

Recovery Strategy for the White Prairie Gentian (*Gentiana alba*) in Canada

White Prairie Gentian



2012

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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).

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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 White Prairie Gentian 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 White Prairie Gentian 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

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Angela McConnell, Christina Rohe, Barbara Slezak, Kathy St. Laurent, Lesley Dunn and Madeline Austen of Environment Canada, Canadian Wildlife Service – Ontario, Wendy Dunford of Environment Canada, Canadian Wildlife Service – National Capital Region, Pam Wesley, Vivian Brownell, Allen Woodliffe and Eric Snyder of Ontario Ministry of Natural Resources and Clint Jacobs and Jared Macbeth of the Walpole Island Heritage Centre all reviewed and provided comments and advice during development of this document.

EXECUTIVE SUMMARY

White Prairie Gentian (*Gentiana alba*) is a sprawling herbaceous perennial with a range centred in the plains of the American mid-west with scattered populations from southern Ontario, Pennsylvania and North Carolina west to Minnesota, eastern Nebraska and Kansas and south to Arkansas. In Canada, one extant population of White Prairie Gentian currently exists on the Walpole Island First Nation in the St. Clair River delta, southwestern Ontario. There are historic records from two other areas in Ontario, one in Essex County and the other in Northumberland County, both of which are considered extirpated (Waldron, 2001). White Prairie Gentian is listed as Endangered on Schedule 1 of the *Species at Risk Act* (SARA).

Threats identified to the Canadian population of the White Prairie Gentian include, but are not limited to: habitat loss or degradation, changes in ecological dynamics and natural processes, disturbance or harm and invasive species. White Prairie Gentian is also limited by its small population size and geographically-isolated population. Given that the species is found at the northern extent of its range and has a naturally limited distribution in Canada, it will likely always be vulnerable to anthropogenic and natural stressors.

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 for White Prairie Gentian in Canada is to maintain the one extant population at its current abundance and distribution.

The broad strategies to recovery include, but are not limited to: protection, conservation and management of White Prairie Gentian habitat, monitoring and assessment of extant population(s), outreach and education and addressing biological knowledge gaps.

Critical habitat for this species is not identified at this time. Once adequate information is obtained, 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 White Prairie Gentian by December 2017.

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 White Prairie Gentian. 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. It is uncertain if individuals would be available to sustain or improve the population and it may not be possible to mitigate various threats to the species.

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.

Unknown. There are individuals capable of reproduction within the Canadian range; however, the Canadian population is extremely low (less than 50 individuals). Individuals are also available in the United States; however, it is unknown if these populations 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. Habitat management or restoration could reverse trends at currently occupied sites that show declining habitat quality and extent because of decreasing fire frequency which is required to maintain suitable habitat conditions for this species.

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 or degradation, changes to natural processes and disturbance from recreational activities. However, it is unknown if significant threats such as the spread of invasive species and hybridization can be mitigated to the extent required to sustain a viable population within Canada.

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

Yes. There are some recovery techniques (i.e., prescribed burning) which would be effective in maintaining suitable habitat for the White Prairie Gentian. Some occupied White Prairie Gentian habitat is currently being sought for acquisition and the rate of habitat conversion has been reduced at Walpole Island First Nation through efforts by the Walpole Island Heritage Centre (COSEWIC, 2009). Recovery techniques to reduce the long-term impacts of invasive species and hybridization may require further investigation.

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1. COSEWIC* SPECIES ASSESSMENT INFORMATION

Date of Assessment: November 2010

Common Name (population): White Prairie Gentian

Scientific Name: *Gentiana alba*

COSEWIC Status: Endangered

Reason for Designation: This showy perennial exists in Canada as a single small population within a remnant oak savannah habitat in southwestern Ontario. The small population size and impacts from potential threats such as increased shading, trampling, and genetic contamination through hybridization with a common native species of gentian, places the species at on-going risk..

Canadian Occurrence: Ontario

COSEWIC Status History: Designated Endangered in April 1991. Status re-examined and confirmed in May 2001 and November 2010.

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

2. SPECIES STATUS INFORMATION

The global conservation rank for the White Prairie Gentian (*Gentiana alba*) is apparently secure¹ (G4). In the United States, the range of White Prairie Gentian is centred in the plains of the American mid-west with scattered populations in other states; the national conservation rank is currently unranked² (NLR) (NatureServe, 2011, Appendix B). In Canada, White Prairie Gentian (*Gentiana alba*) is found only in the province of Ontario; the national conservation rank is critically imperilled³ (N1) and the subnational conservation rank for Ontario is critically imperilled (S1) (NatureServe, 2011).

White Prairie Gentian is listed as Endangered⁴ on Schedule 1 of the federal *Species at Risk Act* (SARA). In Ontario, the White Prairie Gentian 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%. White Prairie Gentian's Canadian distribution was historically, and is currently, very restricted, occurring at the northern edge of its North American range.

¹ uncommon but not rare, some cause for long-term concern due to declines or other factors

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/country

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

White Prairie Gentian is a sprawling herbaceous perennial which measures between 30 cm and 90 cm for flowering stems (Waldron, 2001). The yellowish green opposite leaves are smooth and oval shaped. Plants produce up to a dozen stems with a dense cluster of greenish white to yellowish white, closed bottle-shaped flowers at the top of each stem (Waldron, 2001; Environment Canada, 2010). The sepals on the flower are folded and ribbed along the midrib, which distinguishes it from the white-flowered form of the Closed Bottle Gentian (*Gentiana andrewsii*). The fruit is a capsule containing hundreds of tiny winged seeds.

White Prairie Gentian flowers from mid-August to late September. Small plants have been found to have few or no flowers, while the large plants can have up to a dozen flowering stems. The White Prairie Gentian belongs to a group of highly evolved gentians that have closed flowers structured to enhance cross-pollination (Waldron, 2001). It is likely that the flowers are self-fertilizing in the absence of pollinators (Costelloe, 1988). In early October, the fruit splits apart and releases hundreds of tiny seeds (Environment Canada, 2010). The flowering season of White Prairie Gentian overlaps with that of Closed Bottle Gentian (*G. andrewsii*) with which it can hybridize; hybrids are known to occur in the Canadian extant population (Waldron, 2001).

3.2 Population and Distribution

The Canadian distribution is believed to remain unchanged since the species was first assessed by COSEWIC in 1991, with the one extant population of White Prairie Gentian entirely restricted to the north portion of the Walpole Island First Nation, in the St. Clair River delta, southwestern Ontario (Figure 1) (Waldron, 2001). Population trends for this species are difficult to assess as the species is easily over-looked, the number of stems vary from year-to-year and the presence of hybrids may complicate identification. In addition, reports summarizing surveys of the species' abundance include counts of flowering stems and/or number of individual plants making it difficult to compare numbers among survey years. It appears that the population doubled from 18 individuals in 1989 to 45 in 2000, which can't be explained by survey effort (Waldron, 2001). In 2008, the population was estimated at approximately 100 flowering stems (50 individuals) among three stands (J. Bowles, unpublished report, 2008).

The species has not been observed for over a century at the two historical locations, near Healey Falls in Northumberland County and at the Amherstburg quarries in Essex County, despite recent searches by several botanists in areas where suitable habitat still exists (Waldron, 2001; M.J. Oldham, pers. comm. 2008). These two populations are considered extirpated (Waldron, 2001).

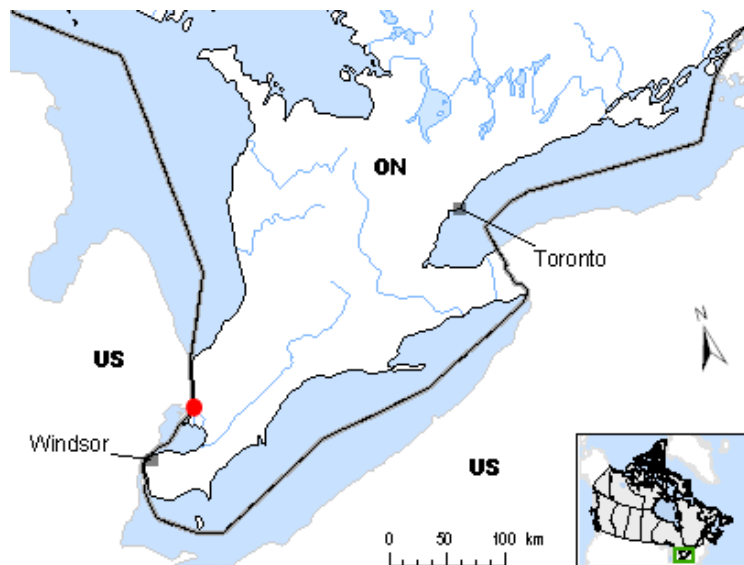


Figure 1. Canadian Distribution of White Prairie Gentian (Environment Canada, 2010).

3.3 Needs of the White Prairie Gentian

White Prairie Gentian requires well drained, calcareous soil and is restricted to mesic⁶ and dry-mesic prairies, savannas and alvars. Regular early spring fire is an important natural disturbance regime to maintain suitable habitat characteristics for the species, although late spring or summer fires can kill growing stems (Waldron, 2001). The closed “bottle” flowers of the White Prairie Gentian restrict entrance to most insect pollinators and are thus almost always pollinated by bumblebees (*Bombus* spp.). Successful germination of seeds (*ex situ*) requires a few (i.e., three) months of cool, moist soil conditions. Germination percentages following treatment are high; seedlings grow easily and appear vigorous (Waldron, 2001).

On the Walpole Island First Nation in the St. Clair River delta, White Prairie Gentian occurs in partially shaded oak savanna habitats (Waldron, 2001). All savanna vegetation types are considered critically imperilled in Ontario (ONHIC, 2010). An estimated 570 ha of oak savanna on Walpole Island First Nation in 1972, was reduced to 360 ha by 1998; a 37% loss mainly attributable to closing in of the tree canopy (Crow et al., 2003). Habitat associations from nearby populations in Michigan suggest a wider adaptation to habitat conditions than those reported from the St. Clair River delta for White Prairie Gentian (Waldron, 2001). The two historical locations in Canada, where White Prairie Gentian populations are considered extirpated, are both limestone alvars (Waldron, 2001).

3.4 Biological Limiting Factors

The greatest limiting factor for White Prairie Gentian in Canada is likely its extremely small population size. Relatively small, geographically-isolated populations are prone to loss of genetic diversity and are at greater risk of being extirpated by stochastic events. Limited pollination may increase the likelihood of inbreeding which can lead to reduced reproduction and a decline

⁶ relating or adapted to a moderately moist habitat

in plant fitness, especially for small and isolated populations of plants, such as White Prairie Gentian (Fischer and Matthies, 1997). Population recruitment may also be limited by natural factors, such as the conditions existing at the northern limit of the species' range, seed predation and hybridization. Shading through natural succession is also a limiting factor to the survival of the species, as it intolerant of shade (Waldron, 2001).

4. THREATS

4.1 Threat Assessment

Table 1. Threat Assessment Table - White Prairie Gentian (adapted from J. Bowles, unpublished report, 2008)

Threat	Level of Concern ¹	Extent	Occurrence	Frequency	Severity ²	Causal Certainty ³
*Habitat Loss or Degradation						
Road construction	High	Widespread	Historic/ Current	Recurrent	High	Medium
Agricultural expansion	Medium	Widespread	Historic/ Imminent	Recurrent	Low	High
Land fill and cemetery expansion	Medium	Widespread	Current	Recurrent	Moderate	High
Quarrying/sand extraction	Medium	Widespread	Historic/ Current	Recurrent	High	High
Housing development	Low	Widespread	Historic/ Current	Recurrent	Low	High
*Changes in Ecological Dynamics and Natural Processes						
Alteration of fire regime	Medium	Widespread	Current	Seasonal	High	High
*Disturbance or Harm						
Recreational activities: incidental harm (e.g., ATVs, trampling)	High	Widespread	Current	Continuous	High	High

Threat	Level of Concern ¹	Extent	Occurrence	Frequency	Severity ²	Causal Certainty ³
*Exotic, Invasive or Introduced Species/Genome						
Varietal introductions (e.g., hybridization)	High	Widespread	Current	Seasonal	Unknown	Medium
Black Locust (<i>Robinia pseudoacacia</i>)	Medium	Widespread	Anticipated	Seasonal	Unknown	Low
European Common Reed (<i>Phragmites australis</i> ssp. <i>australis</i>)	Low-Medium	Widespread	Anticipated	Seasonal	Unknown	Low
White Sweet Clover (<i>Melilotus alba</i>)	Low-Medium	Widespread	Anticipated	Seasonal	Unknown	Low
*Natural Processes or Activities						
Seed predation (e.g., unidentified lepidopteran larva⁷)	Low-Medium	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.

4.2 Description of Threats

Habitat loss or degradation

Habitat loss or degradation resulting from housing development, road construction, agricultural activity and other types of land use could threaten extant populations of White Prairie Gentian and may have already caused local extirpations. The White Prairie Gentian populations historically present at Healey Falls, Northumberland County and Amherstburg, Essex County

⁷ the larvae of lepidopterans are caterpillars. Lepidopterans include butterflies, moths, and skippers.

were almost certainly destroyed by dam building (late 1800s) and quarrying respectively (late 1950s) (Waldron, 1991). On Walpole Island First Nation, increased housing construction, in response to critical housing shortages, has resulted in the loss of suitable habitat for White Prairie Gentian (Waldron, 2001).

Changes in Ecological Dynamics and Natural Processes

In Canada, White Prairie Gentian requires savanna habitat which is dependent on periodic fire (Waldron, 2001). Suppression of fire can limit 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; consequently, many savanna habitats are converting to woodlands (Waldron, 2001). The loss of oak savanna habitats on Walpole Island First Nation has been mostly attributable to closing in of the canopy (Crow et al., 2003). Conversely, late spring and summer fire can be destructive to White Prairie Gentian new growth (Waldron, 2001).

Disturbance or Harm

Pedestrian and all-terrain vehicle (ATV) trail use can result in direct damage to individual plants through trampling and compaction of the soil making potential habitat unsuitable. An informal trail has developed nearby the population with visible signs of compaction and trampling (Waldron, 2001).

Exotic, Invasive or Introduced Species/Genome

Invasive species such as the European Common Reed, White Sweet Clover and Black Locust are invading many prairie and savanna habitats on the Walpole Island First Nation (Bowles, 2005). Invasive species may out-compete or shade White Prairie Gentian plants, promote a decline in vigor resulting in poor growth and lower seed production, and potentially contribute to the loss of germination sites.

On the Walpole Island First Nation, a number of plants surveyed in 2000 showed varying degrees of hybridization and back-crossing⁸ with Closed Bottle Gentian (*Gentiana andrewsii*) (Waldron, 2001). The extent of hybridization and introgression is not known but is considered a threat given the species' small population size and restricted distribution.

Natural Processes or Activities

Selected populations of White Prairie Gentian in the United States and the population in Canada were examined for evidence of seed predation; all exhibited signs of seed predation by an unidentified lepidopteran larva (Waldron, 2001). The unknown species destroys the majority of the seed within two to several adjacent capsules. Sallabanks and Courtney (1992) suggest that for species in which episodic recruitment into the population occurs (i.e., perennial species), high rates of seed predation in one year may not affect long-term recruitment and population size as conditions (e.g., habitat and soil) existing in years of successful recruitment are more important. In Canada however, seed predation should be considered a threat given the species' limited population and distribution.

⁸ to cross (a hybrid) with one of its parents or with an individual genetically identical to one of its parents.

5. POPULATION AND DISTRIBUTION OBJECTIVES

The population and distribution objective for White Prairie Gentian in Canada is to maintain the one extant population at its current abundance and distribution. White Prairie Gentian distribution was historically, and is currently, very restricted, occurring at the northern edge of its North American range.

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 White Prairie Gentian on Walpole Island First Nation. A census of the population was performed in 2003 and 2008 (J. Bowles, unpublished report, 2008). Efforts by the Walpole Island Heritage Centre to acquire lands for conservation has been undertaken and have resulted in the reduction of the rate of conversion of prairie and savanna habitat (COSEWIC, 2009). The Walpole Island Land Trust is currently making attempts to acquire and protect occupied White Prairie Gentian habitat.

A small number of seeds were collected from plants on the Walpole Island First Nation in 2006 for the purpose of studying seed viability and germination conditions and rates. Leaf samples from White Prairie Gentian were also collected to be used in genetic analyses to investigate the rate of hybridization in the population.

Recovery actions described in the Draft Walpole Island Ecosystem Recovery Strategy (Bowles, 2005) include raising awareness in the community about species at risk, including White Prairie Gentian. Pamphlets, calendars, newsletter articles, posters and other communications material have been used to raise awareness.

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 – White Prairie Gentian

Threat or Limitation	Priority	Broad Strategy to Recovery	General Description of Research and Management Approaches
All threats	High	<ul style="list-style-type: none"> • Protect, conserve and manage habitat 	<ul style="list-style-type: none"> • Promote conservation and appropriate management of habitat supporting White Prairie Gentian • Develop and implement habitat management techniques to maintain suitable habitat for White Prairie Gentian • Establish policies, agreements or other tools that protect existing White Prairie Gentian habitat (e.g., acquisition or conservation agreements) • Monitor and manage for invasive species
	High	<ul style="list-style-type: none"> • Monitor / assess populations 	<ul style="list-style-type: none"> • 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	Medium	<ul style="list-style-type: none"> • Conduct research and gather and transfer knowledge 	<ul style="list-style-type: none"> • Examples of knowledge gaps: extent of hybridization between White Prairie Gentian and Closed Bottle Gentian; pollination uncertainties; seed predation and other factors affecting population size and recruitment (e.g., seed dispersal); Traditional Ecological Knowledge

7. CRITICAL HABITAT

7.1 Identification of the Species' Critical Habitat

At this time, the information required to identify critical habitat for the White Prairie Gentian is not available to Environment Canada. Although the continued presence of the White Prairie Gentian population has been confirmed (J. Bowles, unpublished report, 2008), the data required to be able to identify critical habitat sites (i.e., location and extent of population, biophysical attributes of the habitat), are not yet available to Environment Canada. The activities to obtain the required information are outlined in the schedule of studies (Table 3).

White Prairie Gentian is typically known to be associated with areas of mesic to dry-mesic prairies, savannas and alvars with the presence of well-drained, calcareous soil. Given the known historic and current threats to the species, confirmation of the location and extent of the White Prairie Gentian population is required for the identification of critical habitat. Evidence exists that indicates certain threats may have impacted portions of the population (Waldron, 2001; J. Bowles, unpublished report, 2008) during the elapsed time period from when location data is available to Environment Canada (ca. 1990). There is also a need to confirm the biophysical habitat attributes required by the species, to confirm the extent of these attributes where the population occurs (e.g., using Ecological Land Classification (Lee et al., 1998)), and to confirm the extent of the habitat required to meet the population and distribution objective.

Once adequate information is obtained, 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.

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 and habitat information at currently occupied sites.	Confirm location and extent of population. Confirm habitat associations, habitat attributes and determine extent of suitable habitat.	2012 - 2017
Develop and apply criteria to identify sites meeting critical habitat criteria.	Identify critical habitat.	2017

8. MEASURING PROGRESS

The performance indicators presented below provide a way to define and measure progress toward achieving the population and distribution objectives. Specific progress towards implementing the recovery strategy will be measured against indicators outlined in subsequent action plans.

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

- the current Canadian abundance has not decreased, and
- the current Canadian distribution has not decreased.

9. STATEMENT ON ACTION PLANS

One or more action plans will be completed for White Prairie Gentian by December 2017. 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.

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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 White Prairie Gentian. The potential for the strategy to inadvertently lead to adverse effects on other species was considered. 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 WHITE PRAIRIE GENTIAN IN THE UNITED STATES

Table 1. List and description of various conservation status ranks for the White Prairie Gentian in the United States (from NatureServe, 2011).

	Global (G) Rank	National (N) Rank (United States)	Sub-national (S) Rank
White Prairie Gentian (<i>Gentiana alba</i>)	G4 (Apparently Secure - uncommon but not rare; some cause for long-term concern due to declines or other factors)	NNR (Unranked - nation or state/province conservation status not yet assessed)	Arkansas (SNR) Illinois (SNR) Indiana (S2) Iowa (S3) Kansas (S2) Kentucky (S1S2) Maryland (SNR) Michigan (S1) Minnesota (SNR) Missouri (SNR) Nebraska (S1) North Carolina (SH) Ohio (S2) Oklahoma (S1) Pennsylvania (SH) West Virginia (S1) Wisconsin (S3)

S1: Critically Imperilled; S2: Imperilled; S3: Vulnerable; SNR: Unranked; SH: Possibly Extirpated.