COSEWIC
Assessment and Update Status Report

on the

Bird's-foot Violet
Viola pedata

in Canada

ENDANGERED
2002

COSEWIC
COMMITTEE ON THE STATUS OF
ENDANGERED WILDLIFE
IN CANADA

COSEPAC
COMITÉ SUR LA SITUATION
DES ESPÈCES EN PÉRIL
AU CANADA

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Kavanagh, D., L. Hutchison and S. Varga. 1990. COSEWIC status report on the bird's-foot violet *Viola pedata* in Canada. Committee on the Status of Endangered Wildlife in Canada. 34 pp.

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COSEWIC
Assessment Summary

Assessment Summary – May 2002

Common name
Bird's-foot Violet

Scientific name
Viola pedata

Status
Endangered

Reason for designation
A species found in rare oak savannah habitats with a highly restricted geographical range of only five occurrences. Populations have experienced significant declines.

Occurrence
Ontario

Status history
Designated Threatened in April 1990. Status re-examined and updated to Endangered in May 2002. Last assessment based on an update status report.

COSEWIC
Executive Summary

Bird's-foot Violet
Viola pedata

Species information

Bird's-foot violet is a stemless herb with leaves and flowering stalks arising directly from an erect, non-stoloniferous rhizome. The leaves are primarily three-parted with the divisions being further subdivided into three to five linear segments. The flowers are born singly on the ends of long stalks that generally overtop the leaves. The single flowers are flatter than most other violets and are lilac-purple in colour. The five petals may be all the same colour or the upper two may be darker than the lower three.

Distribution

Bird's-foot violet occurs in eastern North America from Ontario and New York south to Georgia and west to Minnesota and Texas. Its only Canadian occurrence is in southern Ontario.

Habitat

Typical habitat for the species is black oak savannah on sandy, well-drained, acidic soil with occasional disturbance to limit excessive shading from encroaching trees and shrubs.

Biology

Bird's-foot violet is a perennial herb that flowers from mid-May to mid-June and again from late September to mid-October. Unlike many other violets, *Viola pedata* can only reproduce by seed production through cross-pollination.

Population sizes and trends

There are five existing populations in Canada. Three occur on private land with one, nine, and 100 plants, and two populations occur on public land with 185 and 6500 plants. The populations on private land are all precarious and at risk from housing development, mowing, and encroachment by trees and shrubs. The largest private-land population—that consisted of 3300 plants in 1987—is now reduced to 100 plants. The smaller population on public land is at risk from ATV use and encroachment by trees

and shrubs. The largest population is more secure since it occurs in a provincial park and its protection is part of the park's Management Plan; in spite of this, the park population has also declined substantially. Although there has been an apparent decline in this population from 10,300 plants in 1987 to 6500 plants in 2001, the very dry weather in 2001 may have caused early senescence in many violets that led to an underestimate of the population size. The decline in total population size for Canada over the last decade is estimated to be 25-50%.

Limiting factors and threats

The main limiting factor appears to be lack of suitable habitat. The violet occurs in one of the most developed parts of the country and the oak savannah required by the species is considered provincially rare. The Turkey Point populations are probably protected since they occur in a provincial park, however, management will be needed to maintain the forest openings required by the species. The St. Williams Forest Station site occurs on public land but bird's-foot violet will decline there unless management is undertaken to maintain some of the open savannah habitat that is now present. The Brantford site occurs on private property that could be further developed and the present landowners are uninterested in management to maintain the species. This site will probably disappear. The other two private-land sites are so small and precarious that they are not likely to survive for long.

Special significance of the species

In Canada, *Viola pedata* is rare and occurs along the northern edge of the species' range. It is an important food source for several species of butterflies, especially for the Regal Fritillary (*Speyeria idalia*). This butterfly is at risk in many states in which it occurs. The Regal Fritillary may still occur sporadically in Ontario, but probably no longer has permanent populations, likely due to the historic reduction of the larval food plant.

Violets have a rich ethnobotanical history, and First Nations' use of V*iola pedata* is no exception.

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
Canadian Wildlife Service Service canadien de la faune
Canada

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

Update
COSEWIC Status Report

on the

Bird's-foot Violet

Viola pedata

in Canada

2002

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SPECIES INFORMATION

Name and classification

Scientific Name: *Viola pedata* L.
Common Name: Bird's-foot violet
Family Name: Violaceae (Violet Family)
Major Plant Group: Angiosperm (dicot flowering plant)

Description

Bird's-foot violet is a stemless herb with leaves and flowering stalks arising directly from an erect, non-stoloniferous rhizome (Figure 1). The leaves are primarily three-parted with the divisions being further subdivided into three to five linear segments. The flowers are born singly on the ends of long stalks that generally overtop the leaves. The single flowers are flatter than most other violets and are lilac-purple in colour (Ballard, 1987). The five petals may be all the same colour or the upper two may be darker than the lower three (Kavanagh *et al.*, 1990).

Figure 1. *Viola pedata* (photo courtesy of Marty Lucas, Becknell and Lucas Media Ltd., North Judson, IN).

DISTRIBUTION

Global range

Bird's-foot violet occurs in eastern North America from Ontario and New York south to Georgia and west to Minnesota and Texas (Figure 2).

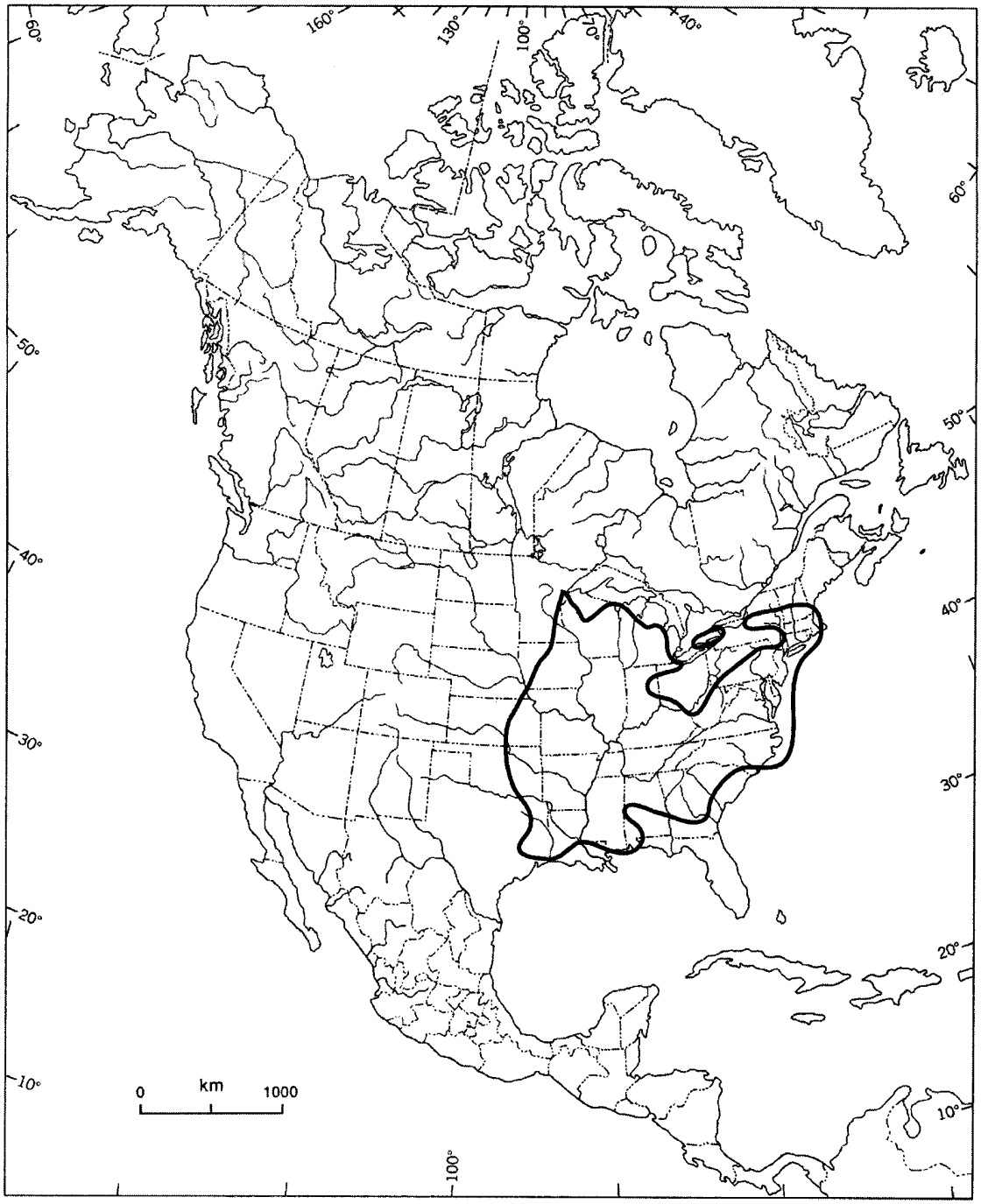

Figure 2. North American Distribution of *Viola pedata* (adapted from Kavanagh *et al.*, 1990).

Canadian range

Bird's-foot violet is known only from southwestern Ontario where it occurs within three counties and two regional municipalities (Figure 3). In 1987, three localities were known: Turkey Point Provincial Park, St. Williams Forest Station, and Brantford. Between the time of preparation of the original status report (Kavanagh *et al*., 1990) and 2001, two historic records that were thought to have been extirpated were relocated.

In 2001, five sites are considered extant. Historical populations are known from Lambton County, Middlesex County, Brant County, Haldimand-Norfolk Regional Municipality, and Niagara Regional Municipality. None of these historical populations could be relocated despite intensive fieldwork in the 1980's for the original status report as well as for other projects (Kavanagh *et al.*, 1990). The present range (extent of occurrence) of bird's-foot violet in Ontario is about 40 km^2. The area of occupancy within this range is about 1.5 km^2. The extant sites are considered to represent fragmented occurrences since the dispersal mechanism of violets is limited to extremely short distances and gene exchange through pollinator activities would also be highly localized.

HABITAT

Habitat Requirements

Bird's-foot violet grows in the Carolinian Zone within the climatic influence of Lake Erie. Typical habitat for the species is black oak savannah on sandy, well-drained, acidic soil with occasional disturbance to limit excessive shading from encroaching trees and shrubs (Kavanagh *et al.*, 1990).

In the past, this disturbance came from periodic forest fires. Now, it is human disturbance—in the form of logging, clearing for hydro rights-of-way, grazing, and occasional mowing—that maintains the open habitat needed by the violet.

Fourteen plants, considered provincially significant in Oldham (1999), are associated with Viola pedata in Ontario. They include*: Tephrosia virginiana, Polygonum tenue, Phlox subulata, Koeleria macrantha, Bouteloua curtipendula, Asclepias verticillata, Asclepias viridiflora, Disporum lanuginosum, Linum virginianum, Thalictrum revolutum, Myrica pensylvanica, Carya glabra, Hypoxis hirsuta, and Dichanthelium villosisimum* (Kavanagh et al., 1990).

Protection/ownership

The largest populations occur in the provincially-owned Turkey Point Provincial Park. The second largest population occurs at the St. Williams Forest Station that is also owned by the province. The three smallest populations occur on private property.

BIOLOGY

Bird's-foot violet is a perennial herb that flowers from mid-May to mid-June and again from late September to mid-October. The flowers are pollinated by long-tongued insects; when the seeds are ripe they are forcefully projected up to one-half metre. The seeds are often gathered by ants; this reduces seed predation by other insects and thus aids reproduction. Unlike many other violets, *Viola pedata* does not produce cleistogamous flowers. Such flowers are self-fertilized and do not open. Nor does bird's-foot violet produce stolons (shoots that enable a plant to spread by vegetative reproduction). This violet can only reproduce by seed production through cross-pollination (Kavanagh *et al.*, 1990). Further details on the general biology of this species are given in Kavanagh *et al.* (1990).

The species is easily grown from seed, provided the seed is covered (requires darkness to germinate). It is a popular violet with gardeners for use in warm sunny rock gardens. Mature plants can be divided. Several cultivars are available including 'Bicolor'. Canadian populations may have a high importance to horticulturalists as they are probably more cold tolerant than southern populations (D. Fraser, pers. comm.)

POPULATION SIZES AND TRENDS

At the time of the original designation of this species in 1990, *Viola pedata* was extant at three locations (Hutchison and Kavanagh, 1994; Kavanagh *et al.*, 1990; Oldham, 1996; Oldham, 2001). There were nine historic records that had not been seen since before 1950. Most of these latter populations had been searched for unsuccessfully prior to the 1990 status report preparation. Two additional historic records date to between 1950 and 1965. Extensive searches had been conducted in these two areas but no *Viola pedata* was found at either location. Between 1965 and the 1990 Status Report, no new locations were found.

Between the time of the COSEWIC designation of this species in 1990 and the present fieldwork in 2001, two historic records that were thought to be extirpated were relocated. The following five sites are considered extant.

Brantford: in 1987 there were about 3300 plants in six subpopulations (Site 2 on Figure 3). Some of these subpopulations were thought to be at risk from housing development (Kavanagh *et al.*, 1990). Fieldwork on 21 September 2000 by Melinda Thompson and Don Kirk found that two of the subpopulations had been eliminated by new housing and the other four subpopulations had been reduced to about 100 plants.

Forestville: in 1987 this record was considered to be extirpated as it had not been seen since 1937 (Kavanagh *et al.*, 1990) and it was not found during inventories of Haldimand-Norfolk natural areas (Gartshore, *et al.*, 1987). A small population was relocated by Mary Gartshore in 1994 (Site 3 on Figure 3). The author and Mary Gartshore searched the site on 10 July 2001 but found only a single plant in a very small forest opening.

St. Williams Forest Station: a small population was found across the road from Turkey Point Provincial Park in 1987 (Site 12 on Figure 3). As the result of fieldwork on 9 and 14 May 2001 by Bill Draper and on 10 July 2001 by Mary Gartshore and the author, a total of about 183 plants were found in six adjacent subpopulations. Less than 200 metres separate this site from plants in Turkey Point Provincial Park on the other side of County Road 10.

Turkey Point Provincial Park: about 10,300 plants were seen in the Park in 1987 (Kavanagh *et al.*, 1990). Fieldwork on 11 July 2001 by the author estimated about 6500 plants in eight subpopulations (Site 12 on Figure 3). Most plants (about 6000) occur in one subpopulation. The other seven subpopulations consist of from six to 300 plants. Due to the very dry conditions in Southern Ontario in 2001, many bird's-foot violets may have entered early dormancy so the population may not have declined since 1987 as the numbers suggest.

Vittoria: in 1987 this record was considered to be extirpated as it had not been seen since 1936 and it was not found during inventories of Haldimand-Norfolk natural areas (Gartshore, *et al.*, 1987). A small population was relocated by Mary Gartshore and Sam Brinker in 2000 (Site 13 on Figure 3). The author and Mary Gartshore searched the site on 10 July 2001 and found nine plants. The population is very precarious near the top edge of an eroding embankment.

The following nine sites have likely been extirpated. None of these old records have information about population size.

Backus Woods: this record is based on a collection made in 1963 (Site 1 on Figure 3). Despite extensive inventory work in this area by Steve Varga in 1985 and more recent searches, bird's-foot violet has not been seen again in this area.

London: last seen here in 1890 (Site 4 on Figure 3). No new sightings despite surveys of Environmentally Sensitive Areas (ESA's) of Middlesex County.

Niagara-on-the-Lake: last seen here in 1906 (Site 5 on Figure 3). Remnant habitat was searched in 1988 in this area by Steve Varga and others but no sightings were made.

North of Normandale: last seen here in 1960 (Site 6 on Figure 3). Not found during inventories of Haldimand-Norfolk natural areas (Gartshore, *et al.*, 1987).

Normandale: last seen here in 1928 (Site 7 on Figure 3). Not found during inventories of Haldimand-Norfolk natural areas (Gartshore, *et al.*, 1987).

Paris: last seen here about 1900 (Site 8 on Figure 3). Not found despite an extensive search of the area in 1989 (Kavanagh *et al.*, 1990).

St. Williams: last seen here in 1939 (Site 9 on Figure 3). Not found during inventories of Haldimand-Norfolk natural areas (Gartshore, *et al.*, 1987).

Sarnia: last seen here in 1909 (Site 10 on Figure 3). Not found despite extensive searches of the area in 1959 and 1961 by L. Gaiser, and by Dorothy Tiedje in 1970's and 1980's (D. Tiedje, pers. com., 2001).

Simcoe: last seen here in 1905 (Site 11 on Figure 3). Not found during inventories of Haldimand-Norfolk natural areas (Gartshore, *et al.*, 1987).

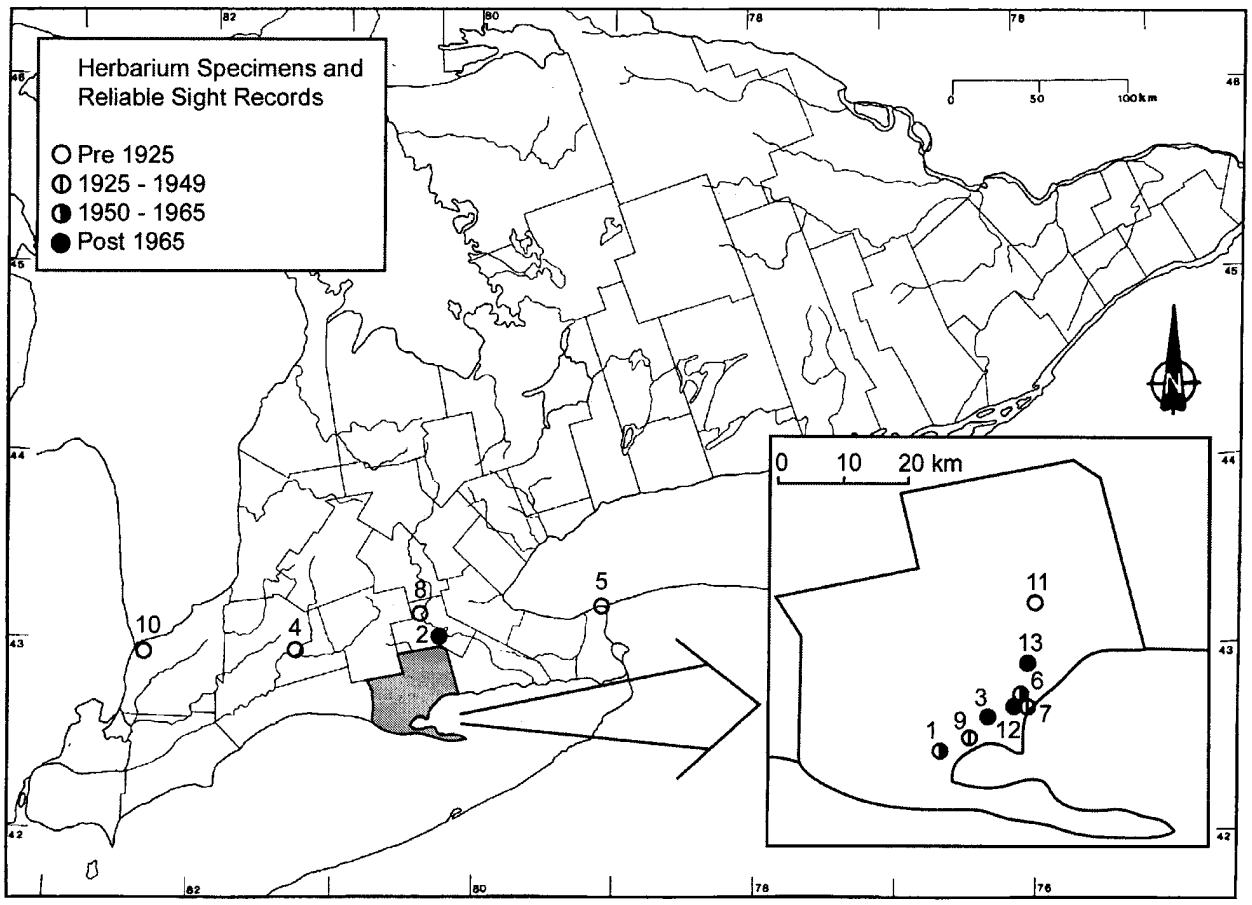

Figure 3. Distribution of *Viola pedata* in Southern Ontario. Numbers refer to sites and populations discussed in text. Extant populations are present at sites 2, 3 12 (representing 2 nearby sites) and 13.

At the time of the original status report, the total Canadian population of *Viola pedata* was thought to be about 13,600 plants at three locations (Kavanagh *et al.*, 1990). Based on fieldwork in 2000 and 2001, the Canadian population is estimated to be about 6,800 plants at five locations. It is estimated that about 5,000 of these plants are of reproductive age. Population counts and estimates—especially at Turkey Point Park—may be low due to the extremely dry conditions in the summer of 2001.

Considering that the population size for the extensive Turkey Point site was derived as an estimate based on an extrapolation from sample areas searched and in view of the difficulty in distinguishing this species from other drought stressed plants, the population size for this locality may have been underestimated. Population counts for smaller sites were based on actual observed individuals throughout the locality and are therefore a better estimate of population size. Taking this difficulty in estimating the size of a large population such as that at Turkey Point into consideration, the Ontario population of bird's-foot violet has declined by about 25-50% since the 1990 status report.

The Ontario populations are isolated from the main range of the species in the United States (refer to Figure 2). If bird's-foot violet populations were to become extirpated in the province, the United States populations likely could not recolonize Canadian sites through natural dispersal mechanisms because these are effective only for short-range dispersal of seeds and because of the discontinuity of habitat.

LIMITING FACTORS AND THREATS

The main limiting factor appears to be lack of suitable habitat. The violet occurs in one of the most developed parts of the country. The oak savannah required by the species may never have been that common and now is considered provincially rare (Bakowsky, 1996).

The Turkey Point populations are reasonably-well protected since they occur in a provincial park. Management will be required to maintain the forest openings required by the species. The park has conducted prescribed burns in order to maintain the numerous rare species there that require open conditions, however, there has been dense regeneration in some portions of these burns due to the severity of the fire. This regeneration could eliminate some violet subpopulations. The main subpopulations of bird's-foot violet along a hydro right-of-way and adjacent to a picnic area are threatened by invading shrubs and young trees—including the alien Scots pine (*Pinus sylvestris*). Lawn mowing is damaging some violets at the edge of the nearby picnic area.

The Brantford sites occur on private property that could be further developed (Kavanagh *et al.*, 1990). The present landowners are uninterested in management to maintain the species (M. Thompson pers. com., 2001). This site will probably disappear. The St. Williams Forest Station site occurs on public land but bird's-foot violet may decline there unless management is undertaken to maintain some of the open savannah habitat that is now present now only as small, scattered forest openings. The Forestville site consists of a single plant in a small opening next to a trail on private property. This site will probably disappear. The Vittoria site occurs in a small forest opening between the crest of an eroding, sandy roadside embankment and encroaching trees and shrubs. This site will probably disappear.

SPECIAL SIGNIFICANCE OF THE SPECIES

In Canada, *Viola pedata* is rare and occurs along the northern edge of the species' range. The species is an important food source to several species of butterflies, most importantly the Regal Fritillary (*Speyeria idalia*), which itself is at risk in many jurisdictions in which it occurs (listed as a species of concern by U.S. Fish and Wildlife, extripated from 5 US states). The Ontario Conservation Data Centre has listed the Regal Fritillary as extirpated, however it may still occur sporadically in Ontario, but probably no longer has permanent populations (Layberry et al. 1998; D. Fraser, pers. comm.). Likely this is due to the historic reduction of the larval food plant.

Violets have a rich ethnobotanical history, and First Nations use of *Viola pedata* is no exception. A paper describing First Nations use of *Viola pedata* (D. Fraser pers, comm. 2002) can be found at: http://www.americanvioletsociety.org/Violets_In_America/Ethnobotanical.htm

TECHNICAL SUMMARY

***Viola pedata* L.**
Bird's-foot violet
Occurs only in Ontario

Extent and Area information	
• *extent of occurrence (EO)(km²)*	40 km^2
• *specify trend (decline, stable, increasing, unknown)*	Stable
• *are there extreme fluctuations in EO (> 1 order of magnitude)?*	**No**
• *area of occupancy (AO) (km²)*	1.5 km^2
• *specify trend (decline, stable, increasing, unknown)*	Decline
• *are there extreme fluctuations in AO (> 1 order magnitude)?*	No
• *number of extant locations*	5
• *specify trend in # locations (decline, stable, increasing, unknown)*	Stable
• *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
Population information	
• *generation time (average age of parents in the population) (indicate years, months, days, etc.)*	several years to flowering?
• *number of mature individuals (capable of reproduction) in the Canadian population (or, specify a range of plausible values)*	Perhaps 5000
• *total population trend: specify declining, stable, increasing or unknown trend in number of mature individuals*	Declining
• *if decline, % decline over the last/next 10 years or 3 generations, whichever is greater (or specify if for shorter time period)*	25-50%
• *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)?*	Yes
• *list each population and the number of mature individuals in each*	see Appendix 1
• *specify trend in number of populations (decline, stable, increasing, unknown)*	Decline (including historical records)
• *are there extreme fluctuations in number of populations (>1 order of magnitude)?*	No
Threats (actual or imminent threats to populations or habitats)	
-Trampling by site visitors, succession and shading, housing development	
Rescue Effect (immigration from an outside source)	
• *does species exist elsewhere (in Canada or outside)?*	Yes
• *status of the outside population(s)?*	Secure
• *is immigration known or possible?*	**Not likely**
• *would immigrants be adapted to survive here?*	Possibly
• *is there sufficient habitat for immigrants here?*	Little
Quantitative Analysis	

ACKNOWLEDGEMENTS

Mike Oldham, Natural Heritage Information Centre, Peterborough, provided a listing of known *Viola pedata* records in Ontario with details of recent confirmations. Mike Postma, Superintendent, Turkey Point Provincial Park contributed information on the park populations. Mary Gartshore, Haldimand-Norfolk, provided information on most sites and took the author to the St. Williams Forest Station, Vittoria, and Forestville sites. Melinda Thompson, Ministry of Natural Resources, Guelph, provided information on the Brantford and Vittoria sites. Donald Kirk, Ministry of Natural Resources, Guelph, and Bill Draper, Toronto, contributed information on the St. Williams Forest Station site. Dorothy Tiedje, Sarnia, described efforts to relocate the historic Sarnia record. I thank Marty Lucas of Becknell and Lucas Media, Ltd. for permission to use the photo of bird's-foot violet. Comments received as part of the review process for this report from Dave Fraser, Endangered Species Specialist, Government of British Columbia, are much appreciated. Funding provided by Canadian Wildlife Service, Environment Canada.

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BIOGRAPHICAL SUMMARY OF CONTRACTOR

David J. White has a B.Sc. in biology and has been conducting natural area inventories and evaluating the status and significance of rare plants for more than 25 years. He began doing field surveys in 1972 for the International Biological Program. From 1973 to 1983, David was employed by the Canadian Museum of Nature as a research technician. During that period he co-authored a number of publications on rare plants, including the Atlas of the Rare Vascular Plants of Ontario. From 1984 to the present, David has worked as a self-employed life science consultant. He has completed projects ranging from natural area inventories and evaluations to reports on invasive species. David has previously written COSEWIC Status Reports on three species and authored or co-authored Update Status Reports on 18 other species.

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