

Recovery Strategy for the Pink Milkwort (*Polygala incarnata*) in Canada

Pink Milkwort



2012

Recommended citation:

Environment Canada. 2012. Recovery Strategy for the Pink Milkwort (*Polygala incarnata*) in Canada [Proposed]. *Species at Risk Act* Recovery Strategy Series. Environment Canada, Ottawa. v + 18 pp.

For copies of the recovery strategy, or for additional information on species at risk, including COSEWIC Status Reports, residence descriptions, action plans, and other related recovery documents, please visit the Species at Risk (SAR) Public Registry (www.sararegistry.gc.ca).

Cover illustration: © Gary Allen

Également disponible en français sous le titre
« Programme de rétablissement du polygale incarnat (*Polygala incarnata*) au Canada
(Proposition) »

© Her Majesty the Queen in Right of Canada, represented by the Minister of the Environment, 2012. All rights reserved.

ISBN

Catalogue no.

Content (excluding the illustrations) may be used without permission, with appropriate credit to the source.

PREFACE

The federal, provincial, and territorial government signatories under the Accord for the Protection of Species at Risk (1996) agreed to establish complementary legislation and programs that provide for effective protection of species at risk throughout Canada. Under the *Species at Risk Act* (S.C. 2002, c.29) (SARA), the federal competent ministers are responsible for the preparation of recovery strategies for listed Extirpated, Endangered, and Threatened species and are required to report on progress within five years.

The Minister of the Environment is the competent minister for the recovery of the Pink Milkwort and has prepared this strategy, as per section 37 of SARA. It has been prepared in cooperation with the Government of Ontario's Ministry of Natural Resources.

Success in the recovery of this species depends on the commitment and cooperation of many different constituencies that will be involved in implementing the directions set out in this strategy and will not be achieved by Environment Canada, or any other jurisdiction alone. All Canadians are invited to join in supporting and implementing this strategy for the benefit of the Pink Milkwort and Canadian society as a whole.

This recovery strategy will be followed by one or more action plans that will provide information on recovery measures to be taken by Environment Canada and other jurisdictions and/or organizations involved in the conservation of the species. Implementation of this strategy is subject to appropriations, priorities, and budgetary constraints of the participating jurisdictions and organizations.

ACKNOWLEDGMENTS

Earlier drafts of this recovery strategy were prepared, as an addendum to the draft Walpole Island Ecosystem Recovery Strategy (Bowles, 2005), by Dr. Jane Bowles in cooperation with the Walpole Island Recovery Team, Walpole Island First Nation and Environment Canada. Members of the Walpole Island Recovery Team include: Dean Jacobs (Walpole Island First Nation), Madeline Austen (Environment Canada, Canadian Wildlife Service – Ontario), Michael Williams (Walpole Island Heritage Centre), Robert Wenting (Environment Canada – Canadian Wildlife Service), D. Roy Isaac (Walpole Island Heritage Centre), Roger Williams (Walpole Island Band Council), Eric Isaac (Walpole Island Community Elder), Deborah Metsger (Royal Ontario Museum), Janice Metcalf-Smith (Environment Canada – National Water Research Institute), Clint Jacobs (Walpole Island Heritage Centre), David W. White (Walpole Island Heritage Centre), Allen Woodliffe (Ontario Ministry of Natural Resources) and the original author Dr. Jane Bowles.

Angela McConnell, Kathy St. Laurent, Christina Rohe, Madeline Austen, Lesley Dunn, Angela Darwin and Marie-Claude Archambault (Environment Canada, Canadian Wildlife Service – Ontario), Clint Jacobs and Jared Macbeth (Walpole Island Heritage Centre) and many others also reviewed and provided comments and advice during development of this document.

EXECUTIVE SUMMARY

Pink Milkwort (*Polygala incarnata*) is listed as Endangered on Schedule 1 of the federal *Species at Risk Act* (SARA). It is a slender, annual herb of open wet-mesic to mesic tallgrass prairies. In North America, Pink Milkwort distribution is centered in the American mid-west and along the southeastern seaboard. In Canada, Pink Milkwort currently exists on the Walpole Island First Nation in the St. Clair River delta, southwestern Ontario and on the Ojibway Prairie Provincial Nature Reserve near Windsor, Ontario (COSEWIC, 2009).

Threats identified to the Canadian population of Pink Milkwort include but are not limited to: habitat loss or degradation, changes to ecological dynamics or natural processes, invasive species, disturbance from recreational activities, drought and browsing by wild animals.

Although there are unknowns regarding the feasibility of recovery, in keeping with the precautionary principle, a full recovery strategy has been prepared as would be done when recovery is determined to be feasible. The population and distribution objective is to maintain, or increase where biologically and technically feasible, the current abundance of Pink Milkwort and to maintain the current distribution of the four extant populations in Canada. The broad strategies to be taken to address the threats to the survival and recovery of the species are presented in the section on Strategic Direction for Recovery (Section 6.2).

Critical habitat for Pink Milkwort has been partially identified in this recovery strategy; it has been identified at the Ojibway Prairie Provincial Nature Reserve near Windsor, Ontario. Once adequate information is obtained, additional critical habitat will be identified and may be described within an area-based, multi-species at risk action plan developed in collaboration with the Walpole Island First Nation.

One or more such action plans will be completed for Pink Milkwort by December 2016.

RECOVERY FEASIBILITY SUMMARY

Based on the following four criteria outlined by the Government of Canada (2009), there are unknowns regarding the feasibility of recovery of the Pink Milkwort. Therefore, in keeping with the precautionary principle, a full recovery strategy has been prepared as would be done when recovery is determined to be feasible. This recovery strategy addresses the unknowns surrounding the feasibility of recovery.

1. Individuals of the wildlife species that are capable of reproduction are available now or in the foreseeable future to sustain the population or improve its abundance.

Yes. There are individuals capable of reproduction within the Canadian range. Individuals are also available in the United States, however it is unknown if these populations are genetically similar to the Canadian populations and whether they could be used to sustain the Canadian population or improve its abundance.

2. Sufficient suitable habitat is available to support the species or could be made available through habitat management or restoration.

Yes. Sufficient suitable habitat is currently available to support the Canadian population.

3. The primary threats to the species or its habitat (including threats outside Canada) can be avoided or mitigated.

Unknown. Some threats can be avoided or mitigated through recovery actions, such as habitat loss/degradation, changes to natural processes and disturbance from recreational activities. However, it is unknown if significant threats such as the impacts of invasive species can be mitigated to the extent required to ensure the long-term persistence of the species in Canada.

4. Recovery techniques exist to achieve the population and distribution objectives or can be expected to be developed within a reasonable timeframe.

Yes. The major threat for Pink Milkwort is the loss of the specialized tallgrass prairie habitat in which it occurs (COSEWIC, 2009). Some occupied Pink Milkwort habitat has been secured through habitat acquisition initiatives and the rate of habitat conversion has been reduced at Walpole Island First Nation due to efforts by the Walpole Island Heritage Centre (Bowles, 2005). There are some recovery techniques (i.e., prescribed burning) which would be effective in reducing the encroachment of woody species and controlling some invasive species. Recovery techniques to reduce the impacts and spread of invasive species in the long-term may require further investigation. Attempts of *ex situ* germination of Pink Milkwort seeds have been unsuccessful (Bake and Bowles, 2007).

TABLE OF CONTENTS

PREFACE	i
ACKNOWLEDGMENTS.....	ii
EXECUTIVE SUMMARY	iii
RECOVERY FEASIBILITY SUMMARY.....	iv
1. COSEWIC Species Assessment Information.....	1
2. Species Status Information	1
3. Species Information	2
3.1 Species Description	2
3.2 Population and Distribution	2
3.3 Needs of the Pink Milkwort.....	4
4. Threats	4
4.1 Threat Assessment.....	4
4.2 Description of Threats.....	6
5. Population and Distribution Objectives	8
6. Broad Strategies and General Approaches to Meet Objectives.....	8
6.1 Actions Already Completed or Currently Underway	8
6.2 Strategic Direction for Recovery	9
7. Critical Habitat	10
7.1 Identification of the Species' Critical Habitat	10
7.1.1 Suitable Habitat	10
7.1.2 Site Occupancy.....	11
7.1.3 Application of the Pink Milkwort Critical Habitat Criteria.....	11
7.2 Schedule of Studies to Identify Critical Habitat	12
7.3 Activities Likely to Result in the Destruction of Critical Habitat	12
8. Measuring Progress.....	13
9. Statement on Action Plans	13
10. References	14
APPENDIX A: Effects on the Environment and Other Species	16
APPENDIX B: Subnational Conservation Ranks of Pink Milkwort in the United States	17
APPENDIX C: Centroids of Critical Habitat	18

(NOTE: Appendix C has been removed from the document posted on the Public Registry.)

1. COSEWIC* SPECIES ASSESSMENT INFORMATION

Date of Assessment: November 2009

Common Name (population): Pink Milkwort

Scientific Name: *Polygala incarnata*

COSEWIC Status: Endangered

Reason for Designation: This annual herb is highly restricted geographically and is present in tallgrass prairie habitats in southwestern Ontario. There are likely four populations with a total of approximately 1800 plants, most of which are found in one population. Threats to all populations include encroachment by woody plants due to fire suppression and invasive species. Habitat conversion to agriculture, housing development, mowing, trampling, drainage and moisture alteration threaten three populations.

Canadian Occurrence: Ontario

COSEWIC Status History: Designated Endangered in April 1984. Status re-examined and confirmed Endangered in April 1998, May 2000, and November 2009.

*COSEWIC – Committee on the Status of Endangered Wildlife in Canada

2. SPECIES STATUS INFORMATION

The global conservation rank for Pink Milkwort (*Polygala incarnata*) is secure¹ (G5). In the United States, Pink Milkwort occurs from Delaware to Florida in the east and from Wisconsin and Iowa, south to Texas in the west; the national conservation status is currently Unranked² (NNR) (NatureServe, 2009, Appendix B). In Canada, Pink Milkwort (*Polygala incarnata*) is found only in the province of Ontario; the national and subnational conservation ranks are critically imperilled³ (N1 and S1, respectively) (NatureServe, 2009).

Pink Milkwort is listed as Endangered⁴ on Schedule 1 of the federal *Species at Risk Act* (SARA). In Ontario, Pink Milkwort is listed as Endangered⁵ under the provincial *Endangered Species Act, 2007* (ESA).

The percentage of the global range found in Canada is estimated to be less than 1%. Pink Milkwort's distribution is very restricted, occurring at the northern edge of its North American range.

¹ common, widespread and abundant

² nation or state/province conservation status not yet assessed

³ extreme rarity (often 5 or fewer occurrences) or because of some factor(s) such as very steep declines making it especially vulnerable to extirpation from the province

⁴ a wildlife species facing imminent extirpation or extinction

⁵ a species that lives in the wild in Ontario but is facing imminent extinction or extirpation

3. SPECIES INFORMATION

3.1 Species Description

Pink Milkwort is an annual herb with a single, smooth, glaucous⁶, slender stem that is unbranched or sparingly branched. Rose-purple, tubular flowers are clustered in a dense, terminal raceme⁷ (COSEWIC, 2009; Environment Canada, 2010). The leaves are few, alternate, linear, ascending and about 5 mm to 12 mm long, usually falling by flowering time. Growth is indeterminate, with mature plants between 20 cm and 40 cm tall. Flowers open and fruit ripens sequentially from the base of the apex of each inflorescence and continues to open upwards throughout the flowering season from July to October. The fruit is a two-celled green capsule. The seeds are black, hairy and about 2 mm long, with a small air-filled appendage (Bake and Bowles, 2007).

3.2 Population and Distribution

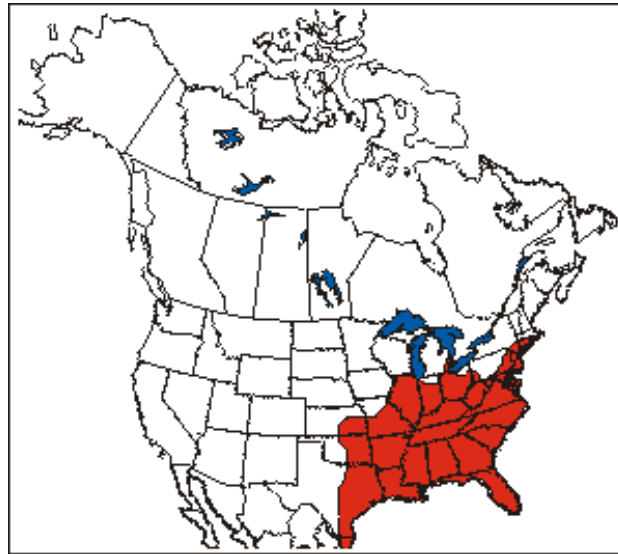
In North America, Pink Milkwort is most common in the central plains and along the southeastern seaboard states (Figure 1). In Canada, there are potentially four extant populations of Pink Milkwort which occur only in the province of Ontario: three populations on Walpole Island First Nation in the St. Clair River delta and one on the Ojibway Prairie Provincial Nature Reserve near Windsor (Figure 2). Historical literature reports from the 1800s exist, indicating Pink Milkwort presence at Leamington, Ontario and from the Niagara River near Niagara Falls; supporting specimens do not exist, or have not been located, nor have any extant populations been found at either location (COSEWIC, 2009). Two populations, once known from Squirrel Island in the St. Clair River delta, and last observed in 1987 and 1996, respectively, are presumed to be extirpated (Brownell, 1998).

In 2008, species abundance on the Walpole Island First Nation was estimated to be 1,800 plants in the three extant populations (COSEWIC, 2009). The largest of the three populations consisted of approximately 1,700 plants in 2008, representing 95% of the total Canadian abundance (COSEWIC, 2009). This population has contained between a minimum of 1600 plants and a maximum of 2250 plants since periodic monitoring began in 2003 (COSEWIC, 2009). The second population on the Walpole Island First Nation, last surveyed in 2006, yielded 87 plants; this same population had 69 plants in 2003. The third population on the Walpole Island First Nation yielded nine plants in a 2006 survey. This site was visited in 2008 and found to be mowed; no plants were observed during the 2008 visit. This population has not been officially recognized as extirpated and is included here as an extant population until its population status can be confirmed. A population census of Pink Milkwort on the Ojibway Prairie Provincial Nature Reserve yielded nine plants in 2008 (COSEWIC, 2009). This population has contained between nine and 28 plants since it was rediscovered in 1994.

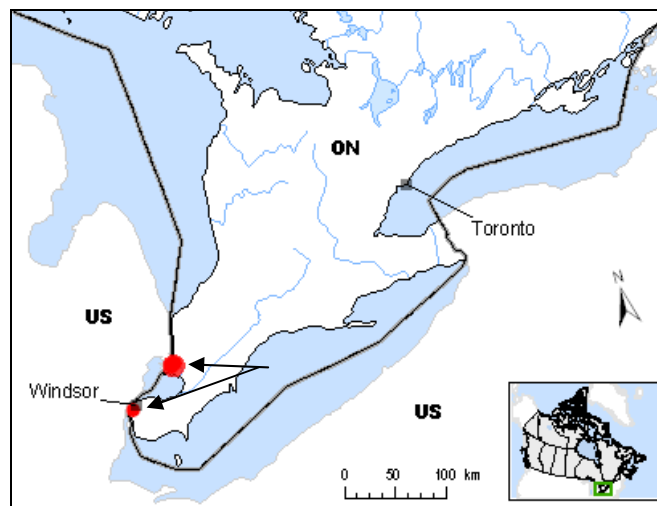
Since this is an annual species, year-to-year population fluctuations are expected; annual monitoring over several years is necessary to detect trends in extant populations. Due to lack of detailed censuses and long-term monitoring, population trends for Pink Milkwort are unknown. In addition, Pink Milkwort is an inconspicuous plant when not in flower, and difficult to spot amongst taller prairie grasses.

⁶ covered with a bluish waxy or powdery bloom

⁷ an indeterminate inflorescence in which each flower grows on its own stalk from a common stem



**Figure 1. North American Distribution of Pink Milkwort
(Modified from: Argus et al., 1982-1987).**



**Figure 2. Canadian Distribution of Pink Milkwort
(Environment Canada, 2010).**

3.3 Needs of the Pink Milkwort

In Canada, the habitat most often associated with Pink Milkwort is open wet-mesic to mesic prairies with soils that are sandy loams with moderate to imperfect drainage. The species has been found growing in sandy substrate where the topsoil had been removed (Canne-Hilliker, 1988). Plant species commonly associated with Pink Milkwort include: Little Bluestem (*Schizachyrium scoparium*), Tall Nut-rush (*Scleria triglomerata*), Bastard Toadflax (*Comandra umbellata*), Golden Alexanders (*Zizia aurea*), Culver's Root (*Veronicastrum virginicum*), pussytoes (*Antennaria* spp.), Switch Grass (*Panicum virgatum*), Panic Grass (*Panicum implicatum*), Virginia Mountain Mint (*Pycnanthemum virginianum*), Indian Grass (*Sorghastrum nutans*) and Dense Blazing Star (*Liatris spicata*) (Bake and Bowles, 2007). Brownell (1984) reported that Little Bluestem was always an associate species.

Periodic fire is an essential factor for maintaining open prairie conditions. A high water table in spring and summer drought may also be contributing factors to maintaining open prairie habitat (COSEWIC, 2009).

Pink Milkwort reproduces sexually, though the primary pollinator(s) is unknown. The flowers are bisexual; however, there is little information on whether they are self-pollinated or cross-pollinated (Brownell, 1984). A small number of bagged inflorescences produced seeds in 2006 (Bake and Bowles, 2007) indicating some degree of self-pollination. Seeds are probably dispersed by ants (Bake and Bowles, 2007); wind has been suggested though unlikely over long distances. Seeds may be dispersed during heavy summer rains that cause temporary flooding of the ground surface, carrying seeds over short distances (COSEWIC, 2009). The distribution of extant populations suggests that long distance dispersal is extremely rare (COSEWIC, 2009).

Because Pink Milkwort is an annual species, the population of mature individuals each year is dependent on seed availability, germination rates and climatic conditions affecting growth. Germination rates are unknown as are data on seed viability and longevity of the seed bank. Attempts at germination in laboratory conditions in 2007 were unsuccessful (Bake and Bowles, 2007).

4. THREATS

4.1 Threat Assessment

Table 1. Threat Assessment Table – Pink Milkwort

Threat	Level of Concern ¹	Extent	Occurrence	Frequency	Severity ²	Causal Certainty ³
*Habitat Loss or Degradation						
Agricultural expansion	High	Widespread	Historic/Current	Recurrent	High	High
Landscaping (e.g., mowing)	High	Localized	Current	Seasonal	High	High
Landfill expansion and dumping	High	Localized	Current/ Anticipated	Recurrent	High	Medium
Housing development	Medium	Localized	Historic/Current	Recurrent	High	Medium

*Changes in Ecological Dynamics or Natural Processes						
Alteration of the fire regime	High	Widespread	Current	Seasonal	High	High
Alteration of the water regime	Medium	Localized	Historic/ Anticipated	Recurrent	Moderate	High
*Exotic, Invasive or Introduced Species/Genome						
European Common Reed (<i>Phragmites australis</i> ssp. <i>australis</i>)	High	Widespread	Current	Seasonal	Moderate	Medium
White Sweet Clover (<i>Melilotus alba</i>)	High	Widespread	Current	Seasonal	Moderate	Medium
Canada Thistle (<i>Cirsium arvense</i>)	High	Localized	Current	Seasonal	Moderate	Medium
Black Locust (<i>Robinia pseudoacacia</i>)	High	Localized	Current	Seasonal	Moderate	Medium
*Disturbance or Harm						
Recreational activities: incidental harm (e.g. ATVs, trampling)	Medium	Localized	Current	Continuous	Moderate	Medium
*Climate and Natural Disasters						
Drought	Low**	Widespread	Anticipated	Recurrent	High	Low
*Natural Processes or Activities						
Browsing by wild animals	Low**	Widespread	Current	Seasonal	Unknown	Low
Insect damage	Low**	Widespread	Current	Seasonal	Unknown	Low

¹ Level of Concern: signifies that managing the threat is of (high, medium or low) concern for the recovery of the species, consistent with the population and distribution objectives. This criterion considers the assessment of all the information in the table).

² Severity: reflects the population-level effect (High: very large population-level effect, Moderate, Low, Unknown).

³ Causal certainty: reflects the degree of evidence that is known for the threat (High: available evidence strongly links the threat to stresses on population viability; Medium: there is a correlation between the threat and population viability e.g. expert opinion; Low: the threat is assumed or plausible).

*Threat categories are listed in order of decreasing significance.

** Threats with a low Level of Concern are listed and described but may not be specifically addressed in the recovery approaches.

4.2 Description of Threats

Loss and degradation of tallgrass prairie habitat is the major limiting factor for Pink Milkwort and continues to threaten the long-term viability of this species (COSEWIC, 2009).

Agricultural Development

Habitat conversion, due to agricultural development, was historically, and continues to be, a major threat to Pink Milkwort and its habitat; many areas of tallgrass prairie on Walpole Island First Nation have been lost (COSEWIC, 2009). In 1985, the majority of one population of Pink Milkwort was lost due to conversion to agriculture; in 2003, a single plant remained (COSEWIC, 2009).

Landscaping

Regular mowing has caused the loss of one subpopulation and may have contributed to the decline of another; mowed areas at Walpole Island First Nation are increasing (COSEWIC, 2009). An area of prairie around a garbage dump, containing a small remnant population of Pink Milkwort, was mowed in 2008 after which no individuals have been relocated; the exact location of the population may have been mowed or covered by dumping (COSEWIC, 2009).

Landfill Expansion and Dumping

One population of Pink Milkwort occurs near a garbage dump; expansion of the garbage dump or direct dumping on the site occupied by Pink Milkwort could threaten this population or may have already contributed its loss (COSEWIC, 2009).

Alteration of the Fire Regime

Pink Milkwort requires open prairie conditions (COSEWIC, 2009). Suppression of fire can limit suitable habitat by allowing trees and shrubs to grow and eventually shade out the species. The frequency of fire on Walpole Island First Nation is declining, mainly due to the pressure to control fire to protect housing and development; many prairie habitats are converting to savanna and woodlands (COSEWIC, 2009). Based on interpretation of air photos from 1972 and 1998, it is estimated that prairies at Walpole Island have been reduced from about 730 ha to about 470 ha, a loss of 36% (Crow et al., 2003). Some of this is a result of conversion to agriculture and housing, but most is due to encroachment by forest and woodland in the absence of regular fires (Crow et al., 2003). Conversely, fires at inappropriate seasons (i.e., fall) can be damaging for this late-flowering species (COSEWIC, 2009).

European Common Reed, White Sweet Clover, Canada Thistle and Black Locust

Invasive species are invading many prairie habitats and contributing to a decline in habitat quality at Walpole Island First Nation (Bowles, 2005). At several sites where Pink Milkwort occurs, White Sweet Clover, European Common Reed and Canada Thistle are abundant and increasing (COSEWIC, 2009). Black Locust is encroaching Pink Milkwort habitat on the Ojibway Prairie Provincial Nature Reserve; this fire-tolerant species may pose a serious threat if not controlled (COSEWIC, 2009). The impacts of invasive species can range from competitive exclusion, niche displacement or hybridization (Mooney and Cleland, 2001) to changes to the fire regime (Brooks et al., 2004). Without implementing management protocols designed to target and control invasive species, habitat conditions can be degraded to the point that habitat becomes unsuitable for Pink Milkwort.

Housing Development

Habitat loss or degradation resulting from housing development could threaten extant populations of Pink Milkwort or have already caused local extirpations (COSEWIC, 2009). On Walpole Island First Nation, housing construction has increased in response to critical housing shortages; the homes and their associated landscaped grounds have resulted in the removal of suitable habitat for Pink Milkwort (COSEWIC, 2009).

Alteration of the Water Regime

Natural changes in lake levels and dredging and ditching operations, including those associated with road development and maintenance, can affect Pink Milkwort habitat through changes to the moisture regime (COSEWIC, 2009). High water levels in the 1980s may have contributed to a decline of Pink Milkwort (COSEWIC, 2009).

Recreational Activities: Incidental Harm

Pedestrian and all-terrain vehicle (ATV) trail use can directly result in damage to individual plants through trampling and indirectly through compaction of the soil making habitat unsuitable. Direct trampling, particularly from ATV use, is increasing on Walpole Island First Nation; at least one site is on an ATV trail (COSEWIC, 2009).

Drought

Most Pink Milkwort habitats are moist to wet during early spring. Because this species is an annual, dry periods in spring may affect the germination rate of Pink Milkwort seeds thereby reducing successful establishment and limiting the number of suitable germination sites. Late summer drought, in areas without a high water table, may cause plants to die prematurely and prevent a good seed set for the following year.

Browsing by Wild Animals

Pink Milkwort plants are subject to browsing, presumably by mammals such as rabbits, which nip off the inflorescence. Damaged plants usually branch from the next lowest node below the damage to produce a new inflorescence (Bake and Bowles, 2007). High browse rates (88%) were detected during a phenology study in 2006 (Bake and Bowles, 2007) but impacts on seed production and plant survival are currently unknown.

Insect Damage

The only insects observed on Pink Milkwort plants capable of causing damage were adults and juveniles of *Merocoris distinctus*, a small true bug of the Leaf-footed bug family (Coreidae), which were often found in flowers. Adults and juveniles have been found among the flowers of Pink Milkwort, but damage to the inflorescence was not obvious (COSEWIC, 2009).

5. POPULATION AND DISTRIBUTION OBJECTIVES

The population and distribution objective is to maintain, or increase where biologically and technically feasible, the current abundance of Pink Milkwort and to maintain the current distribution of the four extant populations in Canada. Pink Milkwort's Canadian distribution is very restricted, occurring at the northern edge of its North American range. The species was recently (ca. 1985) more abundant but there is little opportunity for re-introduction into formerly occupied sites due to extensive land-use change (i.e., conversion to agriculture and residential development) that eliminated the suitable habitat. Restoring this species' population and distribution to recent levels (ca. 1985) is likely no longer possible.

6. BROAD STRATEGIES AND GENERAL APPROACHES TO MEET OBJECTIVES

6.1 Actions Already Completed or Currently Underway

The Walpole Island Heritage Centre has monitored populations of Pink Milkwort on the Walpole Island First Nation since 2003 (COSEWIC, 2009). The rate of conversion of prairie to agriculture has been reduced at Walpole Island First Nation due to efforts by the Walpole Island Heritage Centre to acquire land for conservation (COSEWIC, 2009). Monitoring of the Pink Milkwort population on the Ojibway Prairie Provincial Nature Reserve has occurred regularly since its rediscovery in 1994 (COSEWIC, 2009); a prescribed burn occurred here in early 2010 in which approximately 65% of the prairie area was burned (Essex County Field Naturalists' Club, 2010).

In 2006, a student from the University of Western Ontario, under the supervision of Dr. J. Bowles, conducted a study to help fill some of the knowledge gaps regarding the biology and ecology of Pink Milkwort (Bake and Bowles, 2007).

Recovery actions described in the Draft Walpole Island Ecosystem Recovery Strategy (Bowles, 2005) included raising awareness in the community about species at risk, including Pink Milkwort. Pamphlets, calendars, newsletter articles, posters and other promotional material have been used to raise awareness of species at risk in the Walpole Island First Nation community.

The Walpole Island First Nation is currently developing an ecosystem protection plan based on the community's traditional ecological knowledge (TEK).

6.2 Strategic Direction for Recovery

Table 2. Recovery Planning Table – Pink Milkwort

Threat or Limitation	Priority	Broad Strategy to Recovery	General Description of Research and Management Approaches
Housing development, agricultural expansion, landfill expansion and dumping, landscaping, alteration of the fire regime, alteration of the water regime, European Common Reed, White Sweet Clover, Canada Thistle, Black Locust, and recreation (incidental harm)	High	<ul style="list-style-type: none"> Protect, conserve and manage habitat 	<ul style="list-style-type: none"> Promote conservation and appropriate management of prairie habitats supporting Pink Milkwort Develop and use habitat management techniques (e.g., prescribed burns, invasive species control) to maintain suitable habitat for Pink Milkwort Establish policies and/or agreements that protect prairie habitats, particularly existing Pink Milkwort habitat (e.g., acquisition or conservation agreements) Monitor and manage for invasive species Use habitat restoration techniques (e.g., prescribed burning, invasive species control) to increase extent of suitable habitat at extant locations to enhance colonization and increase abundance, where required
All threats	High	<ul style="list-style-type: none"> Monitor / assess populations 	<ul style="list-style-type: none"> Survey for Pink Milkwort abundance at extant sites and sites where the population status is unconfirmed Establish and implement a long-term monitoring protocol
All threats	Medium	<ul style="list-style-type: none"> Outreach and education 	<ul style="list-style-type: none"> Promote community involvement and awareness regarding species at risk and their habitat Encourage the transfer of Traditional Ecological Knowledge
Knowledge gaps relating to reproduction and recruitment, and impacts of threats, Traditional Ecological Knowledge	Medium	<ul style="list-style-type: none"> Conduct research and gather and transfer knowledge 	<ul style="list-style-type: none"> Examples of knowledge gaps: Methods of seed dispersal and germination rates/requirements; propagation techniques; primary pollinator(s); other factors affecting population size and recruitment (i.e., seed viability and longevity and size of the seed bank); impacts of invasive species, animal browsing and insect damage; Traditional Ecological Knowledge

7. CRITICAL HABITAT

7.1 Identification of the Species' Critical Habitat

Critical habitat for Pink Milkwort in Canada is partially identified in this recovery strategy to the extent possible based on available data. It is recognized that the critical habitat identified below is insufficient to achieve the population and distribution objectives for the species. The Schedule of Studies (Section 7.2) outlines the activities required to identify additional critical habitat necessary to support the population and distribution objectives of this species.

Critical habitat for Pink Milkwort is identified as the extent of contiguous suitable habitat (Section 7.1.1.) at each occupied site (Section 7.1.2).

7.1.1 Suitable Habitat

Pink Milkwort is found in open wet-mesic to mesic prairies with soils that are sandy loams with moderate to imperfect drainage. It is reported to always be closely associated with Little Bluestem (Brownell, 1984).

Suitable habitat for Pink Milkwort is identified using the Ecological Land Classification (ELC) framework for Ontario (Lee et al., 1998). It is identified as the Open Tallgrass Prairie (TPO) community series. Open Tallgrass Prairie is characterized by a ground layer dominated by prairie graminoids such as Little Bluestem, unconsolidated mineral substrates, tree and shrub cover $\leq 25\%$, frequent disturbance by fire and is subject to seasonal extremes in moisture conditions (spring flooding and summer drought) (Lee et al., 1998).

The ELC framework provides a standardized approach to the interpretation and delineation of dynamic ecosystem boundaries. It uses environmental and vegetation characteristics to identify communities, and as such captures the biophysical ecosystem requirements for Pink Milkwort.

Pink Milkwort is an annual species which may exhibit large year-to-year population fluctuations due to its dependency on seed availability and germination conditions. Although Pink Milkwort may occupy only a small portion of the suitable habitat, unoccupied suitable habitat likely contains portions of the seed bank and may represent the dispersal capability for this population. For this reason, suitable habitat is defined as the occupied suitable habitat plus the contiguous unoccupied suitable habitat.

Should information become available indicating populations occupy additional habitat types, the description of suitable habitat would be updated to include these habitat types and critical habitat identification would be modified accordingly.

7.1.2 Site Occupancy

Site Occupancy Criterion: The site occupancy criterion defines an occupied site as a site where Pink Milkwort has been observed for any single year between 2001 and 2010.

Pink Milkwort is an annual species that exhibits large year-to-year fluctuations as a result of stochastic events such as weather, pollinator availability, moisture levels and recent fire history (COSEWIC, 2009). Given the known historic and current threats to Pink Milkwort, (i.e., landscaping, agricultural expansion, housing development and alteration of the fire regime) and the expected year-to-year fluctuations in abundance and extent, data prior to 2001 would require confirmation of the location and extent of Pink Milkwort populations in order to be considered for identification of critical habitat. Evidence exists that indicates certain threats may have impacted portions of the population in the late-1990s. Populations have been reduced or possibly eliminated due to landscaping (i.e., mowing), continued agricultural expansion, housing development and alteration of the fire regime allowing for encroachment of currently occupied habitat by woody and invasive species (COSEWIC, 2009).

7.1.3 Application of the Pink Milkwort Critical Habitat Criteria

Critical habitat for Pink Milkwort is identified as the extent of contiguous ELC community series of Open Tallgrass Prairie (TPO) in which Pink Milkwort has been observed any single year between 2001 and 2010.

Application of the critical habitat criteria to available information identifies critical habitat on the Ojibway Prairie Provincial Nature Reserve (Appendix C; removed from the public document). The best available information was used to identify sites meeting these criteria, including information compiled by the Ontario Natural Heritage Information Centre.

At this time, the information required to identify critical habitat for the other three populations of Pink Milkwort is not available to Environment Canada. Although the continued presence of Pink Milkwort has been confirmed (as in COSEWIC, 2009), the specific data required to satisfy the critical habitat criteria and thus be able to identify critical habitat (i.e., location and extent of populations and biophysical habitat attributes), are not yet available to Environment Canada. Evidence exists that indicates certain threats may have impacted portions of the population during the elapsed time period from when location data was available to Environment Canada (prior to 2001). There is also the need to confirm the attributes, extent and amount of the ELC community series of Open Tallgrass Prairie (TPO) for these three populations. Once adequate information is obtained (i.e., location and extent of populations and habitat attributes), additional critical habitat will be identified and may be described within an area-based multi-species at risk action plan developed in collaboration with the Walpole Island First Nation.

Appendix C, containing the coordinates of the centroids of critical habitat for Pink Milkwort, has been removed from the public document to protect the species and its habitat. Disclosing the location not only puts the plant at considerable risk from inadvertent trampling by visitors wishing to view the rare plant, but also increases the potential for collection.

7.2 Schedule of Studies to Identify Critical Habitat

Table 3. Schedule of Studies to Identify Critical Habitat

Description of Activity	Rationale	Timeline
Confirm/obtain population information for remaining three extant populations for which critical habitat is not yet identified.	Confirm location and extent of populations.	2011 - 2016
Conduct Ecological Land Classification at remaining three extant populations for which critical habitat is not yet identified.	Confirm habitat associations, habitat attributes and extent of suitable habitat.	2011- 2016
Identify additional critical habitat for Pink Milkwort.	Identify critical habitat.	2016

7.3 Activities Likely to Result in the Destruction of Critical Habitat

Destruction is determined on a case by case basis. Destruction would result if part of the critical habitat was degraded, either permanently or temporarily, such that it would not serve its function when needed by the species. Destruction may result from a single activity or multiple activities at one point in time or from the cumulative effects of one or more activities over time (Government of Canada, 2009).

Activities that are likely to result in the destruction of critical habitat for Pink Milkwort include, but are not limited to:

- Activities that result in alterations to the hydrological regime (e.g., dams, dykes, road development) may impact prairie habitat characteristics required by Pink Milkwort rendering the habitat unsuitable and thereby destroying critical habitat.
- Activities that result in loss (i.e., conversion) or degradation (i.e., fragmentation) to the habitat (e.g., agricultural intensification, residential development) may modify prairie habitat characteristics, rendering it unsuitable for Pink Milkwort and thereby destroying critical habitat.
- Activities that promote the expansion of exotic, invasive or introduced species/genome into Pink Milkwort critical habitat (e.g., introduction of seeds and/or plants) may increase resource competition and habitat succession resulting in unsuitable prairie habitat characteristics and/or conditions for Pink Milkwort.
- Activities that compact and/or erode the soil can destroy critical habitat (e.g., ATV use, heavy recreational use, etc.) by preventing plant establishment and reducing the quality of germination sites.

8. MEASURING PROGRESS

The performance indicators presented below provide a way to define and measure progress toward achieving the population and distribution objectives.

Every five years, success of recovery strategy implementation will be measured against the following performance indicators:

- the current level of abundance in Canada has not decreased, and
- the current distribution in Canada has not decreased.

9. STATEMENT ON ACTION PLANS

One or more action plans will be completed for Pink Milkwort by December 2016. Any such action plan is expected to include an area-based, multi-species approach and be prepared in collaboration with the Walpole Island First Nation.

10. REFERENCES

- Argus, G.W., K.M. Pryer, D.J. White, and C.J. Keddy (eds.). 1982-1987. Atlas of the Rare Vascular Plants of Ontario. Four Parts. National Museum of Natural Sciences, Ottawa, Ontario. Looseleaf.
- Bake, A. and J.M. Bowles. 2007. Habitat and reproductive biology of *Polygala incarnata*, an endangered species in Canada. Unpublished Undergraduate Honours Thesis, University of Western Ontario. London, Ontario, Canada.
- Bowles, J.M. 2005. Draft Walpole Island ecosystem recovery strategy. Walpole Island Heritage Centre, Environment Canada and The Walpole Island Recovery Team.
- Brooks, M.L, C.M. D'Antonio, D.D. Richardson, J.B. Grace, J.E. Keeley, J.M. DiTomaso, R.J.Hobbs, M. Pellant, and D. Dyke. 2004. Effects of invasive alien plants on fire regimes. *BioScience* 54:677-688.
- Brownell, V.R. 1984. Status report on the pink milkwort *Polygala incarnata* in Canada. Committee on the Status of Endangered Wildlife in Canada. Ottawa, Ontario. 35 pp.
- Brownell, V.R. 1998 (in press). Update COSEWIC status report on the pink milkwort *Polygala incarnata* in Canada, in COSEWIC assessment and update status report on the pink milkwort *Polygala incarnata* in Canada. Committee on the Status of Endangered Wildlife in Canada. Ottawa, Ontario. vi + 12 pp.
- Canne-Hilliker, J. 1988. Status report on Gattinger's agalinis *Agalinis gattingeri* in Canada. Committee on the Status of Endangered Wildlife in Canada. Ottawa. 19 pp.
- COSEWIC. 2009. COSEWIC assessment and status report on the pink milkwort *Polygala incarnata* in Canada. Committee on the Status of Endangered Wildlife in Canada. Ottawa, Ontario. 24 pp.
- Crow, C., J. Demelo, J. Hayes, J. Wells and T. Hundey. 2003. Walpole Island Land Use change 1972-1998. Unpublished Class Report, Department of Geography, University of Western Ontario. London, Ontario, Canada.
- Environment Canada. 2010. Species profile: pink milkwort. Environment Canada, Ottawa, Ontario. Web site:
http://www.speciesatrisk.gc.ca/search/speciesDetails_e.cfm?SpeciesID=186 [accessed October 2010]
- Essex County Field Naturalists' Club. 2010. The Egret: the newsletter of the Essex County Field Naturalists' Club. Vol. 20(2): June 2010. 26 pp.

- Government of Canada. 2009. *Species at Risk Act Policies, Overarching Policy Framework* [Draft]. *Species at Risk Act Policy and Guidelines Series*. Environment Canada. Ottawa. 38 pp.
- Lee, H.T., W.D. Bakowsky, J. Riley, J. Bowles, M. Puddister, P. Uhlig, and S. McMurray. 1998. Ecological land classification for southern Ontario: first approximation and its application. SCSS Field Guide FG-02. Ontario Ministry of Natural Resources, Southcentral Science Section, Science Development and Transfer Branch, North Bay, Ontario.
- Mooney, H.A. and E.E. Cleland. 2001. The evolutionary impact of invasive species. *Proceedings from the National Academy of Sciences of the United States of America* 98:5446-5451.
- NatureServe. 2009. NatureServe Explorer: An online encyclopedia of life [web application]. Version 4.6. NatureServe, Arlington, Virginia. Web site: <http://www.natureserve.org/explorer>

APPENDIX A: EFFECTS ON THE ENVIRONMENT AND OTHER SPECIES

A strategic environmental assessment (SEA) is conducted on all SARA recovery planning documents, in accordance with the *Cabinet Directive on the Environmental Assessment of Policy, Plan and Program Proposals*. The purpose of a SEA is to incorporate environmental considerations into the development of public policies, plans, and program proposals to support environmentally sound decision-making.

Recovery planning is intended to benefit species at risk and biodiversity in general. However, it is recognized that strategies may also inadvertently lead to environmental effects beyond the intended benefits. The planning process based on national guidelines directly incorporates consideration of all environmental effects, with a particular focus on possible impacts upon non-target species or habitats. The results of the SEA are incorporated directly into the strategy itself, but are also summarized below in this statement.

This recovery strategy will clearly benefit the environment by promoting the recovery of the Pink Milkwort. In particular, species associated with open prairie tallgrass habitat will benefit from this strategy, including other species at risk, such as: Eastern Prairie Fringed-orchid (*Platanthera leucophaea*), Dense Blazing Star (*Liatris spicata*), Colicroot (*Aletris farinosa*) and Small White Lady's-slipper (*Cypripedium candidum*) among several others. The potential for the strategy to inadvertently lead to adverse effects on other species was considered. Some management activities, including prescribed burns and control of invasive species using herbicides, have the potential to harm some species, at least in the short term. The ecological risks of such activities must be considered individually before undertaking them, in order to reduce possible negative effects. The SEA concluded that this strategy will clearly benefit the environment and will not entail any significant adverse effects. The reader should refer to the following sections of the document in particular: Species Needs, Population and Distribution Objectives and Broad Strategies and General Approaches to Meet Objectives.

APPENDIX B: SUBNATIONAL CONSERVATION RANKS OF PINK MILKWORT IN THE UNITED STATES

List and description of various conservation status ranks for the Pink Milkwort in the United States (from NatureServe, 2009).

	Global (G) Rank	National (N) Rank (United States)	Sub-national (S) Rank
Pink Milkwort (<i>Polygala incarnata</i>)	G5 (Secure – common; widespread and abundant)	NNR (Unranked - nation or state/province conservation status not yet assessed)	Alabama (SNR) Arkansas (SNR) Delaware (S1) District of Columbia (SNR) Florida (SNR) Georgia (SNR) Illinois (S1) Indiana (S1) Iowa (S2) Kansas (SNR) Kentucky (S4) Louisiana (SNR) Maryland (S2S3) Michigan (SX) Mississippi (SNR) Missouri (SNR) Nebraska (SNR) New Jersey (SH) New York (SX) North Carolina (S4) Ohio (S2) Oklahoma (SNR) Pennsylvania (SH) South Carolina (SNR) Tennessee (SNR) Texas (SNR) Virginia (S4) Wisconsin (S1)

S1: Critically Imperilled; S2: Imperilled; S3: Vulnerable; S4: Apparently Secure; SNR: Unranked; SH: Possibly Extirpated; SX: Presumed Extirpated.

APPENDIX C: CENTROIDS OF CRITICAL HABITAT

This appendix has been removed from the document posted on the Public Registry.