE

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

## COSEWIC MEMBERSHIP

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

## DEFINITIONS

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

\* Formerly described as “Vulnerable” from 1990 to 1999, or “Rare” prior to 1990.

\*\* Formerly described as “Not In Any Category”, or “No Designation Required.”

\*\*\* Formerly described as “Indeterminate” from 1994 to 1999 or “ISIBD” (insufficient scientific information on which to base a designation) prior to 1994.

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



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**Update  
COSEWIC Status Report**

on the

**Eastern Prairie Fringed-orchid**

*Platanthera leucophaea*

**in Canada**

2003

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## INTRODUCTION

In the original status report, Brownell (1984) recommended a national status of "rare" for *Platanthera leucophaea* due to alarming trends in population decline and extirpations across its range and the existence of only 13 populations in Canada. In 1986, COSEWIC designated the species as rare citing the reason as "limited to 12 wetland colonies in Ontario". This rationale was added by the COSEWIC Plant Subcommittee in recognition that the status report and its recommendation was based upon the inclusion of an extensive population in Manitoba that was later separated as the new species, *Platanthera praeclara*. In 1990 terminology for the "rare" category was changed to "vulnerable", and in the year 2000 was changed to "special concern"<sup>1</sup>.

Since the 1986 status designation, many people have expressed concern that the species has declined substantially. To some extent, this may be a consequence of fluctuation in population size from year to year at a particular site. The Eastern Prairie Fringed-orchid is notorious for fluctuations in population size (Sheviak and Bowles 1986, Denny 1988, Bowles 1991). On the other hand, drastic changes in habitat at some sites suggested a possible trend toward increasing threat. In 1989, *Platanthera leucophaea* was officially designated as threatened under the United States Endangered Species Act of 1973 (Harrison 1989).

Subsequent to Brownell (1984), some research has been done on Eastern Prairie Fringed-orchid, status has been updated in various parts of the U.S. range, and recovery plans have been prepared. A thorough and range-wide investigation is beyond the scope of this report and so is a complete analysis of recovery actions and management. It is the purpose of this report to evaluate the current status in Canada, particularly with regard to changes since previous designation, and to bring together the more recently acquired information that may be useful in conservation.

## METHODS

### Information Sources

In order to update the original status report prepared for *Platanthera leucophaea* (Brownell 1984), we gathered information from a variety of sources. A literature search was conducted using AGRICOLA, BIOSIS and Biological Abstracts. Numerous field biologists were contacted in Ontario over a three-year period, and historical and current data were requested from various government and non-government sources [e.g. Natural Heritage Information Centre (Ontario Ministry of Natural Resources); Field Botanists of Ontario].

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<sup>1</sup>Vulnerable" in the older COSEWIC system corresponds to "special concern" in the new system, but "vulnerable" in the IUCN system corresponds to "threatened" in the COSEWIC system.

## Site Definition

A site was defined as populations that are separated by more than 1 km of largely unsuitable habitat or populations that are separated by more than 1.5 km with suitable habitat between them.

## Calculation of Area of Occurrence

Some movement over time has to be assumed even with a sessile organism (i.e. it moves around within its habitat). Plant habitats of course vary greatly in size, but for application of the IUCN criteria, a general rule needs to be applied to account for colonies of 1 or 2 plants, to reduce subjectivity and to allow for this movement. A minimum area of 0.5 ha seems appropriate since it is on the large size (occupied habitat may be a few square metres in a ditch or portion of a bog mat), but is not excessively large. A circle of 0.5 ha in extent (radius of 39.89 m) for each plant in each population (see site definition above) seems reasonable. A line was drawn around the edge of all of the circles where they overlap in a population or by adding the circle areas where they did not overlap. The total area thus identified was determined to be the "area of occupancy" for the population.

The term "extent of occurrence" as used by IUCN is different. For a species such as *Platanthera leucophaea* with a number of small but widely separated populations, the term may not be very meaningful. Nevertheless, if a convex polygon is drawn to include all of the populations in Ontario an area of about 114,000 km<sup>2</sup> would be enclosed.

## Non-extant Populations

A population was considered no longer extant if:

1. not seen or reported for over 20 years; or
2. known to be destroyed by urbanization, conversion to agriculture, loss due to succession etc.; or
3. not seen in the 1990s despite at least 4 searches during the flowering period.

## Calculation of Population Size

Where two reliable observers recorded different numbers in the same year, we used the higher number in calculations of maximum population size. Unless habitat has been destroyed, in the absence of specific information to the contrary, we assumed no change in population size between the 1980s and 1990s. In a few cases, observers have seen a number of plants in a portion of habitat at a site, then extrapolated that number to the entire area of habitat. In the absence of a carefully laid out, statistically defensible, sampling procedure, and because what appears to be suitable habitat for this species is often found upon closer inspection to be unoccupied, we have chosen not to use these "estimates" as a basis for status recommendation. At the same time, we recognize that some of the habitat areas are difficult to access and inventory

thoroughly, and that there may well have been more plants present than were counted during some visits to the sites.

## SPECIES INFORMATION

### Name and Classification

Scientific Name: *Platanthera leucophaea* (Nuttall) Lindley *sensu stricto*  
Common Name: Eastern Prairie Fringed-orchid; Eastern Prairie Fringed-Orchid  
Family: Orchidaceae (orchid family)  
Major Plant Group: Monocot flowering plant

The genus *Platanthera* (tribe Orchideae of subtribe Orchidinae) includes about 200 orchid species in the temperate region of both hemispheres (Dressler 1981). The group of fringed-orchids is confined to North America and within that group, the Eastern Prairie Fringed-orchid belongs to a group of five species (*P. leucophaea*, *P. psycodes*, *P. grandiflora*, *P. peramoena*, *P. praeclara*). The common name has been adopted as Eastern Prairie Fringed-orchid (Whiting and Catling 1986, Case 1987), with the hyphen in “Fringed-orchid” denoting that the species belongs to a group of orchids with a fringed lip.

Recent studies of the phytogeography, variation or classification of Eastern Prairie Fringed-orchid have a major impact on status designation. The original status report was based on presumed occurrence in Manitoba where it was discovered by Catling and Brownell on 26 July 1984. The Manitoba population included approximately 500 plants (vegetative and flowering) at the time of the report, and these plants occurred over an area of 10 hectares (Brownell 1984, Johnson 1985). The Manitoba plants were all lost to a taxonomic change in 1986 (Sheviak & Bowles 1986, Catling and Brownell 1987), when they were accepted as a new species, the Western Prairie Fringed-orchid (*Platanthera praeclara* Sheviak and Bowles). Gleason and Cronquist (1991) made *praeclara* a variety of *P. leucophaea*, but this is inappropriate given its fully distinctive characteristics.

The 1984 status recommendation was based on the Manitoba population plus 712 plants known in Ontario in the early 1980s, and an extreme maximum number of 2243 plants known from the 1960s until the early 1980s (considering maximum numbers over about 20 years at all sites). The Manitoba population thus represented 41% (500 of 1212) of the plants known in the early 1980s when the original status report was prepared and 18% (500 of 2743) of the maximum number of plants suspected in Canada. Thus, loss of the Manitoba population was a substantial change in the total population size not to mention the loss of range, habitat and extent.

Natural hybrids involving *P. leucophaea* from Ontario have been described recently from site 31 (Catling et al. 1999) and sites 32 and 34 (Catling and Brownell 1999). These have been named *Platanthera xreznicekii* (*Platanthera psycodes* x *leucophaea*) and *Platanthera xhollandiae* (*Platanthera lacera* x *leucophaea*) respectively. These natural hybrids not only have a bearing on taxonomic relationships,

but are of potential significance (1) in monitoring due to the identification problems created by intermediates and (2) genetic dilution, pollination interference, etc.

## Description

The Eastern Prairie Fringed-orchid is a 0.5-1 m tall plant with lanceolate leaves and a spike of 10-40 whitish flowers each with a prominent fringed petal and a long spur. A good formal description, keys and a colour photograph are provided by Case (1987) and more technical information involving a morphological comparison of *P. leucophaea* and *P. praeclara* is provided by Sheviak and Bowles (1986). Also refer to the original status report for a description (Brownell 1984). An inflorescence of a plant from Ontario is shown in Figure 1.

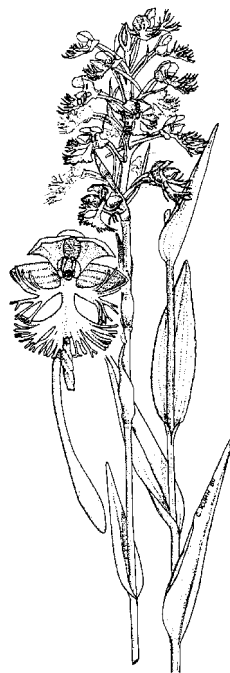


Figure 1. Eastern Prairie Fringed-orchid (*Platanthera leucophaea*) from Mitchell and Sheviak 1981.

## DISTRIBUTION

### Global Range

The Eastern Prairie Fringed-orchid once occurred from Maine west to southern Ontario and Michigan, southern Wisconsin, southeastern Iowa and south to Oklahoma, Louisiana and Arkansas (Sheviak 1987), east to central Virginia and Pennsylvania with a higher concentration of occurrences (many extirpated) in the area of the southern Great Lakes (particularly the prairie peninsula). It has been reliably reported from 13 states and 1 province (Sheviak and Bowles 1986, Bowles 1991). It is now known from

50 populations in 7 states (Illinois, Iowa, Maine, Michigan, Ohio, Virginia and Wisconsin) (Bowles 1991, Engel 1992) and 20 extant populations in southern Ontario. The northeastern distribution limit is apparently Aroostook County, Maine based on the most comprehensive map available (Sheviak and Bowles 1986).

An earlier map produced by Bowles (1983) shows an occurrence in New Brunswick, which is an error (see Hinds 1986). It is not included in the most recent work on the flora of Nova Scotia, Roland's Flora of Nova Scotia, Vol. 2 (Zinck 1998). Reports from Nova Scotia (e.g. Case 1987) therefore are excluded.

### Canadian Range

Brownell (1984) indicated that *Platanthera leucophaea* occurs in Manitoba and Ontario; however, as discussed in section 4.0 on taxonomy, in Canada the Eastern Prairie Fringed-orchid occurs only in southern Ontario. Figure 2 indicates the distribution of the 34 known current and historical reliable occurrences. Lambton County, and southwestern Essex County contain many concentrated occurrences and, therefore, Figure 2 shows only 25 dots. Distinct occurrences are considered to be separated by at least 1 km.

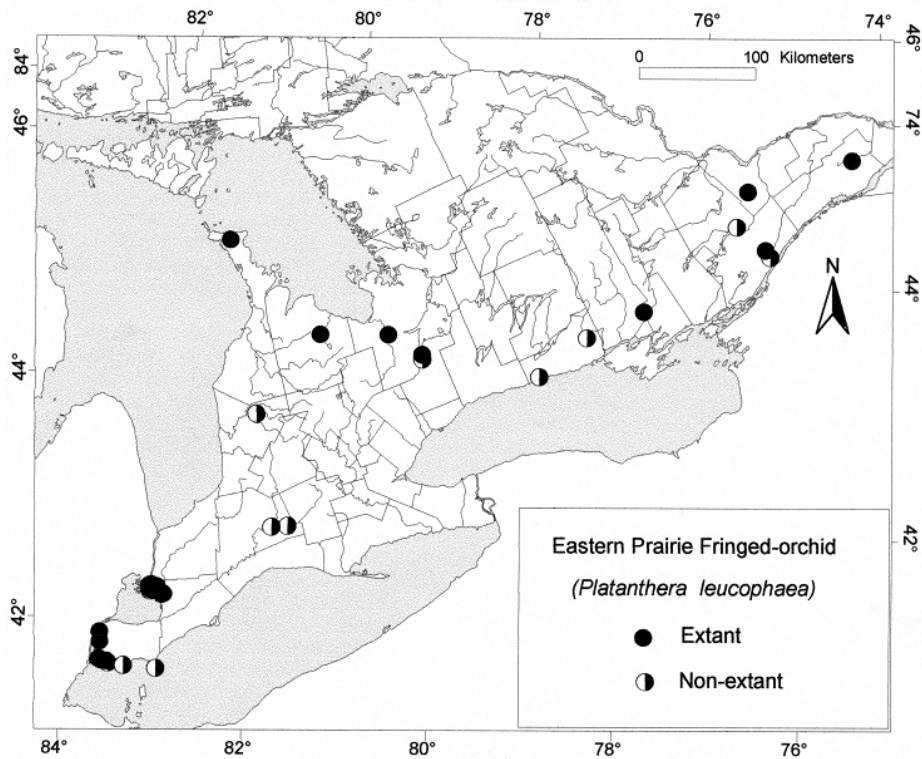


Figure 2. Map of southern Ontario showing locations of *Platanthera leucophaea*. Dots show populations believed to be currently existing and half-dots show populations that are not extant. A population was considered no longer extant if: 1) not seen or reported for over 20 years; or 2) known to be destroyed by urbanization, conversion to agriculture, loss due to succession etc.; or 3) not seen in the 1990s despite at least 4 searches during the flowering period.

Almost all occurrences are based on specimens or photographs in various herbaria in North America (see Brownell 1984). Unsupported locations have been accepted based on personal observations of the authors and/or another reliable field botanist. Detailed location information including site name, UTM, latitude and longitude, are in a confidential file, maintained by the Ontario Ministry of Natural Resources, which is available on a "need to know" basis for conservation purposes.

An additional site near Brockville was previously known but not reported in Brownell (1984) due to confusion in labelling data. The new sites are outlined in Table 1. Intensive field studies from 1984-86 in Lambton County and additional interest due to COSEWIC designation of the species probably contributed to the finds. There has been a generally increasing interest in natural history and field botany over the past decade as evidenced, for example, by the organization of the Field Botanists of Ontario in 1987, but focussed field studies have been most productive in finding new locations.

## HABITAT

Eastern Prairie Fringed-orchid occurs in six types of habitat in Ontario some of which may be considered more important than others because they last longer and are more difficult to create and manage. The habitat types (particularly graminoid and shrub fen) may intergrade, but still provide a useful distinction when looking at the total range of habitat occupied by the species.

1. Fens dominated by the sedge *Carex lasiocarpa* (e.g., sites 31, 24, 30, 10, 33). The latter 4 sites have been known for at least 35 years and are considered viable. These fens are often rather shrubby, with shrubs most commonly occurring on hummocks. The orchid is then usually found in the sedge-dominated hollows.
2. Fens dominated by common reed grass (*Phragmites australis*) and sedges (e.g., sites 31 and 12).
3. Boggy mats around lakes with sphagnum moss, heaths and cranberry, but not strongly acid and somewhat marly below the raised acid hummocks. Only one site (22) and possibly not long-lasting due to limited area.
4. Cobble limestone shore. Only one site known (1) on Bruce Peninsula which has a long history. The lake has a broad, shallow shoreline which, depending upon beaver activity, is exposed annually.
5. Wet mesic prairie with bluestems and other grasses and a high diversity of plants. The mesic and wet mesic prairie communities are largely confined to Lambton County and the St. Clair delta area and to the more limited area at Windsor (site 8). A description of these habitats is available in Faber-Langendoen and Maycock (1994). Brown (1985) lists plants associated with *P. leucophaea* at a site in Lambton County. These are long-lasting gradient habitats.
6. Old fields with *Poa compressa*, *Carex lanuginosa*, *Juncus* spp., and early development of *Cornus* shrubs (e.g., sites 2, 3, 22). These habitats last for approximately 10 years before loss to succession.

An asterisk beside the site number indicates that the population is considered extant. Abbreviations under county are those employed by NHIC and are the first 4 letters. Sources include collections, literature references, and observations communicated via telephone (pers. com.) or via email (referenced). Observations from the year 2000 have been included under the 1990s column.

**Table 1. Summary of Sites and Population Trend Data for *Platanthera leucophaea* in Canada**

Site #	Location Data		Year and number of plants (in brackets)				Sources
	County	Location	<1970	1970s	1980s	1990s	
1*	BRUC		1966 (sev doz.), 1967(0)	71(0), 78(900-1000)	80 (>300) 86(1)	91(3) 99(21) 00(114)	Collections made in 1934, 1950,1953 e.g. TRT 1396; Johnson (1990, pers. com.1997); Cuddy et al (1976); Kaiser(1994); Ford (1995); K. Young pers.com. 2000.
2*	ESSE	A. B.	-	-	84(30-50) 84 (~150) 88(~10)	97 (30), 99(0) 97(0); 95(6) 97(1) 98(1)	M.Oldham pers.com. 1984; Ford (1995); V. Brownell obs. 1997,1999; B. Lebidich pers.com. 1997; Pratt pers. com. 1997, 2000.
3*	ESSE		-	-	-	97 (3)	V. Brownell obs. (1997)
4*	ESSE		-	-	86(~12)	-	G. Waldron obs. (NHIC database)
5	ESSE		-	-	84(1)	-	M. Oldham obs. Probably lost to marina development.
6	ESSE		-	-	80(8), 81(1), 84(0), 85(40)	97(0)	M. Oldham pers. com.(1997); V. Brownell obs. (1997). Succession to thickets.
7*	ESSE		-	-	-	95-96(2), 97(1)	Pratt pers. com. 2000
8*	ESSE	A. B.	-	76 (1)	83(5-6)	96(30) 99(1)	TRT 1936, Catling; Pratt (1979);A. Woodliffe pers.com.(1997); P. Pratt pers.comm (2000)
9	ESSE		1891(-)	-	-	-	DAO 171, Dearness



Site #	Location Data		Year and number of plants (in brackets)				Sources
			<1970	1970s	1980s	1990s	
10*	GREY		-	75(21+)	81(17) 87(14) 88(0) 89(3)	-	TRT 1832 Reznicek; V.Brownell & M.Oldham obs. 1981; Johnson (1990, 1991).
11*	KENT		-	-	-	91(36), 94(30-45) 97(7)	Discovered by John Haggeman, SCNWA, pers. com. 1997.
12*	KENT		-	-	-	96 (245 fl., perhaps 1000 incl. veg.)	Discovered in late summer 1995 by A. Woodliffe, OMNR, Chatham. One of the largest populations in Ontario in last decade.
13	HURO		1892, 1900(-)	-	-	-	J.A. Morton
14	LAMB	(Site 1)	1898(-)	-	84(2)	-	N. Tripp. Site partly destroyed & drainage altered by house construction in 1986.
15*	LAMB	(Site 2)	-	-	84-88 (~65)	-	Brownell obs. (1997)
		A.	-	-	-	97(1)	
		B.	-	-	-	97(1)	
16*	LAMB	(Site 3)	-	-	85(10-15) 86(65)	-	Woodliffe & Allan (1996) note 12 plants. R. Brown recalls seeing ~65 plants in 1986. Usually about 10 plants seen.
17	LAMB	(Site 4)	-	77	82(0), 84(20-30)	-	R. Brown obs. (1980s). Site lost in 1985 when converted to agriculture (Woodliffe & Allen 1996).
18*	LAMB	(Site 5)	-	77(22) 78(19)	80(20) 83(35) 84(20)	-	Brown (1985)
19	LAMB	(Site 6)	1967 (5-8)	-	-	-	Brown (1985). Searched for but not seen since.

Site #	Location Data		Year and number of plants (in brackets)				Sources
			<1970	1970s	1980s	1990s	
20*	LAMB	(Site 7)	-	-	84(8-10) 87(7), 84-86(30-35)	97(1)	Brown (1985), Woodliffe & Allen (1996), V. Brownell obs. (1997)
21*	LAMB	(Site 8)	-	-	84-86(5)	91(~6), 97(0)	Woodliffe & Allen (1996); R.Brown obs. (1991), V. Brownell obs. (1997)
22	LANA		1910-20 (-)	-	-	-	Morris and Eames (1929) (two Mud Lakes near Smiths Falls have been checked unsuccessfully in recent years)
23	LEED		1965(67)	-	83(?)	-	CAN 301, Baldwin; DAO D65 Greenwood; Greenwood (1968), J. Robinson 1983 obs. (NHIC database)
24*	LEED		1956 (-)	76(40), 78(9)	83 (~40)	97(42) 00(24+)	DAO 171, Cody; Brownell obs. (1983, 1997, 2000). Obs. in 2000 incomplete due to post-anthesis.
25*	LENN		-	-	-	94(2), 95(2), 97(0) 99(0)	T. Norris, OMNR, Kingston pers. com. (1997); DAO photo
26	MIDD		1887 (-)	-	-	-	W. Saunders HBC, UWO
27	MIDD	A. B. (probably same as above)	1879 1896 (-)	- -	- -	- -	T. Burgess CAN 163 J. Dearness
28	NORT	Murray Marsh	~1910(1-17)	-	-	-	Morris and Eames (1929)
29	NORT	tamarac swamp near Port Hope	1910-20(-)	-	-	-	Morris and Eames (1929)

Site #	Location Data		Year and number of plants (in brackets)				Sources
			<1970	1970s	1980s	1990s	
30*	OTTA	A. B. (sub-populations are separated by approximately 1.5 km of largely unsuitable habitat (cedar swamp))	-	76(40)	84(40) 84(~100)	96(99+) 96(68), 00(202)	Reddoch (1977,1979); White (1985); Reddoch & Reddoch 1997); Cuddy pers. com. (2000). One of largest populations in Ontario in past decade. Cuddy estimated that in 1996 sub-population A consisted of between 400 and 1000 plants, but see text re. population estimates.
31*	SIMC	A.  B. C.	1967-69 (1000-1500)	~75(500+) av.100-250	84 (100s) 88(0) -	97(119) 99(97) 00(3) 99(19) 97(0)	CAN 371 Soper; Bobbette (1974); B. Ford, G. Allen, J. Gould obs. 1988; Ford (1995); V. Brownell, P. Catling & G. Allen obs. 1997. G.Allen & B. Bowles obs. 1999, 2000. One of the largest populations in Ontario, but numbers low in past decade. This may be partially due to undercounting as the site is difficult to access and find (Allen, pers. com.)
32	SIMC		-	-	81(1)	97(0)	TRT S. Varga; V. Brownell obs. (1997).
33*	STOR		-	-	-	00(3), 00(2)	Cuddy (2000), P.Catling obs.(2000)
34*	YORK		-	-	82(3fl.&~50nfl)	97(20). 00(8+)	Varga obs. 1982; Brownell obs. (1997, 2000). Obs. in 2000 incomplete due to post-anthesis.

The Eastern Prairie Fringed-orchid is adapted to water level fluctuations. It may remain dormant or vegetative in areas that are either too wet or too dry along a gradient with fluctuating water levels. The problem now is that during periods of low water levels (particularly in the Great Lakes), agricultural cultivation extends further into the lower ground thus eliminating populations in the upper part of the gradient. Wet years result in flooding of cropland, rather than flooding of a natural habitat (see also Case 1987 p. 20).

Case (1987, p. 24) described an old field site in Michigan that was abandoned in 1964 after which a large population of *P. leucophaea* developed, which, however, had declined by 1976 as the area had become dominated by thickets of woody plants and by 1984, the population had gone. The duration of this site was thus approximately 10-15 years. A similar situation is described by Denny (1988) as follows: "Population decline is usually attributed to competition from invading woody plants. It has been observed that brush cutting, mowing, grazing, and fire all serve to set back competition from woody plants and stimulate flowering." In March 1979 and 1981, the Killbuck Wildlife Area in Ohio, which had been planted in corn until the mid-1970s, was burned to maintain field habitat for upland game species. In 1982, 387 flowering plants were discovered at the site. By 1986, however, less than 30 were present.

Denny (1988) notes as follows: This species "shows a marked preference to late-successional communities throughout much of its range. However, under certain conditions, these orchids apparently invade early-successional communities. They set seed freely and produce massive quantities of wind dispersed seeds"... "which appear capable of colonizing disturbed sites such as road embankments, lawns, and abandoned croplands where they tend to develop new populations relatively quickly." "Apparently adult plants can withstand and may even thrive on ecological disturbances. They tend to thrive in such situations until increased competition from other plants, or for some other unknown reason, population size is reduced. Clearly, there is much we have yet to learn about this elusive endangered species."

In fens where water levels fluctuate the succession is interrupted and restarted when shrubs are flooded out or die due to drying out or are burned. Rhizomes of these perennial orchids may survive these events below ground so that the populations do not actually disappear but only vary in their above ground appearance. The same is true of some prairie sites where either drought or high water prevent succession to shrub cover or domination by a few species, thus perpetuating an intermediate successional stage where the orchids can survive. Some of the sites in fens (e.g., site 31) or lake margins (site 1) fluctuate from hundreds or even thousands to none from year to year.

Additional information (to the 1984 status report) on habitat, including edaphic characteristics and associated species, is available in Bowles (1991) and Bender (1988).

## **BIOLOGY**

Reproduction is through seed (4,500-10,000 seeds/capsule) (Keibler et al. 1993, Stoutamire 1996). For seedlings to become established, mycorrhizae must be present

to inoculate the seeds (Bowles 1991). Once established, *Platanthera leucophaea* reaches reproductive maturity in approximately 3 to 7 years (Keibler et al. 1993). In late summer or early fall, a new bud is produced on a fusiform tuber from which a stem grows during the following year. Growth begins early the next year and plants usually achieve full size by June. The flowering period of *P. leucophaea* in southwestern Ontario extends from approximately 25 June to 20 July, but this depends on the weather (Brown 1985). If there are very warm days from mid-late June, then flowering can be finished by 5 July. In eastern Ontario, the flowering period extends from about July 4 to July 20 (Reddoch and Reddoch, 1997). Eastern Prairie Fringed-orchid usually produces a spike of 10-40 white flowers (Case 1987). The fruit develops and ripens in late August and early September. Seeds are approximately 1 mm. Additional information on life history, not provided in the original status report, is available in Bowles (1991).

*Platanthera leucophaea* exhibits adaptations to catastrophic events such as periodic drought and may exist in subterranean, dormant or mycotrophic state for one or more years, but proof that flowering plants revert to subterranean existence is lacking. Vegetative plants, however, have been found in many places where flowering plants previously occurred. The plants are noted for dramatic, mass flowerings following several-year periods of apparent absence. This behaviour appears to be linked to fire-stimulated growth and flowering, although other factors, such as rainfall and soil moisture levels, are likely involved as well (Sheviak and Bowles 1986). Population maintenance is dependent on long-term survival of adults and reproduction by seeds.

## **POPULATION SIZES AND TRENDS**

### **Global Population Size**

Based on data in Bowles (1983), which includes information from the 1970s, the largest global population estimate was 2907, of which 2000 (68.8%) were in Ontario. Maximum populations are currently about 3708 (Bowles 1991, Engel 1992 and this report), of which 1053 (28.4%) are in Ontario. Based solely on these numbers, the proportion of the global population in Ontario has thus declined by more than half since the 1970s. This may be misleading as the US populations are undoubtedly more thoroughly documented than those in Ontario. In addition, the US population numbers included a very large population in Ohio which has now substantially declined.

### **Changes in Canadian Population Size**

In 1984, there were 12 populations believed to be extant in Ontario out of a total of 19 previously documented occurrences (Brownell 1984). Currently 20 populations are considered to be extant out of a total of 34. Fourteen populations are therefore considered non-extant (see definition in section on methods). The increase in numbers of both total and extant occurrences can be largely attributed to the increased interest in fen and prairie habitats in recent years. It is to be noted that although the number of

occurrences has increased, many of the populations are extremely small and possibly not viable (Table 1).

Since Brownell (1984), 13 new stations have been discovered. Of the new stations, 6 are in Lambton County (Woodliffe and Allen 1996), 2 are in the adjacent St. Clair River delta of Kent County (A. Woodliffe pers. com. 1997; J. Haggeman pers. com. 1997), 3 are in southwestern Essex County (V. Brownell pers. obs. 1997, P. Pratt pers. com. 1997, 2000), 1 is in Lennox and Addington County (T. Norris pers. com. 1997) and 1 is in the United Counties of Stormont, Dundas and Glengarry (D. Cuddy pers. com. 2000, P. Catling pers. obs. 2000).

Although comparative data is not available for all sites, trends in population sizes may be evaluated through reference to Table 1. There have been substantial variations in population sizes over time. The current area of occupation and total number of individuals, based on maximums for 1990s data, are ~8.75 km<sup>2</sup> and 1053 plants.

Declines in populations have generally involved the disappearance of habitat — due to conversion, succession or other factors. The population at site 31 is of particular concern. Over a long period there has been a substantial decline in the population. Where 1000-1500 existed in the late 1960s and early 1970s, only a few hundred could be found in the 1990s. Where hundreds occurred in more northern parts of the swamp, none have been seen for two decades. This site contained one of the largest recorded in North America in recent times. Its decline may be related to changes in ground water flow (Bradford 1999, Bradford and Watt 2000).

The old field at site 2 in Essex County once contained about 150 robust, flowering plants, but through natural succession became a dogwood (*Cornus drummondii*) thicket which, despite some cutting by the Essex Region Conservation Authority, resulted in a major change in vegetation cover. At the two sub-populations, the population size had decreased by 60-80% (Table 1). The population of 40 plants (Haggeman pers. com. 1997) at site 11 has steadily declined over a period of just 5 years and the habitat has become strongly dominated by Common Reed Grass (*Phragmites australis*).

### **Excluded Reports**

1. Morley Lake, St. Edmunds Township, Bruce County. Reported in Cuddy, Lindsay and Macdonald (1976) on the basis of a personal communication; however, it was not seen on separate visits by K. Lindsay and J. Johnson (pers. comm. 1997).
2. Conroy Marsh, Renfrew County  
The report from Conroy Marsh on the York River, Raglan Twp. (Lewis and Tae 1994) has not been included based on lack of material evidence and insufficient information.

## LIMITING FACTORS AND THREATS

### Limited Habitat

Only a very small percentage of the total North American area of occurrence can be inhabited by *Platanthera leucophaea* due to its narrow habitat preference. Most of the long-term populations are found in fen and prairie habitats. Within Ontario, fens constitute only 0.48% of the total wetland area off the Canadian Shield (Riley 1988). In southern Ontario, off the Canadian Shield, there are only 11 fens more than 75 ha in size. Only some of these fens and only portions of the larger sites are appropriate community types for *Platanthera leucophaea* (e.g., *Carex lasiocarpa* fen and open *Phragmites* fen).

Bakowsky and Riley (1994) have estimated that less than 21 km<sup>2</sup> (2100 ha) of prairie and savanna remain in Ontario and much of this is dry and not appropriate for *Platanthera leucophaea*. It is likely that the area of suitable mesic and wet mesic prairie is less than 3 km<sup>2</sup> and less than 0.1% of presettlement extent.

Both prairie and fen habitat continue to be lost in Ontario, mostly due to direct and indirect human impacts.

### Pollinators

The Eastern Prairie Fringed-orchid requires pollination by hawk moths for seed development (Sheviak and Bowles 1986, Bowles 1991). These large moths in turn require large areas and a diversity of nectar sources.

### Successional Changes

Old field sites in Ohio, Michigan and Ontario have been lost to succession to woody cover.

### Invasive Species

Invasive, especially alien plants, such as Glossy Buckthorn (*Rhamnus frangula*) are contributing to the loss of fen habitat, as evidenced by changes to fens near Ottawa (e.g., site 24). Glossy Buckthorn may have contributed to the loss of sites near London, Ontario, where it has dominated some wet meadow and bog margin communities. Bowles (1991) indicates competition with 3 exotic species in the U.S. portion of the range, including Cut-leaved Teasel (*Dipsacus laciniatus*), Glossy Buckthorn (*Rhamnus frangula*) and Purple Loosestrife (*Lythrum salicaria*). Purple Loosestrife is present in varying amounts in the fen complex at site 30 in eastern Ontario (Cuddy, pers. com.). Common Reed Grass (*Phragmites australis*), while a native species, may become aggressively dominant in fens, especially if water tables are lowered, thereby shading out lower vegetation. Monitoring of succession and invasive species is critical if we are to understand the role of habitat change for this species.

## **Human Impacts**

Impacts on water table at site 31 (Bradford 1999) have been suggested as possible causes for an order of magnitude decline in that population since the 1960s. Loss of mesic and wet mesic prairie to agriculture particularly in Lambton County has continued over the past two decades. Loss of the gradient of fluctuating water to cropland in dry years is also a factor in Ontario (see 4) and elsewhere (Case 1987). Collection for gardening could potentially pose a threat and thus make the ongoing monitoring of populations important.

## **Hybridization**

On the one hand hybridization may be a mechanism of plant adaptation and speciation, but hybrids may compete with parents for pollinators and lead to an increasingly diluted genome (e.g., Husband and Burgess 2000). Hybrids have been documented at sites 31 and 32 in Ontario (Catling and Brownell, 1999, Catling et. al. 1999).

## **Grazing**

White-tailed Deer graze the flowering stems (Bender 1988 and pers. obs.) and deer have become very abundant in some of the fens occupied by the Eastern Prairie Fringed-orchid in Ontario. No assessment of impact of deer on Ontario populations is available.

## **SPECIAL SIGNIFICANCE OF THE SPECIES**

Research on the biology of this species could be illuminating with respect to the field of disturbance ecology and may provide information that could be applied to a large number of rare species of wet mesic prairies and fens. This species is one of the most spectacular and popular North American wild orchids (e.g. Pridgeon 1989) and has a very high profile in the United States, where it is listed as federally threatened (Harrison 1989).

No Aboriginal uses for this plant have been found in the literature but several other species in the genus are known to have been used for medicinal purposes (Native American Ethnobotany web site, as of June 2003: <http://herb.umd.umich.edu/>).



## EXISTING PROTECTION OR OTHER STATUS

### Status Designations

**Global Rank:** G2 (Imperiled — Imperiled because of rarity or because of some factor(s) making it very vulnerable to extinction or elimination. Typically 6 to 20 occurrences or few remaining individuals (1,000 to 3,000) (NHIC 2000)

**US State Ranks**

SRF (State Report False, i.e. not present) in AR, KS, KY, LA, MN, ND, SD;

SX (Extirpated) in MO, NJ, PA;

SH (Historical) in NY, OK;

S1 (Critically Imperiled) in IA, IL, IN, ME, MI, VA, WI;

S2 (Imperiled) in OH.

(The Nature Conservancy pers. comm. 1997, Association for Biodiversity Information 2000)

**Ontario Rank:** S2 (Very rare – Very rare because of rarity or because of some factor(s) making it very vulnerable to extinction or elimination. Typically 6 to 20 occurrences or few remaining individuals (1,000 to 3,000) (NHIC 2000).

**OMNR Designation:** Not currently designated.

**COSEWIC Designation:** Special Concern (COSEWIC 2000).

### Regulatory Protection

In 1989, *Platanthera leucophaea* was officially designated as threatened under the United States *Endangered Species Act of 1973* (see Harrison 1988). An export permit is required under the Convention on International Trade in Endangered Species (CITES; Canada 1973, 1975, Appendix II). There is no other formal legal protection in Canada.

### Rehabilitation Efforts

Cutting and burning at sites 2 and 3 was inadequate to reduce competition. It needed to be done annually and more vigorously and possibly with some soil disturbance. Burning at site 8 is adequate but there were never big populations, and water level fluctuations are probably insufficient for development of a large population.

### Research Programs

In 1985, wildlife agencies established a tallgrass prairie initiative in southwestern Ontario that primarily emphasized the development of a prairie seed nursery that would become self-sustaining. The nursery's purpose is to provide a local indigenous seed source to help re-establish tallgrass prairie habitat. The project is coordinated by the Rural Lambton Stewardship Network, but includes other groups of private citizens, the Ontario Ministry of Natural Resources and The St. Clair Region Conservation Authority.

Woodliffe (pers. com.2000) suggests that there are currently no plans to either propagate or transplant *Platanthera leucophaea* under this initiative, however Canadian Wildlife Service (2000) states that “the Rural Lambton Stewardship Network, and its partners, hand-planted the Eastern Prairie White Fringed-orchid in remnant sites, and monitored plant development and natural seed production. They also compiled records of the nursery work performed, and produced an educational display outlining the project for public viewing at the Ojibway Nature Centre. Nursery production plots will be expanded in the future to increase seed production, and remnant sites and other appropriate areas will be subject to plantings.”

Research results are available on successful establishment from seed in only 4 years (although these results have yet to be published).

### **SUMMARY OF STATUS REPORT**

Eastern Prairie Fringed-orchid is a perennial species requiring from 3-7 years to grow from seed to flowering size. It is a plant of varied habitats including fens, bogs, mesic prairies and successional fields. It was formerly widespread in the northeastern United States, centred south of the Great Lakes. In Canada it occurs only in southern Ontario. Recent surveys for the species indicate that there are about 20 extant populations in Ontario out of a total of 34 known historically. Most populations are small with some, such as the population at site 31, having declined dramatically from up to 1500 plants in the late 1960s to a handful in 2000. The current total number of plants recorded for only a portion of the 20 populations surveyed is estimated to be just over 1000 flowering shoots. Limiting factors include loss of habitat and associated pollinators, successional changes, human impacts on water table levels, hybridization with other species of orchids and grazing by the increased number of deer. The orchid is a globally rare species.

## TECHNICAL SUMMARY

### ***Platanthera leucophaea***

Eastern Prairie Fringed-orchid

platanthère blanchâtre de l'Est

Range of Occurrence in Canada: Ontario

<b>Extent and Area Information</b>	
• <i>Extent of occurrence (EO)(km<sup>2</sup>)</i>	>20,000 km <sup>2</sup>
• <i>Specify trend in EO</i>	unchanged
• <i>Are there extreme fluctuations in EO?</i>	no
• <i>Area of occupancy (AO) (km<sup>2</sup>)</i>	<10 km <sup>2</sup>
• <i>Specify trend in AO</i>	decline
• <i>Are there extreme fluctuations in AO?</i>	no
• <i>Number of extant locations</i>	20
• <i>Specify trend in # more localities are now known due to increased search effort but with habitat loss there is likely an overall decline</i>	likely some decline
• <i>Are there extreme fluctuations in number of locations?</i>	no
• <i>Specify trend in area, extent or quality of habitat</i>	decline
<b>Population Information</b>	
• <i>Generation time (average age of parents in the population)</i>	3-7 years to flowering
• <i>Number of mature individuals</i>	>1000
• <i>Total population trend:</i>	
• <i>% decline over the last/next 10 years or 3 generations. (comparative data are unavailable for nearly half of 20 populations but some, like the Big Creek population have declined by 60-80%)</i>	sizeable declines at some of the larger populations
• <i>Are there extreme fluctuations in number of mature individuals?</i>	yes
• <i>Is the total population severely fragmented?</i>	yes
• <i>List populations with number of mature individuals in each</i>	see table 1
• <i>Specify trend in number of populations</i>	increase due to greater search effort
• <i>Are there extreme fluctuations in number of populations?</i>	no
<b>Threats (actual or imminent threats to populations or habitats)</b>	
habitat loss; likely decline in pollinators due to habitat size reduction; successional changes, invasive species; human impacts on water table; natural hybridization; grazing by increased deer population	
<b>Rescue Effect (immigration from an outside source)</b>	
• <i>Status of outside population(s)? USA: SX (extirpated) in MO, NJ, PA; SH (historical) in NY, OK; S1(critically imperiled) in IA, IL, IN, ME, MI, VA, WI; S2 (imperiled) in OH</i>	
• <i>Is immigration known or possible?</i>	unknown and unlikely
• <i>Would immigrants be adapted to survive here?</i>	possibly
• <i>Is there sufficient habitat for immigrants here?</i>	limited
• <i>Is rescue from outside populations likely?</i>	no
<b>Quantitative Analysis</b>	
none	

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### **BIOGRAPHICAL SUMMARY OF CONTRACTORS**

Vivian R. Brownell received an honours B.Sc. from the University of Guelph in 1978 with a specialization in field botany. After graduating, she worked for several government departments including the Ontario Ministry of Natural Resources and the Canadian Parks Service, Ontario Region. Since 1983, she has worked as a biological consultant for municipalities, conservation authorities and government agencies. Her work primarily involves biological inventory and evaluation, rare species management, evaluation of natural areas and wildlife habitat and natural heritage systems planning. In 1996 she developed a computer software program (NADEP) that incorporates a databasing system and facilitates the evaluation of natural areas. She has authored or co-authored many papers in scientific journals and books on the subject of alvars, prairies, savannas, sand and rock barrens, orchid classification and plant geography. A partial list of papers, articles and reports can be obtained from the Canadian biodiversity guide to botanical specialists and literature, which is accessible on the internet at <http://www.cciw.ca/eman-temp/scientists/botanists/intro.html>.

Paul M. Catling received an honours B.Sc. from the University of Toronto in 1975, with specialization in botany, and a Ph.D. in botany from the University of Toronto in 1980. From graduation to the present, he has worked as a research scientist with Agriculture and Agri-food Canada in Ottawa. He is curator of the largest herbarium collection of vascular plants in Canada, which contains specimens mounted on approximately one million sheets. His work involves the maintenance and development of the collection as well as systematic and ecological research on native wild plants of economic importance, including medicinal crops, berry crops, and invading alien plants. He has served as President of the Canadian Botanical Association and on many national and international expert committees. A partial list of his papers, articles and reports can be obtained from the Canadian biodiversity guide to botanical specialists and literature, which is accessible on the Internet at <http://www.cciw.ca/eman-temp/scientists/botanists/intro.html>.



## PERSONS CONSULTED

The following people provided information on population trends and observations. Letters and emails on file with the author are indicated as “personal communications”, otherwise the information was gathered via telephone.

Gary Allen, Ontario Ministry of Natural Resources, Midhurst.

Andrea Bradford

Ross Brown

Don Cuddy, Ontario Ministry of Natural Resources, Kemptville K0G 1J0.

Bruce Ford. Personal communication via email to M. Oldham in 1995. Population data from honour's thesis on pollinators, vegetation and soils associated with *Platanthera leucophaea* at Big Creek, Minesing Swamp, Walpole Island and Long Swamp.

Robert S. Gray, Ontario Ministry of Natural Resources, Owen Sound N4K 3E4.

John Haggeman, St. Clair National Wildlife Area, Bear Creek Unit, Canadian Wildlife Service.

Joe Johnson, Personal communication in 1997 to V. Brownell.

Dan Lebedyk, Essex Region Conservation Authority, Essex, Ontario N8M 1Y6.

Personal communication in 1997 to V. Brownell.

Todd Norris, Ontario Ministry of Natural Resources, Kingston K7L 5S8. Personal communication via email and mail in 1997 to V. Brownell.

Michael J. Oldham, Natural Heritage Information Centre, Ontario Ministry of Natural Resources, 300 Water St., Peterborough K9J 8M5. Personal communication in 1997 to V. Brownell.

Paul Pratt, City of Windsor, Department of Parks and Recreation. Personal communication via email in 1997 and 2000 to V. Brownell.

Andrew Promaine, Bruce Peninsula National Park.

Joyce and Allan Reddoch

Dr. A.A. Reznicek, University of Michigan Herbarium, Ann Arbor. Personal communication via email in 1997 to V. Brownell.

Steve Varga, Ontario Ministry of Natural Resources, Maple.

Gerry Waldron

Allen Woodliffe, Ontario Ministry of Natural Resources, Chatham.

Katherine Young, Bruce Peninsula/Fathom Five National Park, Tobermory.

## COLLECTIONS EXAMINED AND FIELDWORK

No collections were examined since the original report, but data were obtained where available from observers and curators. Twelve sites were visited by the authors in 1997 and three were visited in 2000.