

# Tallgrass Communities of Southern Ontario A Recovery Plan



Prepared by Lindsay Rodger  
for World Wildlife Fund  
and the Ontario  
Ministry of Natural Resources

February 1998

*Tallgrass Communities of Southern Ontario: A Recovery Plan*

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Illustrations by Premek Hamr.

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DISCLAIMER

This is the final draft of *Tallgrass Communities in Southern Ontario: A Recovery Plan*. It has been prepared by Lindsay Rodger in consultation with the Tallgrass Communities Advisory Team and others, to define recovery actions that are deemed necessary to protect and recover tallgrass communities in southern Ontario. The goals, objectives and recovery actions identified in the recovery document are subject to appropriations, priorities and budgetary constraints of the participating jurisdictions and organizations, as well as to modifications resulting from changed objectives or new findings.

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# Foreword

The first time I ever heard of tallgrass prairie was as a student reading *A Sand County Almanac* in which Aldo Leopold wistfully states, “No living man will see again the long-grass prairie, where a sea of prairie flowers lapped at the stirrups of the pioneer.”

True, we may never see those days again. But thanks to intensified interest and conservation efforts over the last 20 years, it is still too soon to sign the death warrant for tallgrass and at least some of its inhabitants. This recovery plan is a case in point – a joint effort between World Wildlife Fund and the Ontario Ministry of Natural Resources, prepared with the assistance of an expert Advisory Team.

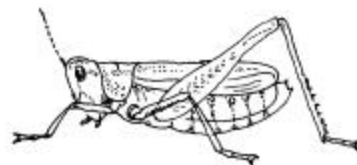
It will come as news to most Ontarians that we even *have* tallgrass prairie in this province. But we do, and it deserves our conservation attention just as much as better known habitats. Further, by developing a recovery plan for these endangered *spaces*, we hope to recover the endangered *species* that call it home. Such an approach, if it works, could serve as an important precedent or model for recovering other habitats that support a cluster of endangered wildlife species.

Leopold hasn’t been proven wrong on much, but wouldn’t it be nice if we could do so in this case?



Monte Hummel  
President  
World Wildlife Fund Canada

January 22, 1998



# Executive Summary

Tallgrass prairies and savannas are some of the most endangered ecological communities in Canada, with approximately 1 percent of their original extent remaining. Tallgrass communities once covered a significant part of southern Ontario's landscape. Owing to degradation and destruction through urban development, agriculture, pollution and mismanagement, less than 3 percent of the original extent remains in the region, with most remnants existing in small, isolated patches. As these highly diverse communities themselves are rare and threatened, so too are many of the wildlife species which depend on these communities for their survival.

Interest in conserving and restoring Ontario's tallgrass communities and their resident wildlife is on the rise in Ontario. However, many initiatives to date have generally been uncoordinated and piecemeal. There is a need for greater coordinated leadership, communication and consolidated information to help direct current and to incite new involvement. To make significant strides toward recovering tallgrass communities region-wide, a larger, more coordinated and strategic approach is required.

A species-by-species approach to recovering tallgrass communities is unrealistic for the task at hand. Because of this, this Recovery Plan deals with recovering tallgrass communities as a whole across their range in Ontario. The overall goal of this Recovery Plan is to recover, reconstruct and conserve a representative network of tallgrass communities, and to recover and protect the full complement of plant and animal life that makes up these diverse ecological communities. To do this on a region-wide scale in a strategic and comprehensive manner, the following eight goals for recovery provide key direction:

1. Improve communication, coordination and information-sharing among those involved in tallgrass community conservation.
2. Amass complete information regarding all tallgrass community remnants in southern Ontario.
3. Establish and expand a network of protected tallgrass community remnants.
4. Encourage protection of tallgrass remnants through sound management.
5. Encourage restoration and habitat creation initiatives where appropriate to enlarge existing remnants, make linkages and create new habitat.
6. Raise public awareness and appreciation of tallgrass communities.
7. Reduce significantly the number of tallgrass community species at risk.
8. Encourage basic and applied research relevant to tallgrass community conservation.

The Recovery Plan lists objectives and specific action items necessary to achieve each of the eight goals. These action items are laid out in a five-year implementation schedule. This implementation schedule should be used to gauge progress toward the overall goal of securing tallgrass communities across southern Ontario, and reducing significantly the number of tallgrass species at risk. Annual progress reports should be prepared, and the findings used to shape the next year's work plans for participating organizations. The Recovery Plan should be revised and updated after five years.

Key to the successful implementation of the Recovery Plan is the development of a Tallgrass Prairie and Savanna Association, which will provide leadership and support for the recovery of tallgrass communities across the region. This association will be instrumental in coordinating the completion of the Recovery Plan actions, and will develop a region-wide communications network.

The writing of this Recovery Plan is an important first step toward recovering southern Ontario's tallgrass communities – it provides a basis for action and will help to lay out specific tasks. However, success will not be realized unless the Plan is implemented. This will require the efforts of many people, all cooperating to

complete necessary actions. All sectors – all levels of government, non-governmental organizations large and small, private landowners, businesses and industries – have a part to play. It is vital both to coordinate the organizations and individuals already engaging in recovery activities and to “expand the circle” by getting others involved. Leadership, monetary and other resources, as well as cooperation, creativity and commitment are all needed to achieve the goals.



*Swallowtail on Black-Eyed*

*Susan*

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# 1. Natural History

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## 1.1 DESCRIPTION OF “TALLGRASS COMMUNITIES”

The term "tallgrass communities" is being used to describe the assemblages of flora and fauna making up tallgrass prairie and savanna systems in North America.

"Prairie" is a French word for "meadow," and is used to describe a natural community type in North America which is dominated by herbaceous plants: grasses, sedges, and forbs (wildflowers). Prairies are treeless or nearly treeless and tend to occur on deep soils.

Historically, prairie covered vast expanses of central North America, east of the Rockies, stretching from southern Alberta, Saskatchewan, Manitoba and Ontario south to Texas and New Mexico (Costello 1969, Watts 1969). Three main types of prairie are recognized in North America – tall, mixed and shortgrass prairie. These types are defined primarily by differences in precipitation patterns, which result in quite distinct vegetation communities. Tallgrass prairie is found in the easternmost region, and receives the highest amounts of precipitation of the three prairie types.

In Canada, the word "prairie" most often brings to mind images of vast, flat or rolling grasslands in the western provinces. Few people realize that, historically, prairie extended through southern Ontario and once covered a significant part of this region's land area. Unlike the mixed-grass prairies found in Alberta and Saskatchewan, southern Ontario (and part of southern Manitoba) was home to tallgrass communities. The ample amount of precipitation in comparison with that of the western provinces produced taller, lush vegetation with a collection of flora and fauna quite different from that in the west. Southern Ontario is part of an area known as the "prairie peninsula" or "archipelago," which describes the extension of tallgrass communities across part of the north-eastern United States and into southern Ontario.

"Savanna" is a general term used to describe an area with open-grown trees and/or shrubs growing over a continuous groundlayer of herbaceous vegetation (Leach and Ross 1995, Eiten 1986). Of the four broad types of savanna found in the mid-western United States and Canada (aspen parkland, pine barrens, cedar glade and oak savanna), oak savanna is most closely

associated with tallgrass prairie in southern Ontario. Oak savanna is comprised of open-grown oak trees scattered across the landscape, with a groundlayer of tallgrass prairie species. Unique to savanna communities are various herbaceous species associated with the oak understorey (Packard 1988).

## 1.2 DISTINGUISHING PRAIRIE, SAVANNA AND OTHER RELATED COMMUNITY TYPES

Savanna can be thought of as an ecotone, or transitional community type, between prairie and forest. The delineation between what constitutes a prairie and a savanna, and what separates these two from other community types sharing various structure and process elements, is not clear cut. Various methods of distinguishing these communities from each other include the use of percent tree cover, canopy cover, density, basal area, mean area per mature tree and distances between trees (Bakowsky 1993). In Ontario, the Natural Heritage Information Centre (NHIC) treats tallgrass communities with less than 10 percent tree cover as tallgrass prairie, and those between 10 percent and 35 percent as savanna (Bakowsky 1993).

Other community types in Ontario share characteristics with tallgrass prairie and savanna, but for various reasons, are not included in this Recovery Plan. For instance, oak woodlands contain many of the same species found in oak savanna. However, woodlands have a higher canopy cover; the NHIC considers woodlands to be those areas having 35 percent to 60 percent canopy cover. Such woodlands are maintained by a different fire regime than tallgrass prairies and savannas, having less frequent, lower intensity fires. Other communities in southern Ontario which share compositional or physiognomic features of tallgrass communities include wet meadows, old fields, alvars, sand dunes and red cedar savannas. However, major differences in the structure and ecology of these latter communities exist, including the fact that they are not normally maintained by fire (Bakowsky 1993). These associated community types are not included in this plan.

### 1.3 TALLGRASS COMMUNITIES IN SOUTHERN ONTARIO

All tallgrass prairies and savannas are not alike – in fact, there exists an incredible diversity both in environmental conditions and species composition from site to site. Compared with tallgrass communities in the mid-western U.S., for instance, Ontario’s communities often have a much higher component of forbs versus grasses. This is especially true in the lakeplain prairies of extreme southwestern Ontario. The Natural Heritage Information Centre recognizes six different tallgrass prairie and savanna types in southern Ontario, based on substantial differences in site moisture, species associations, and physiognomy (Table 1). Owing to such diversity, conserving southern Ontario’s tallgrass communities as a whole requires the protection of sites representing these differences across the region.

Incredibly diverse assemblages of plants are found in tallgrass communities in southern Ontario. Several grasses form the basis of the plant community, such as big bluestem (*Andropogon gerardii*) and Indian grass (*Sorghastrum nutans*), which may grow to greater than two meters in height. These are joined by numerous forbs – from the tiny yellow star grass (*Hypoxis hirsuta*) to the three-meter-high giant sunflower (*Helianthus giganteus*) – which bloom at different times of the year, such that there is a continuous floral display from May to November.

Oak savannas share a similar groundcover of tall grasses and a variety of sun-loving prairie species, but there are a few differences in their floral composition. The first is the addition of open-grown oak trees. In Ontario, oak species found in tallgrass communities include black oak (*Quercus velutina*), white oak (*Q. alba*), bur oak (*Q. macrocarpa*), Hill's oak (*Q. ellipsoidalis*), swamp white oak (*Q. bicolor*) and pin oak (*Q. palustris*). Oak-pine savannas, characterized by both oaks and white pine (*Pinus strobus*), occur on dry sites such as Pinery Provincial Park, in the Rice Lake area, and on the Norfolk sand plain. As with the herbaceous species, tree species composition differs from site to site, depending on environmental conditions. A second difference is the addition of several herbaceous plants that grow nearby and in the shade of these oaks. These plants, such as the false foxgloves (*Aureolaria* spp.) and rattlesnake hawkweed (*Hieracium venosum*), are not found in prairies, but are unique to savannas or other wooded habitats.

The great diversity of plant life in southern Ontario's tallgrass communities provides food and shelter for a

wide variety of animal species. Small mammals abound, including deer and meadow jumping mice, meadow voles and short-tailed shrews; large remnants may provide habitat for coyote, deer, and American badger. A number of different birds that prefer or require grassland can also be found, including meadowlark, bobolink, savanna sparrow and northern bobwhite. Several species of frogs, snakes and turtles live in some types of tallgrass communities. Finally, prairies and savannas are teeming with a vast diversity of invertebrate life, from butterflies and damselflies to ants, leafhoppers and ladybeetles.

### 1.4 ECOLOGICAL GUILDS WITHIN TALLGRASS COMMUNITIES

Both among and within tallgrass communities, conditions are heterogeneous, including differences in light, moisture, microclimate, fire frequency, soil type and depth, and various natural and human-caused disturbances. While a set of flora and fauna having an affinity to tallgrass communities in southern Ontario can be identified, individual species have differing requirements and tolerances to the range of environmental conditions and processes existing in these communities. In some cases, subsets of tallgrass species may be grouped together – in “ecological guilds” – based on shared requirements for particular environmental conditions. For instance, a group of tallgrass plants can be identified that require soil disturbance; various insects require refugia from fire in order to maintain their populations at a site. This information is useful to guide management and recovery decisions, and is discussed further in Section 3.

### 1.5 KEY ECOSYSTEM FACTORS AND PROCESSES

It is thought that a combination of factors, including substrate, landscape type, climate, geographic location, grazing and fire have been responsible for the evolution and maintenance of tallgrass communities (Reichman 1987). While the following section outlines each of these factors separately, it must be stressed that they act in concert to produce and maintain diverse prairie and savanna systems.

**Table 1: Tallgrass community types in southern Ontario, and their respective rarities**

Community Type	Global Rank	Prov. Rank	Est'd EOs	EO Range	Comments
<b>Dry tallgrass prairie ecosite</b> Dry tallgrass prairie type	G3	S1	6 to 20	<10%	few extensive (>2 ha) remnants known
<b>Moist-fresh tallgrass prairie ecosite</b> Moist-fresh tallgrass prairie type	G2	S1	6 to 20	<3%	few extensive (>2 ha) remnants known
<b>Dry tallgrass savanna ecosite</b> Dry black oak tallgrass savanna type	G3	S1	1 to 5	<10%	ca. 400 ha in area of Pinery Provincial Park, very little elsewhere
Dry black oak – pine tallgrass savanna type	G?	S1	1 to 5	<10%	ca. 400 ha in area of Pinery Provincial Park, also at Wasaga, Turkey Point.
<b>Moist-fresh tallgrass savanna ecosite</b> Moist-fresh pin oak – bur oak tallgrass savanna type	G1	S1	1 to 5	<3%	< 1000 ha
Moist-fresh black oak tallgrass savanna type	G2	S1	1 to 5	<3%	< 1000 ha

**Source:** modified from Bakowsky 1996.

**\*Key:**

Global ranks:	G1	Critically imperiled globally because of extreme rarity (five or fewer occurrences or very few remaining hectares) or because of some factor(s) making it particularly vulnerable to extinction.
	G2	Imperiled globally because of extreme rarity (six to 20 occurrences or few remaining hectares) or because of some factor(s) making it vulnerable to extinction throughout its range.
	G3	Either very rare and local throughout its range or found locally (even abundantly at some of its locations) in a restricted range (e.g. a single province or physiographic region) or because of other factor(s) making it vulnerable to extinction throughout its range; in terms of occurrences, in the range of 21 to 100.
	G?	Insufficient information currently exists to properly determine rank.
Provincial rank	S1	Extremely rare in Ontario; usually five or fewer occurrences in the province, or very few remaining hectares.
Estimated EOs		Estimated number of element occurrences of the particular community type.
EO Range		Estimated distribution range of the community element within the province.

\* See page 46 for information on the determination of global and provincial rankings.

### 1.5.1 Climate and geographic location

The prairie peninsula is thought to have developed due to a warm, dry period about 5,000 years ago, which favoured herbaceous prairie plants over deciduous forest (Deevey and Flint 1957). Tallgrass vegetation advanced from the mid-west across southwestern Ontario, lower Michigan, Ohio, Indiana and western Pennsylvania. Since this warm climatic period, the climate has become cooler and more humid, which favoured the invasion of forest into some tallgrass areas (City of Windsor, Department of Parks and Recreation, undated; Deevey and Flint 1957). However, tallgrass communities in various areas in southern Ontario resisted conversion to forest due to a combination of features and processes. Remnants tend to be found in areas that experience warmer than average microclimates, such as south-facing slopes and sandy sites near lakes and rivers (Bakowsky 1993). Tallgrass communities would also be favoured in drought-prone, fire-prone sites, and would have been maintained historically by Native Americans' frequent use of fire (Pyne 1982, Day 1953).

### 1.5.2 Fire

While most people think of it as a highly destructive force, fire has been called "the guardian of the tallgrass prairie" (Reichman 1987). In fact, it is generally believed that fire is the main driving force behind the persistence of prairie and savanna communities (Reichman 1987, Sauer 1950). Over thousands of years, tallgrass communities have co-existed with fire, and they have come to depend on it for maintenance and renewal. Prairie and savanna plants develop extensive root systems that allow them to literally rise from the ashes if the above-ground biomass is removed by fire. At the same time, fire kills plants that are fire-intolerant, which controls invasion by most trees and by herbaceous species which are not part of the tallgrass community. Exceptions to this include several species of oak which are relatively fire tolerant; thus, savannas, as well as tallgrass prairies, develop in the presence of a fire regime.

Because the dried leaves and stems of prairie grasses decompose very slowly, dead plant matter (litter) can accumulate to levels that choke off the growth of herbaceous tallgrass species within a few years (Knapp and Seastedt 1986). Fire removes this accumulated litter, increasing light availability to tallgrass plants, especially in the spring. Fire also volatilizes nitrogen, thus creating the high light, low nitrogen conditions under

which the dominant prairie grasses are most competitive (Wedin and Tilman 1992). Finally, fire leaves the ground covered with black ash; this absorbs solar radiation, warming the soil and encouraging plant growth.

Tallgrass fires were often kindled by lightning strikes. Since dry grass ignites easily, and uninhibited wind has the ability to move fire along quickly over large areas, expansive areas could be torched by a single strike. Fire can occur at most times of the year; however, the most likely times would be early spring and mid-summer when fuel conditions are favourable and large weather disturbances bring high lightning activity to various areas in central North America (Bragg 1982). In addition, there is evidence that Native Americans in various places across the North American prairies frequently set grassland fires (Pyne 1982). Some of these fires may have been accidental; others were started purposefully to drive wild game or to clear land for various reasons, including attracting wild game to the tender grass shoots that the fires encouraged.

The natural frequency of fires on tallgrass communities is not known. Historical documentation suggests that tallgrass prairie burned at least once in 10 years, and perhaps as often as every three to four years (Reichman 1987). The mean natural fire interval in the savannas of Pinery Provincial Park is thought to have been approximately 20 years (Tegler 1986). Differences in fire frequency, intensity, and size of area burned undoubtedly have a hand in effecting differences in species composition and frequency. Ongoing research (e.g. on Konza Prairie in Kansas; see Reichman 1987) suggests that different burn times and intensities elicit different responses from individual plants. For example, early spring fires enhance growth, tiller production and density of flowering stems of big bluestem and various other dominant grasses.

### 1.5.3 Soil and landscape

Tallgrass communities usually occur on deep soils, greater than 25 cm deep (Bakowsky 1993). Most remaining prairie and savanna remnants in southern Ontario occur on sandy soils (Faber-Langendoen and Maycock 1994, Bakowsky 1988). Historically, prairie communities also existed on clay and clay-loam soils, but all known examples have been converted to other land uses (Bakowsky 1993). Most grasslands are located on flat to rolling landscape (Sauer 1950); this may be related to the need for fire, which can travel quickly and easily over this type of terrain.

### 1.5.4 Grazing and other animal activities

Disturbance caused by grazing animals is another general feature of grasslands (Anderson 1990). Historically, the most notable North American grassland grazer was the bison. While now only found in isolated, managed herds, large numbers of bison once ranged across the great plains. Since herds migrated, tallgrass communities were likely subjected to infrequent but heavy local grazing episodes. Grasses are adapted to grazing; since their growth points (called meristems) are located close to or underneath the ground's surface, they can easily re-grow from these points following a grazing episode. A moderate amount of grazing actually stimulates plant growth in grassland communities.

Provisional evidence suggests that bison were present

in southern Ontario at the time of European contact and for a short time afterwards in small numbers only (Campbell *et al.* 1997), and so were unlikely to have impacted Ontario's tallgrass communities to the same extent as those in the central United States. Elk also inhabited the area historically; however, southern Ontario's tallgrass region has not experienced large undomesticated herbivores for many decades. Various small herbivores, from groundhogs to grasshoppers, impact tallgrass communities here today.

Various other animal activities causing disturbance in tallgrass communities include burrowing by small mammals and their predators, ant mound activity, and scat production. Such disturbances may serve important ecological purposes, such as exposing bare soil for seed germination and providing microclimates hospitable to various organisms or processes.



*Henslow's Sparrow*

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## 2. Evaluation of Current Status

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The following section summarizes what is known about the past and current distribution of tallgrass communities, discusses the current status of those communities and associated flora and fauna, and outlines the main factors currently limiting or threatening these communities.

### 2.1 PAST AND CURRENT DISTRIBUTION, RANGE-WIDE AND IN ONTARIO

Before settlement, tallgrass communities covered most of Iowa, Illinois, southern Minnesota and Wisconsin, northern Missouri, and the eastern parts of North and South Dakota, Nebraska, Kansas and Oklahoma. This area formed a rough triangle, with its points extending north into southern Manitoba, south into northeastern Texas, and east into Indiana, southern Michigan and Ontario with outlying patches in more eastern States (Reichman 1987, Costello 1969).

Recent assessments clearly show that tallgrass communities across North America are in peril. It is estimated that tallgrass prairie once covered 775 000 km<sup>2</sup> (77.5 million ha) in the United States; at present, only 2-4 percent remains (Ostlie, pers. comm.). At the time of settlement, midwest oak savanna covered between 11 and 13 million ha. In 1985, a survey identified 113 remnant sites totalling approximately 2 600 ha, which represents 0.02 percent of its former area (Nuzzo 1986). Of the approximately 6 000 km<sup>2</sup> of south-central Manitoba that was once covered by tallgrass prairie (Watts 1969), it is estimated that less than 1 percent remains in a few isolated patches (Joyce and Morgan 1989).

A variety of sources has been used to piece together a picture of the historical extent of tallgrass communities in Ontario. Since prairie vegetation modifies upper soil layers in recognizable ways, soil analysis has been used to estimate the former extent of tallgrass communities in southwestern Ontario (Lumsden 1966). Such work shows that sizable portions of Essex, Kent and Lambton counties and, to a smaller extent, Elgin and Middlesex counties, may once have been covered with tallgrass communities. Surveyors' notes and various other historical records reveal that tallgrass communities may once have been frequent on near-shore areas around Lakes Erie, Ontario, St. Clair, and the southern portion of Lake Huron, and were also known to occur inland

around such areas as London, St. Thomas, Delhi, Simcoe, Brantford, Dumfries Township, Lake Simcoe, Rice Lake and Peterborough (Bakowsky and Riley 1994). It is estimated that at least 800 km<sup>2</sup> (Bakowsky, pers. comm.), but perhaps up to 2 000 km<sup>2</sup> or more (Woodliffe, pers. comm.), of southern Ontario was once covered by tallgrass communities (see Figure 1).

In 1992, approximately 2 100 ha (21 km<sup>2</sup>) of prairie, savanna and woodland were known to be remaining in southern Ontario (Bakowsky and Riley 1994; see Figure 2). This total represents less than 3 percent of the presettlement extent of prairie and savanna in this region. The majority of this area is accounted for in three locations: Walpole Island in Lake St. Clair (225 ha), Ojibway Prairie Complex in Windsor (443 ha) and on the southern edge of Lake Huron, from Grand Bend to Kettle Point, including Pinery Provincial Park (1 250 ha). Most other remnants exist as small, isolated patches of less than 2 ha.

### 2.2 STATUS OF ECOLOGICAL COMMUNITIES AND INDIVIDUAL SPECIES CONSIDERED AT RISK

Table 1 lists the types of tallgrass communities found in southern Ontario and shows both global rankings, assigned by The Nature Conservancy (U.S.) and provincial rankings, assigned by the Natural Heritage Information Centre, which designate the level of rarity of these communities. As can be seen, all types are considered extremely rare both provincially and globally.

Since so little of these tallgrass communities remains, it is not surprising that many plant and animal residents of these communities are quite rare. To date, 156 plants associated with tallgrass communities in Ontario have been granted one or more official rare designations at the global, national and/or provincial levels (Appendix 1). A growing number of faunal species associated with tallgrass communities is also

Figure 1: Estimated minimum\* historical extent of tallgrass prairie and savanna in southern Ontario

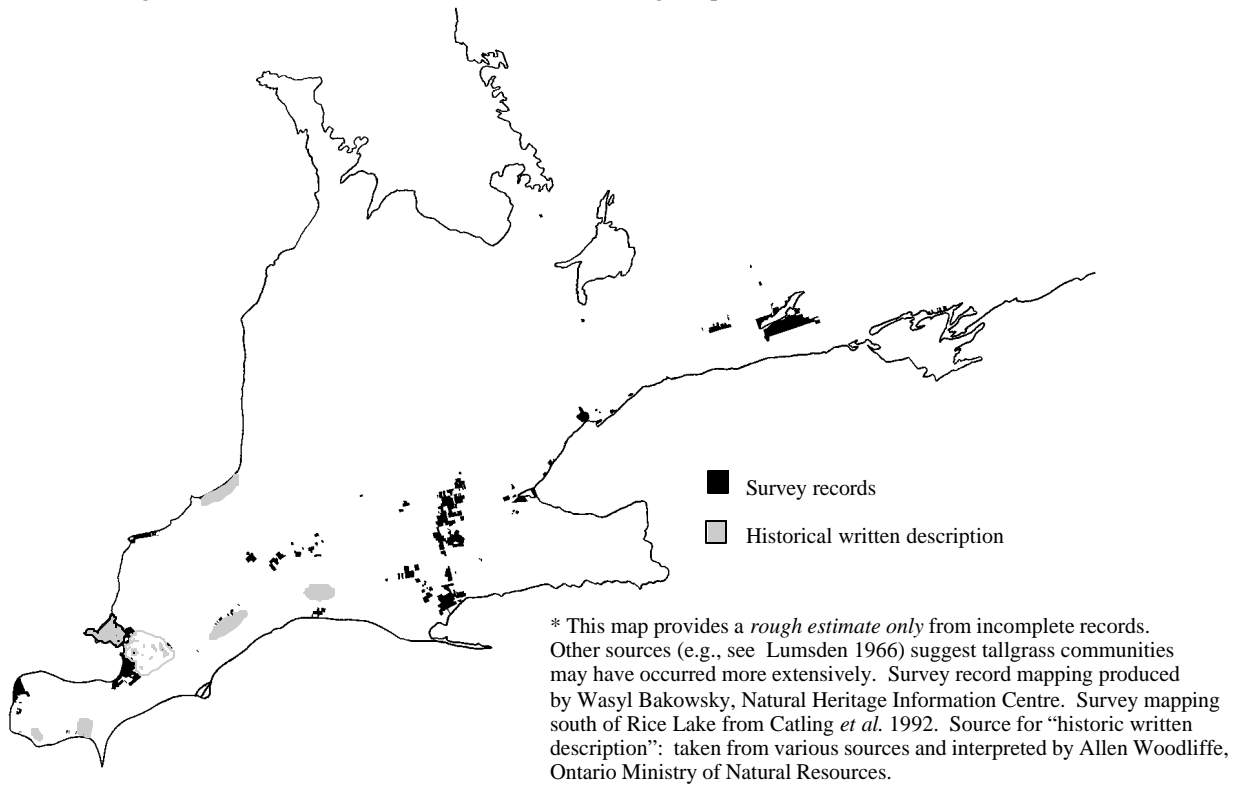
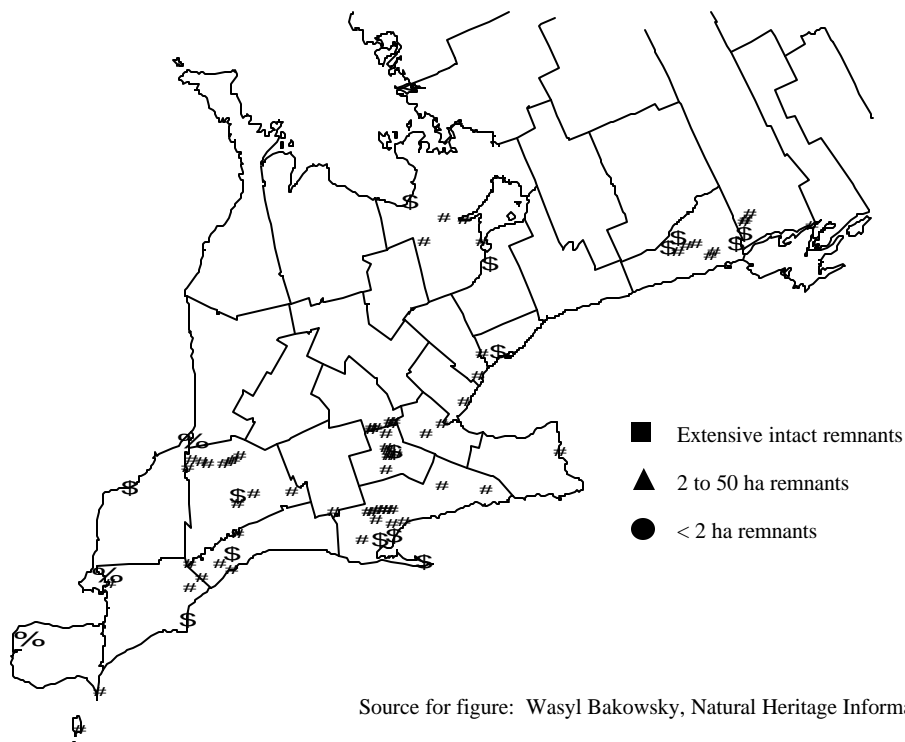


Figure 2: Dot distribution map of current tallgrass prairie and savanna remnants in southern Ontario



considered to be at risk (Appendix 2). Floral treasures such as the white prairie gentian and small white lady's slipper orchid are now known in only a few sites. Several butterflies which depend on tallgrass flora have virtually disappeared from Ontario, including the karner blue, which was listed as extirpated by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC) in 1997. Elk, once inhabitants of southern Ontario's grasslands, were extirpated by 1850 (Peterson 1966). While tallgrass communities once supported a variety of large mammals and many bird species, most remnants are too small to support viable populations of animals such as badger and Henslow's sparrow.

## 2.3 OVERVIEW OF LIMITING FACTORS

While the primary cause of the decline of tallgrass communities in North America is outright habitat destruction, other factors continue to threaten existing remnants, such as the alteration of ecological processes (i.e. fire suppression, altered hydrology), habitat degradation and invasion by exotic species. In addition, various genetic diversity issues must be dealt with in the attempt to conserve some of Ontario's rarest flora and fauna.

### 2.3.1 Habitat destruction

By far the largest threat to tallgrass communities in southern Ontario has been the conversion of natural areas to other land uses. Many cities and towns in southern Ontario were built on land formerly covered by prairie and savanna. The great richness of prairie soils was ideal for growing agricultural crops, and the paucity of trees made clearing in preparation for the plow much easier than on forested land. Since the beginning of European settlement in the great plains region, millions of hectares have been ploughed under and planted with monocultures of various cereal and grain crops. The main challenge for the survival of tallgrass communities and the organisms that depend on them is simply to have enough space to survive and to allow natural processes, such as fire, to occur. The sum total of the tiny, isolated remnants left in southern Ontario is not enough to conserve healthy tallgrass communities in perpetuity – and many of these have no form of protection from further destruction. Already, various species have declined and disappeared due to lack of habitat, and more extirpations are likely if the trend of habitat loss is not reversed. In order to recover tallgrass communities, these threats and their underlying factors must be addressed.

### 2.3.2 Removal of fire regime

Simply setting aside land for tallgrass occupation is not enough to conserve this threatened ecosystem. The occurrence of fire is necessary to maintain a healthy, functioning tallgrass community. Fire acts to renew and invigorate the growth of tallgrass flora, creating conditions that give these native species a competitive edge. When fire is suppressed, shrubs and trees that are not part of tallgrass communities tend to invade. Over time, these invaders create a canopy which shades out the sun-loving grassland species, and may dominate to the point that they degrade the habitat as a whole. Existing remnants are so small and isolated, the chances of a lightning strike igniting a fire on them on a regular basis are minute. In addition, wildfires are suppressed for public safety reasons.

In order to maintain their ecological health, southern Ontario's tallgrass communities need to be actively managed with carefully controlled burn programs. In areas where prescribed burning is not possible, properly timed mowing can restore some, but not all, of the benefits of fire. However, the hay should be removed or it will accelerate nitrogen cycling and encourage the invasion of cool season grasses and weeds. Similarly, grazing, although important in maintaining heterogeneity in some types of prairie and savanna, accelerates nitrogen cycling and will also encourage the invasion of non-prairie plants. Thus, grazing cannot be a substitute for fire. In fact, grazed tallgrass communities may require more frequent fire to maintain the dominance of the tallgrass flora (Hobbs *et al.* 1991).

### 2.3.3 Overgrazing

The vegetation in tallgrass communities evolved with bouts of brief but sometimes intense grazing episodes. Grasses are adapted to grazing; unlike many other plants, the growth points, or meristems, are located close to or below the ground's surface. As long as the meristem is not removed, the plant can re-grow from these points following a grazing episode. Tallgrass communities can also provide good pasture for domestic animals. However, sustained overgrazing can significantly degrade or destroy a tallgrass remnant. While non-native grasses like Kentucky bluegrass keep their meristems at ground level, the meristems of tallgrass residents big bluestem and switchgrass rise several centimetres above ground level (Madson 1982). If grazed to the point that the meristems are removed, these plants will be weakened and may not grow back.



The majority of the tall grasses in prairies and savannas are "warm-season" grasses. This means that they start their growth later in the year than typical non-native "cool-season" grasses used widely in North America for pasture. Allowing warm-season grasses to be grazed too early results in growth setbacks and significantly lower yields. Grazing also speeds the cycling of nitrogen, encouraging the growth of non-native plants and woody species adapted to higher nitrogen levels.

Overgrazing by large deer populations is also an issue of concern. At Pinery Provincial Park, three prescribed burns were carried out between 1986 and 1993 in an attempt to restore several savanna communities. These burns were successful in regenerating tallgrass flora from the seed bank; however, this new growth was immediately removed by heavy deer grazing. Since continued burning and subsequent heavy grazing will deplete the native seed bank, prescribed burns at the park have been halted until the deer population is controlled (T. Crabe, pers. comm.)

### 2.3.4 Alteration of groundwater regime

In some tallgrass communities, fluctuating water levels prevent invasion by woody species. However, in many areas, human activities associated with urban development and agriculture (e.g. ditching) have changed drainage features and patterns dramatically. Tallgrass communities are more susceptible to woody species invasion when periodic flooding no longer occurs on a regular basis.

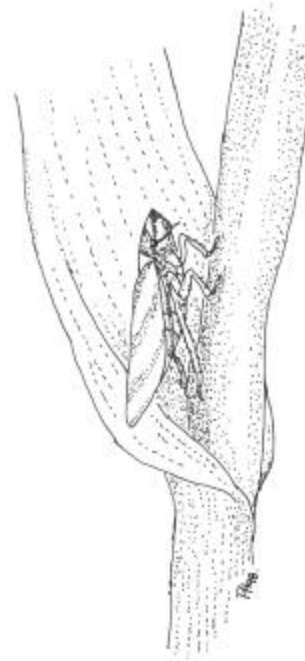
### 2.3.5 Pollution

The unique interaction between prairie grasses and soil in a healthy tallgrass community creates a very nitrogen-limited environment; tallgrass species lose their competitive edge against non-native plants and woody vegetation in high nitrogen environments (Wedin and Tilman 1996). As such, high nitrogen inputs can lead to invasion of non-native plants and loss of native species diversity. Many tallgrass remnants in southern Ontario are affected by an increased nutrient load due to polluted air and water. Major sources of nitrogen pollution include run-off and drift from fertilized agricultural fields and livestock operations, fertilizer use in urban settings, motor vehicle emissions and various industrial activities. To lower the risks to tallgrass communities, nitrogen pollution must be reduced at source. In addition, securing buffer lands and increasing fire frequency in remnants may be

necessary to help combat the deleterious effects of increased nitrogen levels.

### 2.3.6 Genetic diversity issues

Genetic diversity helps a species to survive in a variety of different conditions and to adapt to change. Thus, it is not enough to save individuals of a species; it is also important to conserve the existing genetic diversity of that species. Since many tallgrass species achieve their northern- or eastern-most distribution in southern Ontario, this region may support populations that have distinct genotypes from their counterparts to the south and west. Currently, some attempts to restore or re-create tallgrass communities in Ontario are carried out using plant material from distant populations, which may change the character and the fitness of the local communities. While these activities are cause for concern to some conservationists, as yet no agreed upon set of guidelines exists for determining appropriate ways to conserve genetic diversity in tallgrass communities.



*Leafhopper*

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## 3. Recovery Potential

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It is critical that a concerted, region-wide effort be launched to recover tallgrass communities in this province. The following section comments on the types of recovery efforts currently underway, then describes the recommended approach for region-wide recovery planning.

### 3.1 CURRENT RECOVERY EFFORTS

Until recently, most conservation efforts in Ontario have been focused on wetland and forest systems, with the exception of a few tallgrass conservation projects that have been ongoing for several decades. This is beginning to change, with a recent profusion of interest and activity in active tallgrass conservation work. The following selection of ongoing activities, while not exhaustive, demonstrates the range of tallgrass conservation work currently underway.

With the exception of areas managed by Native Americans prior to European settlement, the Ojibway Prairie Complex in Windsor has the longest history of organized active management in southern Ontario. This remnant has received management attention – including prescribed burning – since 1978. Comprised of several pieces of land with a mix of private and public ownership, the complex is jointly managed by the Windsor Parks and Recreation Department, Ontario Parks, the Ministry of Natural Resources (OMNR) and the Friends of Ojibway Prairie. This 443 hectare site is one of Ontario's largest remaining tallgrass remnants.

A much more recent effort, the OMNR (Chatham)-initiated Tallgrass Prairie Initiative, began following the highly successful 13<sup>th</sup> North American Tallgrass Prairie Conference, held in Windsor in August, 1992. This initiative gathered momentum with the formation of the Rural Lambton Stewardship Network (RLSN) in 1994. This non-government organization has been very active, forming partnerships with a multitude of government agencies, non-governmental organizations, commercial and industrial firms, schools and community groups to do small- and large-scale tallgrass prairie creation projects on public and private lands, and to facilitate the region-wide transfer of useful technology. The Initiative is also in the process of developing a large-scale seed nursery.

Various agencies are considering or are already planting tallgrass plants as part of integrated roadside management programs. A milestone was reached in the spring of 1996, when the first prescribed burn along Highway 401 was carried out by OMNR in cooperation with the Ministry of Transportation (MTO). Activities by various naturalist groups and conservation agencies (including World Wildlife Fund [WWF], the Nature Conservancy, the Federation of Ontario Naturalists [FON] and Wildlife Habitat Canada) include remnant acquisition, restoration and management, habitat creation and various environmental education initiatives. Municipal and provincial parks, such as Windsor's Ojibway Prairie Complex, Toronto's High Park, and Rondeau, Pinery and Turkey Point Provincial Parks, are active in tallgrass research, management, and environmental education. Businesses and industries are also becoming involved – both as sponsors of work, and in naturalization projects on their own land. For example, two hectares of an Ontario Hydro corridor in Sarnia were recently planted with tallgrass species. Related applied research work in southern Ontario includes work by researchers at the University of Waterloo to evaluate the appropriateness of tallgrass plantings on hydro corridors, and an OMNR study to evaluate the use of tallgrass plants for aggregate reclamation projects. Several private native plant nurseries and seed suppliers are in operation, supplying appropriate plant material.

Several more species-specific activities are going on as well. For example, the Karner Blue Recovery Team, with the assistance of various cooperating agencies, has initiated work towards the goal of rearing and reintroducing the karner blue butterfly, while RLSN, OMNR and the Ontario Federation of Anglers and Hunters are investigating possibilities for reintroducing the northern bobwhite to augment southern Ontario's depleted populations.

Private landowners and local naturalist groups across the region are working to manage remnants and to create tallgrass habitat on their own properties. Natural gardening with tallgrass prairie plants is an activity that has experienced a dramatic increase in popularity over the past decade. This has done much to raise public awareness and interest in tallgrass communities conservation in the region. Lambton Wildlife Incorporated, a naturalist club in Lambton county, owns and manages several tallgrass remnants in the Port Franks area. In 1996, the club began a comprehensive entomological study of these areas. This study, which has recorded more than one thousand species of insects to date, has made a significant contribution to a little-studied aspect of tallgrass communities in southern Ontario.

While various schools across the region are becoming active in naturalization projects on school property – including prairie work – several post-secondary institutions have faculty involved in different aspects of tallgrass communities research. Various tallgrass plant species are being evaluated for possible commercial and agricultural uses, such as ethanol production and pest control in agricultural settings.

Besides those agencies and individuals currently involved in tallgrass recovery work, there exists a great potential to involve various groups with complementary mandates and activities. The Ontario Environmental Farm Program and the corporate property sanctuary program developed by the Audubon Cooperative Sanctuary System of Canada are examples of initiatives which could conceivably support tallgrass community recovery work. Partnerships with agencies operating complementary programs, such as Ducks Unlimited (active in dense nesting cover habitat creation projects) should definitely be pursued to advance tallgrass community recovery.

The Carolinian Canada Coalition has recently developed a conservation strategy which presents a vision, goals and actions for a coordinated effort regarding natural communities conservation in southern Ontario (Reid and Symmes 1997a and 1997b). This strategy includes the goal of achieving protection for all significant prairie and savanna remnants and restoration of the full range of native tallgrass communities (Appendix 4).

### **3.2 RECOVERY PLAN APPROACH**

Conservation efforts can be roughly divided between those taking a species focus and those which focus on entire communities or habitats. To date, much of the recovery effort for species at risk in Canada has been carried out on a species-by-species basis. As time goes by – and more species are added to the “at risk” list, but few are removed – it is becoming increasingly apparent that a single species approach alone is not a practical method of recovering many species of flora and fauna.

From a financial perspective, a species-by-species approach to recovering any more than a handful of species is unrealistic; tens and sometimes hundreds of thousands of dollars are spent to implement RENEW (Recovery of Nationally Endangered Wildlife) recovery plans. The time required to undertake and analyze necessary research, coordinate recovery plan committees and develop an appropriate recovery plan for one species can take months or years. The tendency has been to focus on the more “glamorous” species, such as large mammals and showy wildflowers, while ignoring less showy or less well known species that may be equally rare and may be just as important in terms of maintaining ecosystem structure and function.

Habitat loss is recognized as playing an important role in the decline of many species in Canada. For example, loss of habitat has been identified as the major factor in the decline of more than 70 percent of COSEWIC’s endangered species (Caza 1995). Recovering ecological communities as a whole may be a more efficient, timely and cost-effective way to conserve most of the species that depend on them. There can be little argument that the main threat to most tallgrass community species in southern Ontario is the paucity of secured, high quality habitat. Recovery of such habitat will be a major step toward the recovery of many species at risk. As such, recovering tallgrass communities as a whole is considered a top priority, and comprises the main thrust of this Recovery Plan.

### **3.3 PROVISIONS FOR ECOLOGICAL GUILDS AND SINGLE SPECIES WITH SPECIAL REQUIREMENTS**

While such a broad-based recovery strategy is vital to the long-term viability of southern Ontario’s tallgrass communities, single species recovery programs continue to be necessary for species whose

populations have declined to the extent that reintroduction programs are necessary. Single species programs may also be necessary in cases in which specific factors must be controlled to prevent declines, such as poaching, hybridization, and toxic contamination.

In addition, some species at risk have particular management needs that need to be addressed. A wide variety of flora and fauna exist within the tallgrass community matrix. Although the ecosystem as a whole is fire-adapted, the elements of biodiversity contained within have differing requirements and tolerances to the environmental conditions and processes existing in these communities. For example, the karner blue butterfly depends on wild lupine, a fire-dependent tallgrass wildflower; however, fire itself destroys immobile butterfly eggs, larvae and pupae. Patchy fire, which was frequent on large expanses of tallgrass habitat historically, maintained a balance between renewing the lupine population and sparing a portion of the butterfly's progeny. Historically, at the landscape scale, there was sufficient diversity and variation in the application of these natural processes (e.g. patchy fire, localized wet spots, soil disturbance). This

variation, vital to maintaining the full complement of resident flora and fauna, is usually absent from remnants (particularly the smaller ones). In order to recover some species, their specific needs may require specialized management.

This Plan starts the process of identifying these needs. The tables of rare flora (Appendix 1) and fauna (Appendix 2) list specific aspects of each species' ecology that must be considered for their recovery and management. Also included in Appendix 1 are non-rare plant species which typically occur in tallgrass communities and may be considered to be characteristic species of prairie and savanna. This information will be useful for developing site-specific management plans, and may also be useful in identifying ecological guilds, which would provide logical groupings for multi-species recovery plans.

This Plan recommends further study to identify the needs of tallgrass species at risk, and to produce and implement specific recovery plans for those species facing threats not addressed by this Plan. For maximum efficiency, recovery plans should deal with an ecological guild (as opposed to a single species only) when appropriate.



*Badger*

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## 4. Recovery Plan

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The following section outlines goals for recovering tallgrass communities across southern Ontario, and the recommended objectives and actions for accomplishing those goals.

### 4.1 RECOMMENDATIONS FOR RECOVERY PLAN PARTICIPANTS

Please note that agencies and organizations mentioned in the following Goals, Objectives and Actions and the corresponding Implementation Schedule have been suggested as *possible participants* in Recovery Plan execution. It is believed, by the author and Advisory Team members of this Recovery Plan, that these organizations are in the best position to participate in the actions listed. These listings have not been formally approved by all mentioned organizations; however, many of these organizations have indicated that they are interested in becoming involved, while others are already working on action items listed in this Plan. See also Appendix 3 for an expanded list of potential participants. The successful execution of this Recovery Plan will require assistance and cooperation from a wide variety of agencies and individuals beyond those listed in this document.

### 4.2 TOP PRIORITIES FOR TALLGRASS COMMUNITY RECOVERY

While the Recovery Plan outlines numerous recommended actions organized under eight goal statements, the following lists five statements that are intended to guide action and point out top priorities.

1. **Organize a Tallgrass Prairie and Savanna Association** that will guide and evaluate progress of this Recovery Plan, and will provide leadership in the areas of communication, information-sharing and education.
2. **Focus on protecting existing remnants.** The top priority is to protect what remains. The vital first step towards this goal involves locating, surveying and prioritizing protection activities for all tallgrass remnants in southern Ontario.
3. **Engage in habitat creation in key areas** to enlarge and connect remnants.

4. **Develop resources and services to encourage people to protect, restore and maintain tallgrass communities**, and ensure that these resources are easily accessible.
5. **Elicit increased support** from all levels of government, non-governmental organizations, the business community and private citizens to provide the funds, the resources and the will to complete all recommended actions put forward by this Plan.

### 4.3 GOALS

1. Improve communication, coordination and information-sharing among those involved in tallgrass community conservation.
2. Amass complete information regarding all tallgrass community remnants in southern Ontario.
3. Establish and expand a network of protected tallgrass community remnants.
4. Encourage protection of tallgrass remnants through sound management.
5. Encourage restoration and habitat creation initiatives where appropriate to enlarge existing remnants, make linkages and create new habitat.
6. Raise public awareness and appreciation of tallgrass communities.
7. Reduce significantly the number of tallgrass community species at risk.
8. Encourage basic and applied research relevant to tallgrass community conservation.

#### 4.4 STEP-DOWN OUTLINE AND NARRATIVE

<b>Goal 1</b>	<i>Improve communication, coordination and information-sharing among those involved in tallgrass community conservation.</i>
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Many tallgrass community conservation projects are underway in southern Ontario. As such, there exists an incredible potential for those involved to share information and resources in order to advance the common cause. Unfortunately, most people are only familiar with the work going on in their local areas. It is evident, too, that there are many individuals and groups interested in becoming involved, but they are discouraged by the lack of centrally available information and guidance. Clear leadership is required so that appropriate information and expertise can be made more easily available.

Tallgrass community recovery work would greatly benefit from the development of a more coordinated, region-wide effort, which in turn requires as its base an efficient network of communication. This need was recognized following the 1992 North American Prairie Conference held in Windsor, Ontario. Shortly thereafter, OMNR staff began exploring the possibility of establishing an Ontario Tallgrass Prairie Association, an affiliation of interested groups which would address coordination and communication needs. By 1994, the RLSN was formed, and this organization held a symposium in November 1995 to generate and assess interest levels. Although there appears to be great interest in this idea, progress has stalled at this initial stage.

First Nations communities play a huge part in the stewardship of tallgrass communities in Ontario; some of the largest and most biologically diverse remnants in the province are retained on First Nations lands. Tallgrass community recovery and conservation across Ontario would greatly benefit from the involvement of First Nations communities, some of which have been stewards of the province's prairies and savannas since long before European settlement. Some partnership projects have been undertaken with First Nations and non-Native conservation organizations, including a life science inventory for Walpole Island. Expanding opportunities for cooperative activities and information-sharing would be most useful for advancing tallgrass conservation. For example, much remains to be learned from pristine remnants such as those on Walpole Island which would help conservationists across Ontario in their efforts to restore and conserve other remnants. Native and non-Native philosophical and cultural perspectives, stewardship techniques and expertise could be shared for developing a more widespread interest in, and richer understanding of, tallgrass communities.

#### **Objective 1.A      Set up a Tallgrass Prairie and Savanna Association.**

- Action 1.A.1**      An Ontario Tallgrass Prairie and Savanna Association should be organized. High priorities of the association should include
- communicating with the Prairie Conservation Forum, which acts as a vehicle for networking and issue promotion in Manitoba, Alberta and Saskatchewan. This forum, which currently represents about 40 government, private sector and non-governmental organizations, may provide a useful model for an association in Ontario;
  - taking a leadership role by coordinating an implementation strategy for this Recovery Plan, and an ongoing evaluation of progress towards the goals;
  - developing strategies for putting in place a communication network,

- information clearinghouse, fundraising and awareness-raising campaigns;
- finding necessary resources (staffing and funding) to coordinate the Tallgrass Prairie and Savanna Association’s activities;
- developing a strong link with the Carolinian Canada Coalition to ensure the coordination of mutual and complementary goals and objectives for prairie and savanna conservation (see Appendix 4); and
- encouraging links to organizations not directly associated with tallgrass community conservation, but with complementary mandates and/or audiences that may be interested in tallgrass community information.

**Objective 1.B Explore opportunities to communicate and coordinate with First Nations communities regarding tallgrass community issues.**

**Action 1.B.1** Develop stronger lines of communication between First Nations and non-Native communities to share information and ideas regarding tallgrass community conservation issues. This might be initiated through the Tallgrass Prairie and Savanna Association. Some items which might be discussed include

- educational opportunities to share philosophical and cultural perspectives of natural heritage;
- partnership projects, including research, life science inventory work and rare species recovery; and
- ecotourism opportunities.

<b>Goal 2</b>	<i>Amass complete information regarding all tallgrass community remnants in southern Ontario.</i>
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A vital first step to conserving southern Ontario's tallgrass communities is to know where remnants exist and to have accurate information about each, such as size, resident plant and animal species, current degree of site protection and threats to remnant health. This information would be most helpful to groups and individuals interested in being involved in conservation activities. A comprehensive inventory of tallgrass communities in southern Ontario was compiled in 1993 (Bakowsky 1993) but not released. This information should be made available in a form which is useful for conservation purposes. In addition, new sites continue to be discovered. Searching for previously unidentified sites should be a high priority. These new records should be added to the existing inventory data as they are found.

**Objective 2.A      Complete an inventory of all significant tallgrass community remnants in southern Ontario.**

**Action 2.A.1**      The OMNR, including the Natural Heritage Information Centre (NHIC), should coordinate the completion of the 1993 draft inventory of tallgrass community remnants in southern Ontario (Bakowsky 1993). The NHIC should make a summary of the inventory work available to groups and individuals for conservation purposes. This should be done in a manner that is sensitive to landowners' privacy rights.

- 2.A.2**      Ongoing updates to current inventory information should occur. This task could be facilitated by assistance from naturalist clubs and conservation organizations. Some activities which would be helpful include
- highlighting the project in naturalist publications;
  - indicating a legal and ethical protocol for searching for remnants on private lands;
  - wide distribution of the NHIC's report forms for discoveries of rare plants and plant communities, possibly through the FON to affiliated naturalist clubs, possibly through OMNR, Ontario Ministry of Agriculture, Food and Rural Affairs (OMAFRA), Conservation Authority offices and other conservation and naturalist organizations;
  - developing, publishing and distributing a "sightings wanted" poster – as currently exists for fauna such as the northern leopard frog and eastern spiny softshell turtle – for a select number of tallgrass community indicators, in order to give people a visual key to tallgrass community identification;
  - developing clear guidelines concerning what comprises a "tallgrass community" and a "significant" remnant. These designations should be determined with the recognition that tallgrass communities are so rare that much of what remains can be considered "significant";
  - developing an organized search project on a county or watershed basis in cooperation with naturalist groups, stewardship networks and land management agencies; and
  - linking with other vegetation mapping projects to share information.



- 2.A.3** Set up a Geographic Information Systems (GIS) base map containing all tallgrass remnants, and associated pertinent information, such as soil type, landforms, drainage, etc. This task should be accomplished in a way that the product is useful for the development of “master plans” to expand and link remnants (see Action 5.B.1) and to aid in determining appropriate ranges of tallgrass species for restoration work (see Action 5.A.6).

<b>Goal 3</b>	<i>Establish and expand a network of protected tallgrass community remnants.</i>
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Once a tallgrass remnant is identified, it is important that some method of protection be put in place. The ultimate goal is to develop a system of protected reserves across southern Ontario, adequately representing the different types of tallgrass communities, and to focus on linking reserves where possible. It is also important to secure and restore buffer lands around tallgrass remnants to help protect them from local disturbances. Protection can take many forms, from designation as national, provincial, or municipal parks, to nature reserves owned by private organizations, to voluntary stewardship and conservation easement agreements with private landowners. Since most of the land in southern Ontario is privately owned, encouraging private landowners to become active in land stewardship activities is vital; any activity to assist this call to action must be given top priority.

While protection of all remnants is a laudable goal to strive for, it is recognized that limited time and funds mean that some sites will receive attention before others. A prioritization system is needed that will identify the most ecologically significant sites in need of protection so that they can be secured first. This system should take into account such attributes as representation, remnant size, proximity to other remnants, species diversity, the existence of rare species and threats to the remnant.

**Objective 3.A Identify prime candidate sites for addition to a network of protected tallgrass communities.**

**Action 3.A.1** The NHIC should develop an appropriate prioritization system for ranking remnants in order of ecological significance and rank all inventoried remnants.

**3.A.2** A "priority sites" information package should be developed, listing important remnant sites that are not secured, ownership information, threats and conditions and resources necessary for securement. Lists of prioritized sites should be organized on a county or watershed basis so that groups interested in working in their local area may find out about conservation priorities in that area. The need to make such information public must be balanced with the need to protect remnants from unscrupulous activities.

**Objective 3.B Incorporate tallgrass community conservation into municipal and regional official plans and other frameworks for land-use planning.**

**Action 3.B.1** Mapping of and relevant information regarding tallgrass remnants should be made immediately available to all municipalities in southern Ontario. All regional and municipal governments will be modifying their official plans within the next two years to conform with the new natural heritage policy under the Provincial Planning Act. Significant tallgrass remnants, if identified, will qualify as candidate "significant wildlife habitat" under the Act.

**Objective 3.C      Increase landowner stewardship activities.**

**Action 3.C.1**      Owners of tallgrass remnants should be encouraged to steward remnants through a variety of mechanisms, including voluntary agreements, conservation easements, donations and leases. Possible activities include

- requesting that agencies currently involved in stewardship work with landowners (e.g. land trusts, Ontario Heritage Foundation) focus on tallgrass communities as a high priority;
- the Ontario Nature Trust Alliance helping to promote the formation of land trusts for the purpose of increasing tallgrass community conservation activities by land trusts; and
- each county/region having a designated person/agency for natural heritage stewardship land owner contact. This contact should provide educational information and promote a variety of land conservation options. Activities toward achieving this include convening a workshop with conservation agencies, stewardship networks, local land trusts and representatives of possible target groups to discuss strategies and needs for developing a region-wide landowner contact and stewardship program; and requesting that the Centre for Land and Water Stewardship and Wildlife Habitat Canada share evaluations of stewardship models and provide appropriate background information for recommending a model strategy.

**3.C.2**      Explore possible links with complementary programs to take advantage of existing mechanisms and to maximize people reached. Possibilities include

- expanding the Ontario Environmental Farm Plan program to consider the habitat requirements of grassland species through activities such as examining crop rotation, grazing and mowing practices; and
- enlisting the support of agencies such as the Environmental Farm Plan Working Group, the Ontario Soil and Crop Improvement Association, the Ontario Farm Environment Coalition, the Ontario Federation of Agriculture and the Christian Farmers Federation of Ontario to encourage wide distribution of material supportive of natural communities protection to the agricultural community.

**3.C.3**      Showcase tallgrass conservation and restoration projects. This could include an awards program which recognizes grassland communities conservation and restoration work in Ontario. This might be accomplished by linking with current similar programs.

**Objective 3.D      Use a variety of approaches to secure tallgrass remnants through acquisition.**

**Action 3.D.1**      Set up a charitable foundation, or a special division within an existing organization, to raise money for land acquisition, and to promote tallgrass community recovery efforts.

**3.D.2**      Existing conservation-oriented agencies should highlight tallgrass communities as an important theme in future fundraising and habitat acquisition projects. Possible

activities include

- organizations which acquire land for protection purposes (e.g. Nature Conservancy, Canadian Wildflower Society, Federation of Ontario Naturalists, land trusts) helping to secure key unprotected remnants; and
- current "adopt an acre" habitat acquisition programs (such as that operated by the Nature Conservancy) highlighting tallgrass communities in Ontario.

**3.D.3** Federal, provincial, and local government agencies responsible for the preservation of biodiversity and natural heritage should be encouraged to help provide resources for tallgrass remnant securement. This might include

- identifying special project funding for tallgrass conservation work; and
- the development of land exchanges, whereby property without significant ecological value is traded for lands with significant value.

**3.D.4** Encourage the development of conservation real estate, by which properties containing natural habitat are marketed by real estate firms to conservation-minded buyers. Interested firms might work in cooperation with conservation agencies which have a land acquisition mandate.

<b>Goal 4</b>	<i>Encourage protection of tallgrass remnants through sound management.</i>
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Conservation of tallgrass communities involves more than simply protecting them from outright destruction; it also involves ongoing management activities that restore and maintain diverse, healthy ecosystems. Tallgrass community management must include the development of a fire regime (or a treatment that mimics the effects of fire), and may involve various other activities, such as exotic species control, native species augmentation or reintroduction, and human use issues, including safety and site use restrictions. Once a priority remnant is secured, a management plan should be prepared and implemented, and results monitored. Such a plan may be quite straightforward or complex depending on the site in question. Tallgrass landowners and managers stewarding private property should be encouraged to develop simple but comprehensive plans to suit their needs and those of the site. Such individuals may require guidance in management plan development and implementation.

As increasing numbers of remnants are afforded protection, and as habitat creation activities continue, there will be an increasing need for access to prescribed burn services. Steps must be taken to ensure that necessary resources and qualified personnel continue to be available for prescribed burn management activities.

**Objective 4.A      Land managers should develop and implement sound management plans for all secured remnants.**

- Action 4.A.1**      Produce appropriate information to assist with tallgrass community management. Such information should be regularly updated to provide the best available information. Required information includes
- an annotated bibliography of existing published information and other resources and services relevant to tallgrass community management in southern Ontario;
  - a model management plan (see Appendix 5); and
  - a fact sheet series, similar to those of OMNR’s series of managed forest Extension Notes, which provides information needed for tallgrass remnant restoration and management.
- 4.A.2**              Develop a standardized method for ongoing monitoring and evaluation of tallgrass community management activities. Tools such as the Rapid Assessment Program and Floristic Quality Assessment could be modified to provide an easy-to-use assessment procedure. This action should be accomplished in concert with Action 5.B.2.
- 4.A.3**              Set up a central information clearinghouse (see Action 1.A.1), or a clearinghouse system through existing land management and stewardship agencies such as OMNR, OMAFRA, conservation authorities, parks, stewardship networks, the Centre for Land and Water Stewardship and the FON.
- 4.A.4**              Provide management planning services to remnant owners and managers, including municipalities, MTO, conservation authorities, industries and agricultural

representatives and private landowners. Such services could include workshops, field trips and literature, and should focus on tallgrass community identification and ecology, ecosystem values, land-use impacts and management of tallgrass communities. This should dovetail with the recommended landowner contact, stewardship and recognition program (Action 3.C.1).

**4.A.5** Develop a network of applied research and demonstration projects across the region, and conduct organized tours of the projects.

**4.A.6** Appropriate government agencies should facilitate the production, review and updating of sound and comprehensive management plans for all publicly owned remnants.

**Objective 4.B Ensure the continuing existence of resources and qualified personnel for prescribed burn management activities.**

**Action 4.B.1** OMNR district and area offices should continue to implement prescribed burns as required for the management of tallgrass sites on public land.

**4.B.2** Develop a greater understanding of the need for prescribed burns among municipal authorities and local fire departments. This could involve

- an outreach program, including the circulation of educational information, information sessions and invitations for appropriate professional staff to observe prescribed burns; and
- soliciting interest and involvement of professional fire department staff in helping to conduct burns.

**4.B.3** Hold a workshop to assess the need for and explore the possibility of providing a prescribed burn training program for private individuals and agencies wishing to manage privately-owned remnants. This workshop should involve appropriate OMNR staff, as well as others who may potentially become involved, such as local fire departments, other institutions or organizations dealing with fire training and management (e.g. technical colleges, Parks Canada) and various community groups and individuals.

**4.B.4** Ensure that appropriate educational resources are available to explain the need for fire in tallgrass community management, and to provide important practical information for using fire as a management tool. Possibilities include

- producing an educational video regarding prescribed burns;
- producing educational literature. Model documents include *Fire in Canada's National Parks* (Anon undated c), *How to Manage Small Prairie Fires* (Pauly 1982) and *A Landowner's Guide to Roadside Burning* (Anon undated a); and
- developing a program for assisting groups and individuals with the preparation of prescribed burn plans. This could involve OMNR in partnership with an organization such as the FON.

<b>Goal 5</b>	<i>Encourage restoration and habitat creation initiatives where appropriate to enlarge existing remnants, make linkages and create new habitat.</i>
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Securing and restoring existing remnants is a vital first step toward reclaiming southern Ontario's tallgrass communities. However, it is not enough to ensure the preservation of the ecosystem as a whole. Even if we were able to protect every existing remnant in southern Ontario, we are still left with a collection of small, widely scattered and unconnected fragments. Small remnants do not provide needed conditions for various tallgrass species that require large habitat areas, such as the Henslow's sparrow and greater prairie chicken. Other wildlife species may only be able to establish small populations, which may suffer from lowered genetic diversity and be more prone to disease, population declines, and catastrophic loss. Larger blocks of habitat, and connections between blocks, are vital to increasing the chances for tallgrass species to develop and maintain healthy populations in southern Ontario.

Active habitat creation is a necessary action toward removing tallgrass communities from their current position as communities at risk. High priority projects include those which enlarge and connect remnants, and those that re-build habitat on historic tallgrass lands. However, there exist a number of ecological and ethical concerns with creating tallgrass communities where they no longer exist, or where it is not clear whether they ever existed. "Intelligent tinkering" is necessary to minimize the chances of harming the health and survival of tallgrass species and the community as a whole. Expert guidance is necessary to help people make ecologically and ethically sound habitat creation decisions.

**Objective 5.A      Develop widely accepted guidelines for ecologically and ethically sound habitat restoration and creation activities.**

**Action 5.A.1**      A working group should be formed of representatives from appropriate agencies, academic and other research institutions and other experts to develop needed guidelines.

- 5.A.2**      Guidelines and/or protocols should be developed for
- planning appropriate habitat restoration and creation activities;
  - ecological integrity criteria and associated minimum and optimum size criteria for reserve design;
  - plant provenance and distribution;
  - use of rare species in restoration and creation projects;
  - seed collection from remnants;
  - plant material rescue;
  - keeping records (e.g. of species planted at a site and their genetic provenance); and
  - identifying native plant material suppliers using ethical practices and supplying material with appropriate genetic provenance.

**5.A.3**      The working group should provide interim advice regarding plant selection and the use of local genetic material, erring on the side of caution. This could include recommended species lists based on flora known to exist within each county in

southern Ontario, as is currently used by the RLSN (information based on OMNR publications regarding plant distribution in Ontario, e.g. Riley 1989).

- 5.A.4** The Society for Ecological Restoration (SER) should publish its ecological restoration project policies in a format suitable to a wide general audience and should distribute them widely. It should encourage those active in habitat creation and restoration activities to follow the project guidelines contained therein. The Canadian Wildflower Society should continue to distribute its list of ethical “Gardener’s Guidelines,” which are directed to those undertaking small-scale naturalization efforts.
- 5.A.5** The Ontario Chapter of SER should continue to produce a native plant material source list, and a list of contract collectors and growers. The list should outline the importance of the provenance of plant material for use in restoration projects. This list should be widely publicized.
- 5.A.6** The RLSN and OMNR should press ahead with their proposal to develop a GIS program to help determine appropriate range extensions of tallgrass species and communities, based on what possible ranges the flora may have had in the absence of major habitat fragmentation in southern Ontario. This type of modeling system is currently available for woody species. Links should be made with related projects (see Actions 2.A.4 and 5.B.1).

**Objective 5.B**      **Appropriate tallgrass community creation work should be carried out to enlarge and connect existing remnants.**

- Action 5.B.1** Conduct a landscape mapping exercise to identify areas of former or potential prairie, based on location, available historic information, landform, soil and drainage. Develop “master plans” on a watershed or county basis by mapping existing remnants and proposing specific expansions and linkages. GIS would be a useful tool for this task; links should be made with related projects (see Actions 2.A.4 and 5.A.6).
- 5.B.2** Develop a standardized method for ongoing monitoring and evaluation of creation/restoration projects and associated management activities. Tools such as the Rapid Assessment Program and Floristic Quality Assessment could be modified to provide an easy-to-use assessment procedure. This action should be accomplished in concert with Action 4.A.2.
- 5.B.3** Encourage appropriate tallgrass community creation projects, and explore possible links with complementary programs to take advantage of existing mechanisms and to maximize people reached. Possibilities for expanding participation include
- approaching managers of the Audubon Cooperative Sanctuary System of Canada to determine whether tallgrass community interests could be incorporated into their cooperative sanctuary programs for schools, businesses and corporate properties and backyard properties; and
  - encouraging organizations involved in habitat creation projects (e.g. Ducks Unlimited) to use native plant species of local genetic provenance in their habitat creation projects.



- 5.B.4** Tallgrass community vegetation should be used where appropriate as part of integrated roadside vegetation management programs, as a means of reducing roadside maintenance costs while enhancing local landscape identity and regional biodiversity. This could be accomplished by
- holding a workshop to discuss the potential opportunities and needs for developing and implementing an integrated roadside vegetation management system across southern Ontario, using tallgrass community vegetation when appropriate. Key participants would include agencies already active in such work and those in the position to help implement such a system, including U.S. agencies with relevant experience, MTO, municipal and county roadside management managers, farmers and other landowners;
  - developing links with active agencies in the United States, such as the Office for Integrated Roadside Vegetation Management (University of Iowa) and the National Roadside Vegetation Management Association; and
  - developing appropriate support resources. Model documents include *The Roadside Almanac: Integrated Roadside Vegetation Management* (Anon undated d.) and *A Landowner's Guide to Roadside Management* (Anon undated b.).

- 5.B.5** Increased funding for tallgrass restoration and creation activities is necessary. Recommendations include
- greater funding for research, monitoring and ongoing management, which are integral parts of such projects;
  - maintaining and expanding appropriate government funding programs;
  - eliciting greater corporate sponsorship of habitat creation activities; and
  - development of programs that offer financial assistance and/or other resources for tallgrass habitat creation activities on private lands.

**Objective 5.C** **Stimulate interest in retaining remnants and using tallgrass plant species for commercial and agricultural purposes.**

- Action 5.C.1** Set up demonstration sites that provide working examples of sustainable commercial and agricultural uses of tallgrass remnants and tallgrass plant species. Such sites could include demonstrations of ecotourism opportunities, use as pasture and erosion control, switchgrass cropping for ethanol production and flower meadows for queen bee production.

**Objective 5.D** **Ensure an adequate supply of appropriate materials and equipment for restoration and creation projects across the region.**

- Action 5.D.1** A way to better coordinate the needs of the market with the supply offered by native plant material suppliers should be developed. This could be a key topic of discussion at a native plant growers symposium (an idea currently being considered by the Canadian Wildflower Society).

- 5.D.2** Encourage a cooperative approach to accessing equipment for large-scale projects. The Tallgrass Prairie and Savanna Association could coordinate the use of such equipment for projects across the region.

<b>Goal 6</b>	<i>Raise public awareness and appreciation of tallgrass communities.</i>
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The general awareness of tallgrass communities in Ontario is quite poor. In fact, many Ontarians do not even realize that tallgrass grows east of Manitoba, much less that it is an ecosystem in peril. Raising awareness is vital in order to cultivate public interest in and support for conservation activities. It is of utmost importance to raise the profile of tallgrass communities, and to promote greater understanding of the issues to all residents of southern Ontario. It is also vital to provide ecologically and ethically sound information and advice for those who wish to become involved in tallgrass community conservation and restoration. Public participation in conservation projects should be encouraged through a variety of means, including community-based naturalization projects, and through programming at both formal and non-formal educational institutions.

**Objective 6.A      Develop a comprehensive campaign to raise awareness among the general public.**

**Action 6.A.1**      Hold a brainstorming session among agencies involved in land management, education, public outreach, etc. to

- determine needs for educational material and methods of developing needed resources and for coordinating information dissemination;
- identify key target groups; and
- develop a coordinated marketing strategy.

**6.A.2**              Produce and distribute appropriate literature and audio-visual resources. Useful items would include

- a guide to southern Ontario’s tallgrass communities, as per similar U.S. booklets (e.g. Wendt 1984), but with a greater emphasis on tourism opportunities;
- a pamphlet providing an introduction to Ontario’s tallgrass communities;
- a brochure discussing natural landscaping, xeriscaping and tallgrass plants;
- films and videos;
- canned or personal slide programs; and
- portable displays.

**6.A.3**              Develop and maintain a website which lists useful information and contacts in Ontario, and provides links to other related sites. One such project is currently being developed at the University of Waterloo. Such a site might be maintained in conjunction with the Carolinian Canada Coalition’s web site.

**6.A.4**              Produce and distribute appropriate promotional materials, such as buttons, posters, t-shirts, calendars and souvenir literature.

**6.A.5**              Develop a media strategy, leading to the production of features on tallgrass community ecology and conservation. Possibilities include

- television programs such as *The Nature of Things* and *The Discovery Channel*;
- special theme editions and articles in various print media (e.g. *Seasons*, *Wildflower*, *Canadian Geographic*, gardening and sportsman’s magazines with an Ontario audience, newsletters); and

- media releases sent out by groups involved in tallgrass community projects to local newspapers, radio and television stations to notify them of interesting current and upcoming activities.
- 6.A.6** Conservation agencies, such as WWF and FON, should consider some aspect of tallgrass communities as a 1999 campaign theme for educational programs.
- 6.A.7** Regional tourist associations, such as the Southwestern Ontario Tourist Association, should promote public sites containing tallgrass remnants, such as Rondeau Provincial Park and the Ojibway complex in Windsor. Participating associations should be provided with displays and/or appropriate literature to help with this task.
- 6.A.8** Real estate boards should disseminate appropriate information to purchasers of property containing a tallgrass remnant.
- 6.A.9** Parks, nature centres, museums and zoos in southern Ontario should develop interpretive displays and programs related to the natural and cultural history associated with the region's tallgrass communities.
- 6.A.10** The Tallgrass Prairie and Savanna Association should designate a high-profile honorary spokesperson.
- 6.A.11** Install demonstration gardens and habitat creation areas, with associated interpretive information, in frequented places. Ideas include
- highway rest stop areas;
  - city parks and public spaces;
  - educational institutions;
  - botanical gardens;
  - commercial/industrial lands; and
  - establishing a "wildflower route," as has been done in Minnesota (Jacobson *et al.*, 1990), by creating prairie vegetation along a major highway route in southern Ontario.
- 6.A.12** The Tallgrass Prairie and Savanna Association, along with conservation-oriented clubs and agencies, should consider organizing special events to raise public awareness. At the same time, these events would raise the profile of the organizations. Appropriate events might include
- a tallgrass community festival;
  - field trips and site tours; and
  - talks and demonstrations on tallgrass wildlife, restoration and natural gardening.
- 6.A.13** Provide training workshops on such topics as species identification, monitoring techniques and growing native plants.
- 6.A.14** Encourage the development of community-based naturalization projects and programs.

**Objective 6.B      Encourage greater understanding of and involvement in tallgrass conservation at all academic levels.**

**6.B.1**      Ensure sufficient resources are available to help elementary and high school teachers bring tallgrass community ecology and conservation into the curriculum. Possible actions include

- development by WWF of a tallgrass community education package for elementary and high schools through their *Schools for Wildlife* program;
- development by the Canadian Wildlife Federation of a section devoted to Canada's tallgrass communities in its next edition of *Project WILD Activity Guide* for educators of elementary and secondary school children;
- resources specifically about tallgrass ecology and conservation offered by FON through their *Resources for Educators* offerings;
- linking the resource development options above with the Carolinian Canada conservation strategy goal to have a Carolinian biodiversity educational kit that fits within curriculum guidelines available for use in every school in the zone within three years;
- encouraging other existing agencies and initiatives, such as the Evergreen Foundation, to provide information and resources relevant to tallgrass communities to teachers; and
- development of additional coordinated school programs with an emphasis on monitoring (as recommended in the *International Countryside Stewardship Exchange in Ontario, Canada 1996 Report* [Anon 1996]), inventory work and stewardship activities.

**6.B.2**      Southern Ontario schools should engage in naturalization projects, including tallgrass community creation.

**6.B.3**      Raise the profile of tallgrass community concerns at academic and professional institutions, and encourage students to enter into related fields. Some activities to accomplish this include

- the incorporation of tallgrass community conservation and research into the curricula of existing ecological, environmental and landscape architecture programs in Ontario;
- expanding current government-funded student employment programs which could provide work terms and summer student experiences involving tallgrass community research and conservation work; and
- raising or allocating funds to establish scholarships, bursaries and student research awards for tallgrass community-related activities.

<b>Goal 7</b>	<i>Reduce significantly the number of tallgrass community species at risk.</i>
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It is widely recognized that the most important way to protect species at risk is to protect the natural communities which comprise their habitats. Recovery planning by some agencies is shifting from a focus on recovering individual species to recovering the ecosystems in which they reside. However, for some species that are extremely rare, extirpated, or are facing specific threats, species-specific recovery actions may be necessary in addition to habitat protection.

**Objective 7.A Identify priority tallgrass species for in-depth status review.**

**Action 7.A.1** OMNR’s Committee on the Status of Species at Risk in Ontario (COSSARO) should identify priority tallgrass species as candidates for in-depth status review. The production of a status report is the first step in the process of considering a species for designation in one of the provincial “risk” categories (i.e., Endangered, Threatened or Vulnerable). COSSARO currently uses NHIC-ranked lists as a basis for identifying priority candidates for the preparation of status reports (see Appendices 1 and 2 for S1- and S2-listed tallgrass species). It is recommended that tallgrass species be given high priority for such review.

**7.A.2** The Committee on the Status of Endangered Wildlife in Canada (COSEWIC) and COSSARO should continue to broaden their working activities to include more work regarding invertebrates and non-vascular plants.

**Objective 7.B Streamline the current processes for the identification and recovery of species at risk.**

**Action 7.B.1** Encourage COSEWIC, COSSARO and the program for the Recovery of Nationally Endangered Wildlife (RENEW) to streamline the process for the identification, evaluation and recovery of species at risk. This could include eliminating the duplication of content in status reports and recovery plans.

**Objective 7.C Coordinate agency recovery actions and blend single- and multi-species recovery approaches.**

**Action 7.C.1** Produce and implement single- or multi-species recovery plans for those species with special management needs over and above those described in this Recovery Plan. A strategy should be developed which allows the production of recovery plans for all COSEWIC-designated tallgrass species within a five-year period. Bring together representatives of appropriate agencies to discuss ways in which the traditional single species approach can be dovetailed with current multi-species and habitat recovery planning to achieve this goal.

**Objective 7.D Encourage conservation genetics activities.**

**Action 7.D.1** Convene a meeting (and arrange appropriate follow-up) of appropriate agencies and

individuals, such as botanical gardens, arboreta, nurseries, the Ministry of Agriculture and Agri-Food Canada, academic institutions, ecologists and naturalists to discuss the usefulness of and requirements for gene banks to house rare plant material, including tallgrass community species.

- 7.D.2** Upcoming ecological and conservation-oriented conferences in Canada and the United States should contain sessions regarding recent findings and advances in conservation genetics relevant to tallgrass species and communities issues.

<b>Goal 8</b>	<i>Encourage basic and applied research relevant to tallgrass community conservation.</i>
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The science of tallgrass community management and creation is still in its infancy in Ontario. There is much yet to learn to help us become more effective at maintaining, restoring and creating tallgrass systems. It is important to encourage an accelerated level of research in the province to aid in ongoing conservation work. The following list is by no means exhaustive, but it does highlight various areas which require additional research:

- ecovars
- conservation genetics
- soils and soil organisms
- plant community associations
- grazing and fire management
- tallgrass community management
- basic inventories of invertebrate species
- horticultural information for various species
- development of a framework for assessing a site's "health" (ecological integrity criteria)
- efficient, cost effective restoration and reclamation techniques
- commercial, industrial and agricultural uses of tallgrass community species
- remnants, landscape ecology and viability of wildlife populations

**Objective 8.A      Advance tallgrass community research activities and ensure widespread dissemination of findings.**

**Action 8.A.1**      Appropriate government, non-government and academic interests should meet to develop a prioritized list of basic and applied research needs and opportunities.

**8.A.2**      Increased funding is necessary to engage in needed research activities. Government agencies, private conservation organizations and corporations should sponsor high priority research activities. Particular attention should be paid to the need for funding for ecological inventories and monitoring activities, two aspects of conservation research that are vital to conservation but are severely under-funded.

**8.A.3**      Facilitate research by coordinating researchers with practitioners. Currently, many management and restoration projects are taking place in the absence of research. For example, the Tallgrass Prairie and Savanna Association might provide a mechanism for linking students looking for research or co-op term projects with an appropriate tallgrass community conservation project.

**8.A.4**      Make research information accessible and encourage its application to ecosystem management and land-use planning issues. This might be accomplished by:

- publishing findings in both peer-reviewed journals and popular magazines and newsletters; and
- setting up and maintaining an electronic database.

#### 4.5 RECOMMENDATIONS FOR FURTHER CONSIDERATION BY GOVERNMENT

WWF, along with various other non-governmental organizations and individuals consulted during the development of this plan, put forward the following recommended actions for consideration by various government departments. It is recognized that implementation of several of these actions would involve major policy changes. However, it is the consensus of the Advisory Team that these actions will facilitate recovery efforts for tallgrass communities in southern Ontario.

#### *Recommendations for consideration by the Ontario Ministry of Natural Resources*

**Recommendation 1    Ascertain that current government programs, policies and tax incentives are supportive of tallgrass community conservation.**

- Action 1.A**    OMNR should change the Areas of Natural and Scientific Interest (ANSI) site evaluation system to a points system (following the model of the provincial wetlands evaluation system) so that any remnant meeting a certain number of criteria or scoring a certain minimum number of points is deemed provincially significant. Currently, the ANSI process recognizes only the best of each natural community type in each site district as provincially significant, and the provincial emphasis is on securing only these sites.
- 1.B**    In the interim, the ANSI process should recognize the six tallgrass community types (see Table 1) as separate community types. The current system considers all prairie, savanna and alvar communities as one community type, which minimizes the number of sites deemed provincially significant. As a result of this activity, newly designated provincially significant sites will exist and protection for them should be sought.
- 1.C**    Modify current programs such as the Conservation Land Tax Incentive Program to provide more owners of tallgrass community remnants with tax incentives.
- 1.D**    Programs which provide incentives for planting trees should be reviewed so that historic tallgrass sites are not converted to managed forests.
- 1.E**    Modify a current program or develop a new program to provide incentives for conversion of appropriate agricultural or developed lands to tallgrass communities.

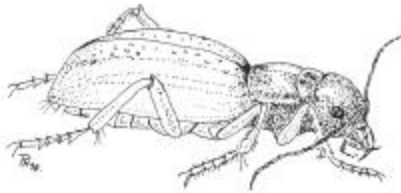
**Recommendation 2    Provide continued leadership in the area of prescribed burn management activities.**

- Action 2.A**    OMNR should provide a leadership role in ensuring that there is continued access to prescribed burn expertise and services in the face of increasing need. See Objective 4.B.



*Recommendation for consideration by the Ontario Ministry of Agriculture, Food  
and Rural Affairs*

**Recommendation 1** Amend the Weed Control Act so that non-aggressive milkweed (*Asclepias*) species associated with tallgrass communities may be legally protected and planted as part of tallgrass communities recovery efforts.



*Tiger Beetle*

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## 5. Implementation Schedule

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Table 2 outlines a recommended implementation schedule for all actions listed in Section 4. Organizations that may be key participants in action implementation have been listed; however, it is reiterated here that the mention of these agencies does not indicate their commitment to participate, nor does it preclude others from being involved. The successful execution of this Recovery Plan will require assistance and cooperation from a wide variety of agencies and individuals beyond those listed in this document.

This Plan and corresponding implementation schedule should be revised and updated after five years and at regular intervals thereafter as deemed appropriate by the Tallgrass Prairie and Savanna Association.

The abbreviations used in the implementation schedule are:

ACSS	Audubon Cooperative Sanctuary System of Canada
CA	Conservation authorities
CBCN	Canadian Botanical Conservation Network
CCC	Carolinian Canada Coalition
CLAWS	Centre for Land and Water Stewardship
COSEWIC	Committee on the Status of Endangered Wildlife in Canada
COSSARO	Committee on the Status of Species at Risk in Ontario
CWF	Canadian Wildlife Federation
CWS	Canadian Wildflower Society
DU	Ducks Unlimited
EF	Evergreen Foundation
FON	Federation of Ontario Naturalists
MTO	Ministry of Transportation
NCC	Nature Conservancy of Canada
NHIC	Natural Heritage Information Centre
OEFP	Ontario Environmental Farm Plan program
OFEC	Ontario Farm Environment Coalition
OHF	Ontario Heritage Foundation
OMAFRA	Ontario Ministry of Agriculture, Food and Rural Affairs
OMNR	Ministry of Natural Resources
ONTA	Ontario Nature Trust Alliance
OSCIA	Ontario Soil and Crop Improvement Association
PC	Parks Canada
RENEW	Recovery of Nationally Endangered Wildlife
RLSN	Rural Lambton Stewardship Network
SER	Society for Ecological Restoration Ontario Chapter
SN	County-based Stewardship Networks
SOTA	Southwestern Ontario Tourist Association
TPSA	Tallgrass Prairie and Savanna Association
WWF	World Wildlife Fund Canada

**Table 2: Implementation Schedule**

Goal	Action	Targets:				Suggested key agencies
		January 1999	January 2000	January 2001	January 2003	
1. Improve communication, leadership	1.A.1	Tallgrass Prairie and Savanna Association formed; its mandate clarified; this Recovery Plan adopted as a working document; strategies for a communication network, information clearinghouse, fundraising and education developed	Funds for an Association coordinator secured and the position filled; a detailed implementation strategy for this Recovery Plan developed, and a system for monitoring progress in place		Tallgrass community recovery progress assessed against Recovery Plan timeline	RLSN, WWF, OHF, CCC, OMNR
	1.B.1	Meeting held with members of First Nations communities owning tallgrass remnants to explore common interests, objectives and cooperative project ideas	An ongoing communication and information-sharing link is established			TPSA
2. Survey remnants	2.A.1	Tallgrass community inventory completed	Inventory updated as required	Inventory updated as required	Inventory updated as required	NHIC, OMNR
	2.A.2	Inventory project publicized by all naturalist clubs and conservation organizations in southern Ontario	Inventory activity ongoing	Inventory activity ongoing	Inventory activity ongoing	FON, naturalist clubs, CWS
	2.A.3	Responsibility for GIS base map development established	GIS base map completed			NHIC
3. Protect remnants	3.A.1	Remnant prioritization system developed; inventoried remnants ranked				OMNR, NHIC
	3.A.2		"Priority sites" information package completed and distributed	"Priority sites" information package updated	"Priority sites" information package updated	OMNR
	3.B.1	Mapping of and relevant information regarding tallgrass remnants made available to municipalities		Official plans of all regional and municipal governments modified to include tallgrass remnants as "significant wildlife habitat"		regional and municipal governments, NHIC

**Table 2: Implementation Schedule**

Goal	Action	Targets:				Suggested key agencies
		January 1999	January 2000	January 2001	January 2003	
	3.C.1	Workshop held to determine strategy for region-wide landowner contact program	A person or agency in each county/region designated to deliver landowner contact program; stewardship agencies and land trusts focusing on tallgrass community stewardship work	At least one new stewardship agency/land trust initiative incorporating some aspect of tallgrass community conservation each year	At least one new stewardship agency/land trust initiative incorporating some aspect of tallgrass community conservation each year	TPSA, CCC, FON, CLAWS, ONTA, OHF, land trusts
	3.C.2	At least one complementary program or initiative expanded to address tallgrass conservation concerns	At least one complementary program or initiative expanded to address tallgrass conservation concerns; tallgrass conservation information being distributed to agricultural community	At least one complementary program or initiative expanded to address tallgrass conservation concerns; tallgrass conservation information being distributed to agricultural community	At least one complementary program or initiative expanded to address tallgrass conservation concerns; tallgrass conservation information being distributed to agricultural community	TPSA, DU, OEFP, OSCIA, OFEC
	3.C.3			A recognition/awards program for tallgrass conservation and restoration work in Ontario in operation		TPSA, CCC, SER, CWS
	3.D.1		Charitable foundation set up and raising money for tallgrass acquisition and recovery			
	3.D.2	Tallgrass remnants highlighted in habitat acquisition fundraising programs	Tallgrass remnants highlighted in habitat acquisition fundraising programs	Tallgrass remnants highlighted in habitat acquisition fundraising programs	Tallgrass remnants highlighted in habitat acquisition fundraising programs	NCC, land trusts, CWS, FON, OHF
	3.D.3	At least one tallgrass conservation project assisted by government funding or land exchange activity	At least one tallgrass conservation project assisted by government funding or land exchange activity	At least one tallgrass conservation project assisted by government funding or land exchange activity	At least one tallgrass conservation project assisted by government funding or land exchange activity	federal, provincial, local governments
	3.D.4	At least one new land trust initiative incorporating some aspect of tallgrass community conservation each year	At least one new land trust initiative incorporating some aspect of tallgrass community conservation each year	At least one new land trust initiative incorporating some aspect of tallgrass community conservation each year	At least one new land trust initiative incorporating some aspect of tallgrass community conservation each year	FON, ONTA, CLAWS

**Table 2: Implementation Schedule**

Goal	Action	Targets:				Suggested key agencies
		January 1999	January 2000	January 2001	January 2003	
4. Manage remnants	4.A.1	Annotated bibliography of literature, resources and services relevant to tallgrass communities in southern Ontario produced; model management plan(s) available	Tallgrass community restoration and management extension notes produced and widely distributed	Annotated bibliography updated	Annotated bibliography updated	TPSA, OMNR
	4.A.2		Standardized method for monitoring and evaluation of remnant management activities developed and distributed			NHIC, OMNR, TPSA, FON
	4.A.3	Responsible agencies established and funding sought for information clearinghouse system	Information clearinghouse in operation			TPSA, OMNR, CA, FON, SN, CLAWS, OMAFRA, parks
	4.A.4			Management planning service in operation		TPSA, CCC, FON, OMNR, CLAWS, CA, SN
	4.A.5		At least one demonstration site per county operational; organized tours occur at least twice per year		At least two demonstration sites per county operational; organized tours at least twice per year	TPSA, CA, SN, OMNR, CWS, RLSN
	4.A.6		All publicly-owned remnants have management plans in place			All government agencies owning/managing remnants
	4.B.1	OMNR implements prescribed burns for tallgrass sites on public land	OMNR implements prescribed burns for tallgrass sites on public land	OMNR implements prescribed burns for tallgrass sites on public land	OMNR implements prescribed burns for tallgrass sites on public land	OMNR
	4.B.2		Outreach program for municipal authorities and fire departments in place		Municipalities and fire departments in southern Ontario are well-informed regarding prescribed burn requirements	OMNR, TPSA

**Table 2: Implementation Schedule**

Goal	Action	Targets:				Suggested key agencies
		January 1999	January 2000	January 2001	January 2003	
	4.B.3		Workshop held to explore possibilities for providing prescribed burn training for management of tallgrass on private land		Training program operational	TPSA, OMNR, PC, technical colleges with fire training programs
	4.B.4	Appropriate literature and/or audio-visual resources for fire management available	Prescribed burn assistance program developed and operating			TPSA, OMNR, FON
5. Restore and create	5.A.1	Working group formed to develop guidelines for tallgrass community restoration and creation				SER, CBCN, TPSA, OMNR
	5.A.2			Appropriate guidelines, standards and protocols developed to aid tallgrass conservation		working group formed from Action 5.A.1
	5.A.3		Interim plant selection advice for restoration and creation projects produced			working group formed from Action 5.A.1
	5.A.4	SER ecological restoration policies and CWS ethical gardening guidelines widely distributed				SER, CWS
	5.A.5	SER native plant material source list production continued; contract collection and growing service providers added	SER native plant material source list updated and circulated	SER native plant material source list updated and circulated	SER native plant material source list updated and circulated	SER

**Table 2: Implementation Schedule**

Goal	Action	Targets:				Suggested key agencies
		January 1999	January 2000	January 2001	January 2003	
	5.A.6			GIS bioclimatic modeling system developed and being used to help determine possible ranges of tallgrass communities and associated wildlife		RLSN, OMNR
	5.B.1	Landscape mapping to identify former and potential tallgrass sites completed	Model "master plans" for remnant expansion and linkages developed for at least two counties/watersheds		"Master plans" developed for at least one-third of the counties/watersheds in southern Ontario	NHIC, CA, municipalities
	5.B.2		Standardized method for monitoring and evaluation of creation/restoration projects developed and distributed			NHIC, OMNR, TPSA, SER
	5.B.3	Tallgrass planting activity increasing	Tallgrass planting activity increasing	Tallgrass planting activity increasing	Tallgrass planting activity increasing	TPSA, SER, CWS, RLSN, ACSS, DU, naturalist clubs
	5.B.4	Integrated roadside vegetation management system workshop held	Appropriate IRVM literature available		At least five jurisdictions using tallgrass vegetation in IRVM programs	TPSA, MTO, county roads departments
	5.B.5	Funding for tallgrass restoration and creation increases by 10%; monitoring and management receive more funding	Funding for tallgrass restoration and creation increases by 10%; monitoring and management receive more funding	Funding for tallgrass restoration and creation increases by 10%; monitoring and management receive more funding	Funding for tallgrass restoration and creation increases by 10%; monitoring and management receive more funding	government agencies, private funding agencies, businesses and industries
	5.C.1			At least two pilot projects using tallgrass species for commercial purposes in operation		CA, agricultural community
	5.D.1		Meeting or conference held; a plan for coordinating native plant material supply and demand developed			CWS, plant material suppliers, representatives of market sectors

**Table 2: Implementation Schedule**

Goal	Action	Targets:				Suggested key agencies
		January 1999	January 2000	January 2001	January 2003	
	5.D.2			A cooperative approach to accessing equipment for large-scale projects in place		TPSA
6. Outreach	6.A.1	A brainstorming session held to determine resource and marketing needs for public awareness-raising	An education marketing strategy developed and implemented			TPSA, WWF, FON, CWS, CCC
	6.A.2		Appropriate print literature, audio-visual resources and promotional material for public awareness-raising have been developed and distributed			TPSA, CWS, OHF, public and corporate sector sponsorship, universities/students
	6.A.3	Tallgrass information website developed and operational	Tallgrass information website maintained	Tallgrass information website maintained	Tallgrass information website maintained	University of Waterloo
	6.A.4	Promotional materials produced and distributed	Promotional materials produced and distributed	Promotional materials produced and distributed	Promotional materials produced and distributed	TPSA with cooperation from many partners, e.g. CWS, FON, WWF, NCC, parks, OHF, corporate sponsorship
	6.A.5	At least two major media pieces per year regarding some aspect of Ontario's tallgrass communities and conservation initiatives	At least two major media pieces per year regarding some aspect of Ontario's tallgrass communities and conservation initiatives	At least two major media pieces per year regarding some aspect of Ontario's tallgrass communities and conservation initiatives	At least two major media pieces per year regarding some aspect of Ontario's tallgrass communities and conservation initiatives	TPSA, FON, CWS, OHF, SER, RLSN, OMNR, naturalist groups
	6.A.6		Various existing conservation agencies use some aspect of tallgrass communities as a campaign theme			WWF, FON, NCC, OHF



**Table 2: Implementation Schedule**

Goal	Action	Targets:				Suggested key agencies
		January 1999	January 2000	January 2001	January 2003	
	6.A.7		Appropriate southern Ontario tallgrass communities are being widely promoted as tourist attractions			TPSA, tourist associations, including SOTA
	6.A.8		Information disseminated to purchasers of property containing a tallgrass remnant			real estate boards
	6.A.9	At least one new tallgrass display or program developed per year in Ontario's parks, nature centres, museums and zoos	At least one new tallgrass display or program developed per year in Ontario's parks, nature centres, museums and zoos	At least one new tallgrass display or program developed per year in Ontario's parks, nature centres, museums and zoos	At least one new tallgrass display or program developed per year in Ontario's parks, nature centres, museums and zoos	all parks, nature centres, museums, zoos and other non-formal educational facilities in southern Ontario
	6.A.10		A high profile honorary spokesperson designated to promote tallgrass community conservation			TPSA
	6.A.11	At least two new tallgrass creation projects installed per county	At least two new tallgrass creation projects installed per county At least one major highway designated as a wildflower route; restoring or creating tallgrass vegetation along the roadside begun	At least two new tallgrass creation projects installed per county	At least two new tallgrass creation projects installed per county At least 10 km of tallgrass vegetation established on the wildflower route	RLSN, TPSA, MTO
	6.A.12	At least three special events held per year in southern Ontario to raise public awareness	At least three special events held per year in southern Ontario to raise public awareness	At least three special events held per year in southern Ontario to raise public awareness	At least three special events held per year in southern Ontario to raise public awareness	TPSA, naturalist groups, CA, SN, CWS, OHF
	6.A.13	At least two training workshops provided per year regarding tallgrass ecology, management and restoration	At least two training workshops provided per year regarding tallgrass ecology, management and restoration	At least two training workshops provided per year regarding tallgrass ecology, management and restoration	At least two training workshops provided per year regarding tallgrass ecology, management and restoration	universities, CA, naturalist clubs, SN, CWS

**Table 2: Implementation Schedule**

Goal	Action	Targets:				Suggested key agencies
		January 1999	January 2000	January 2001	January 2003	
	6.A.14	Community-based naturalization projects encouraged	Community-based naturalization projects encouraged	Community-based naturalization projects encouraged	Community-based naturalization projects encouraged	TPSA, CWS, EF, FON
	6.B.1		Tallgrass community education package for elementary and high schools developed  <i>Project WILD Activity Guide</i> contains a section devoted to Canada's tallgrass communities	Tallgrass community education package marketed to all elementary and secondary schools in southern Ontario		WWF, FON, CCC  CWF
	6.B.2		At least 10% of southern Ontario schools are involved in tallgrass community study and activities		At least 50% of Southern Ontario schools are involved in tallgrass community study and activities	WWF, FON, EF, Ontario schools
	6.B.3		Students completing post-secondary biology, ecology, environmental and landscape architecture programs in Ontario are aware of Ontario's tallgrass community conservation issues	At least one post-secondary institution offers student scholarships or research awards for tallgrass community study/activity	At least three post-secondary institutions offer courses and/or research opportunities in the areas of tallgrass ecology, conservation and creation	All post-secondary institutions in Ontario
7. Aid species at risk	7.A.1	COSSARO identifies priority tallgrass species for in-depth status review		Status reviews completed for all high priority tallgrass species		OMNR
	7.A.2		Broadened COSEWIC and COSSARO activities include greater focus on invertebrates and non-vascular plants			COSEWIC, COSSARO
	7.B.1		COSEWIC, COSSARO and RENEW processes streamlined to speed species identification, evaluation and recovery efforts			COSEWIC, COSSARO, RENEW

**Table 2: Implementation Schedule**

Goal	Action	Targets:				Suggested key agencies
		January 1999	January 2000	January 2001	January 2003	
	7.C.1	Multi-agency meeting held to discuss dovetailed use of single-/multi-species and ecosystem approaches to recovery planning for maximum efficiency	Strategy for development of recovery plans for all COSEWIC-listed tallgrass species produced		Recovery plans developed for all COSEWIC-listed tallgrass species	WWF, RENEW
	7.D.1			Meeting held to explore possibilities for gene banks for southern Ontario's rare plant species		OMNR, TPSA, SER
	7.D.2			At least two conservation-oriented conferences in North America have included conservation genetics as a major theme		
8. Research	8.A.1		Prioritized list of basic and applied research needs developed; organized activity to address listed research needs initiated		Research activity evaluated against prioritized list	OMNR
	8.A.2	Increased funding available for research activities	Increased funding available for research activities	Increased funding available for research activities	Increased funding available for research activities	government agencies, private conservation agencies, businesses and industries
	8.A.3			Service in place to help coordinate researchers with practitioners to increase research activity		
	8.A.4	Research information and results widely accessible	Research information and results widely accessible	Research information and results widely accessible	Research information and results widely accessible	researchers, conservation-oriented journals, magazines, newsletters

**Table 2: Implementation Schedule**

Goal	Action	Targets:				Suggested key agencies
		January 1999	January 2000	January 2001	January 2003	

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# Appendices

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## List Format for Appendices 1 and 2

Appendices 1 and 2 were modified from various lists produced by the Natural Heritage Information Centre. The following explanation of list format is modified from Oldham 1996; definitions for the status categories used by COSSARO and COSEWIC are taken from Ontario Ministry of Natural Resources 1996.

**Column 1:**     Scientific Name

**Column 2:**     Common Name

**Column 3:**     Global Rank (Grank)

Global ranks are assigned by a consensus of the network of natural heritage programs (conservation data centres), scientific experts and The Nature Conservancy to designate a rarity rank based on the range-wide status of a species, subspecies or variety. Global ranks are assigned in a manner similar to that described for provincial ranks (below), but consider these factors throughout the total range of the taxon.

- G1**     **Extremely rare**; usually five or fewer occurrences in the overall range or very few remaining individuals; or because of some factor(s) making it especially vulnerable to extinction.
- G2**     **Very rare**; usually between five and 20 occurrences in the overall range or with many individuals in fewer occurrences; or because of some factor(s) making it vulnerable to extinction.
- G3**     **Rare to uncommon**; usually between 20 and 100 occurrences; may have fewer occurrences, but with a large number of individuals in some population; may be susceptible to large-scale disturbances.
- G4**     **Common**; usually more than 100 occurrences; usually not susceptible to immediate threats.
- G5**     **Very common**; demonstrably secure under present conditions.
- GU**     **Status uncertain**, often because of low search effort or cryptic nature of the species; more data needed.
- G?**     **Unranked**, or if following a ranking, rank tentatively assigned.
- Q**     Denotes that the taxonomic status of the species, subspecies, or variety is



questionable.

**T** Denotes that the rank applies to a subspecies or variety.

A rank range, e.g. G2G3, indicates that the Global Rank is either G2 or G3, but that the information currently available is insufficient to determine which rank applies.

**Column 4: Provincial Rank (Srank)**

Provincial (or Subnational) ranks are used by the Natural Heritage Information Centre to set protection priorities for rare species and natural communities. These ranks are not legal designations. The most important factors considered in assigning provincial ranks are the total number of known, extant sites in Ontario and the degree to which they are potentially or actively threatened with destruction. Other criteria include the number of known populations considered to be securely protected, the size of the various populations and the ability of the taxon to persist at its known sites. The taxonomic distinctness of each taxon has also been considered. Hybrids, introduced species and taxonomically dubious species, subspecies and varieties have generally not been included. By comparing the global and provincial ranks, the status, rarity and urgency of conservation needs can be ascertained. Provincial ranks have been assigned using the best available scientific information and have been reviewed by a group of experts on the flora of Ontario. The NHIC evaluates provincial ranks on a continual basis and produces updated lists, and welcomes information which will assist in assigning accurate provincial ranks.

**S1** **Extremely rare** in Ontario; usually five or fewer occurrences in the province or very few remaining individuals; often especially vulnerable to extirpation.

**S2** **Very rare** in Ontario; usually between five and 20 occurrences in the province or with many individuals in fewer occurrences; often susceptible to extirpation.

**S3** **Rare to uncommon** in Ontario; usually between 20 and 100 occurrences in the province; may have fewer occurrences, but with a large number of individuals in some populations; may be susceptible to large-scale disturbances.

**S4** **Common** and apparently secure in Ontario; usually with more than 100 occurrences in the province.

**S5** **Very common** and demonstrably secure in Ontario.

**SH** **Historically known** from Ontario, but not verified recently (typically not recorded in the province in the last 20 years); however, suitable habitat is thought to be still present in the province and there is reasonable expectation that the species may be rediscovered.

**SX** Apparently **extirpated** from Ontario, with little likelihood of rediscovery. Typically not seen in the province for many decades, despite searches at known historic sites.

**?** Following a ranking indicates some degree of uncertainty.

A rank range, e.g. S2S3, indicates that the Ontario Rank is either S2 or S3, but that the information currently available is insufficient to determine which rank applies.

**Column 5:** **COSEWIC Status**

Status assigned by the Committee on the Status of Endangered Wildlife in Canada.

**EXP** **Extirpated** Any indigenous species of fauna or flora no longer known to exist in the wild in Canada, but occurring elsewhere.

**END** **Endangered** Any indigenous species of fauna or flora that is threatened with imminent extinction or extirpation throughout all or a significant portion of its Canadian range.

**THR** **Threatened** Any indigenous species of fauna or flora that is likely to become endangered in Canada if the factors affecting its vulnerability do not become reversed.

**VUL** **Vulnerable**. Any indigenous species of fauna or flora that is particularly at risk because of low or declining numbers, occurrence at the fringe of its range or in restricted areas, or from some other reason, but is not a threatened species.

**NAR** **Not at risk.**

**OMNR Status**

**Column 6:** Status assigned by the Ontario Ministry of Natural Resources. Designations made by OMNR since January 1995 are based on recommendations of a ministry technical committee called the Committee on the Status of Species at Risk in Ontario (COSSARO). Endangered species (END) are protected under the province's Endangered Species Act.

**END** **Endangered** Any native species that, on the basis of the best available scientific evidence, is at risk of extinction or extirpation throughout all or a significant portion of its Ontario range if the limiting factors are not reversed.

**THR Threatened.** Any native species that, on the basis of the best available scientific evidence, is at risk of becoming endangered throughout all or a significant portion of its Ontario range if the limiting factors are not reversed.

**VUL Vulnerable.** Any native species that, on the basis of the best available scientific evidence, is a species of special concern in Ontario, but is not a threatened or endangered species.

**Column 7: Ecology**

This column lists information regarding species-specific ecological needs and preferences. Such information should be considered when developing tallgrass community management plans.

Codes:

- 1 Fire-adapted (or tolerant)
- 2 Fire-sensitive
- 3 Benefits from or tolerates soil disturbance
- 4 Sensitive to soil disturbance
- 5 High light intensity species
- 6 Medium light intensity species
- 7 Low light intensity species
- 8 Micro-organism association
- 9 Host-plant or predator-prey association
- 10 Requires specific pollinator or dispersal agent
- 11 Requires moist or wet soil in spring
- 12 Need for large remnants to maintain viable populations
- 13 Other specific habitat needs
- 14 Specific threats or pressures

soil types: Sa Sand  
L Loam  
Si Silt  
C Clay  
O Organic

**Appendix 1: NHIC list of rare and characteristic vascular plants associated with tallgrass prairie and savanna in Ontario  
(Note: Rare species in boldface)**

Scientific Name	Common Name	Grank	Srank	COSEWIC	MNR	Ecology	Prairie	Savanna
<b><i>Agalinis gattingeri</i></b>	round-stemmed purple false foxglove	G4	S1	END		1,3,4,Sa	X	
<b><i>Agalinis skinneriana</i></b>	pale purple false foxglove	G3	S2	END		1,3,4,Sa	X	?
<b><i>Agrimonia parviflora</i></b>	swamp agrimony	G5	S3S4			1,3,5-6,Sa, Si?	X	X
<b><i>Aletris farinosa</i></b>	colic root	G5	S2	THR	THR	1,3,5,Sa	X	
<b><i>Allium cernuum</i></b>	nodding onion	G5	S2			1,5,Sa,L	X	
<i>Amelanchier alnifolia</i> var. <i>humilis</i>	low shadbush	G5	S4			1,3,5,Sa	X	X
<b><i>Amorpha canescens</i></b>	leadplant	G5	SH			1,3?,5-6,8, Sa	X	
<i>Andropogon gerardii</i>	big bluestem	G5	S4			1,3,5,Sa,L	X	X
<i>Andropogon virginicus</i>	broom sedge	G5	S4			1,3,5,Sa	X	
<i>Anemone cylindrica</i>	thimbleweed	G5	S4			1,3,5,Sa	X	X
<b><i>Anemonella thalictroides</i></b>	rue anemone	G5	S3			1,6-7,Sa		X
<i>Arenaria stricta</i>	rock sandwort	G5	S5			1,3,5,Sa	X	X
<b><i>Aristida longespica</i> var. <i>geniculata</i></b>	three-awn grass	G5T?	S2			1,3,5,±11,Sa	X	
<b><i>Aristida longespica</i> var. <i>longespica</i></b>	three-awn grass	G5T?	S2			1,3,5,±11,Sa	?	
<b><i>Aristida purpurascens</i></b>	arrow feather three-awn grass	G5	S1			1,3,5,Sa,L	X	
<b><i>Asclepias hirtella</i></b>	tall green milkweed	G5	S1			1,3,5,Sa	X	
<b><i>Asclepias purpurascens</i></b>	purple milkweed	G4G5	S2			1,3,5,Sa	X	X
<b><i>Asclepias sullivantii</i></b>	prairie milkweed	G5	S2			1,3,5,±11,Sa	X	
<i>Asclepias tuberosa</i>	butterfly-weed	G5	S4			1,3,5,Sa	X	X
<b><i>Asclepias verticillata</i></b>	whorled milkweed	G5	S2			1,3,5-6,Sa,L	X	X
<b><i>Asclepias viridiflora</i></b>	green milkweed	G5	S2			1,3,5,Sa	X	X
<b><i>Aster dumosus</i></b>	bushy aster	G5	S2			1,3,5,11,Sa	X	
<i>Aster laevis</i>	smooth aster	G5	S5			1,3,5-6,Sa,L	X	X
<i>Aster oolentangiensis</i>	sky-blue aster	G5	S4			1,3,5,Sa,L	X	X
<b><i>Aster praealtus</i></b>	willow aster	G5	S2			1,3,5,Sa	X	X
<b><i>Aster shortii</i></b>	Short's aster	G4G5	S2			1,3,5,Sa,L	X	X
<b><i>Aureolaria flava</i></b>	smooth yellow false foxglove	G5	S3			1,3,6,9,Sa		X
<b><i>Aureolaria pedicularia</i></b>	fernleaf yellow false foxglove	G5	S3			1,3,6,9,Sa		X
<b><i>Aureolaria virginica</i></b>	downy yellow false foxglove	G5	S1			1,3,6,9,Sa		X
<b><i>Baptisia tinctoria</i></b>	yellow wild indigo	G5	S2			1,3,5-6,Sa	X	X

**Appendix 1: NHIC list of rare and characteristic vascular plants associated with tallgrass prairie and savanna in Ontario**  
(Note: Rare species in boldface)

Scientific Name	Common Name	Grank	Srank	COSEWIC	MNR	Ecology	Prairie	Savanna
<i>Blephilia ciliata</i>	downy woodmint	G5	S1			1,3,5-6,Sa,L	X	
<i>Bouteloua curtipendula</i>	side-oats grama	G5	S2			1,3,5,Sa,L	X	X
<i>Bromus kalmii</i>	Kalm's brome grass	G5	S4			1,3,5,Sa	X	X
<i>Bulbostylis capillaris</i>	hair-like bulbostylis	G5	S3?			3,5,11,Sa	X	
<i>Calamovilfa longifolia</i> var. <i>magna</i>	sand reed	G5TU	S3			1,3,5,Sa	X	X
<i>Carex albicans</i> var. <i>albicans</i>	blunt-scaled oak sedge	G5T4T5	S2			1,3,5-6,Sa,L		X
<i>Carex bicknellii</i>	Bicknell's sedge	G5	S2			1,3,5,Sa,L	X	
<i>Carex conoidea</i>	prairie gray sedge	G4	S3			1,3,5,11,Sa,L	X	
<i>Carex inops</i>	sun sedge	G5	S1			1,3,5,Sa		X
<i>Carex meadii</i>	Mead's stiff sedge	G4G5	S2			1,3,5,11,Sa,L	X	
<i>Carex mesochorea</i>	midland bracted sedge	G4G5	S1			1,3,5,Sa	X	
<i>Carex nigromarginata</i>	black-edged sedge	G4G5	S1			1,3,6?,Sa		X
<i>Carex richardsonii</i>	Richardson's sedge	G4	S4?			1,3,5,Sa	X	X
<i>Carex sartwellii</i>	Sartwell's sedge	G4	S4			1,3,5,11,Sa,L	X	
<i>Carex siccata</i>	hay sedge	G5	S5			1,3,5,Sa	X	X
<i>Carex suberecta</i>	wedge-fruited oval sedge	G4	S2			1,3,5,Sa	X	
<i>Carex swanii</i>	downy green sedge	G5	S3			1,3,6,Sa	X	
<i>Carex tetanica</i>	common stiff sedge	G4G5	S3			1,3,5,11,Sa	X	
<i>Carya laciniosa</i>	big shellbark hickory	G5	S3			1,3,5-6,11,Sa,L,Si,C		X
<i>Carya ovalis</i>	sweet pignut hickory	G5	S3			1,3,5-6,Sa	X	X
<i>Castilleja coccinea</i>	scarlet paint-brush	G5	S5			1,5,9,11,Sa,L	X	X
<i>Ceanothus americanus</i>	New Jersey tea	G5	S4			1,3,5-6,8,Sa,L	X	X
<i>Ceanothus herbaceus</i>	New Jersey tea	G5	S4			1,3,5-6,8,Sa	X	X
<i>Celtis tenuifolia</i>	dwarf hackberry	G5	S2	VUL		1,3,5-6,Sa	X	X
<i>Chenopodium foggii</i>	Fogg's goosefoot	G3?Q	S2			3,5-6,Sa		X
<i>Cirsium discolor</i>	prairie thistle	G5	S4			1,3,5-6,Sa	X	X
<i>Cirsium hillii</i>	prairie thistle	G3	S3			1,3,5-6,Sa		X
<i>Comandra umbellata</i>	bastard toadflax	G5	S5			1,3,5-6,Sa,L	X	X
<i>Coreopsis tripteris</i>	tall coreopsis	G5	S2			1,3,5-6,Sa,L	X	X
<i>Cyperus flavescens</i>	yellow flat sedge	G5	S2			1,3,5,11,Sa	X	
<i>Cyperus lupulinus</i>	umbrella-sedge	G5	S4			1,3,5,Sa	X	X
<i>Cypripedium candidum</i>	small white lady's-slipper	G4	S1	END	END	1,4?,5,8,11,Sa,O	X	

**Appendix 1: NHIC list of rare and characteristic vascular plants associated with tallgrass prairie and savanna in Ontario  
(Note: Rare species in boldface)**

Scientific Name	Common Name	Grank	Srank	COSEWIC	MNR	Ecology	Prairie	Savanna
<i>Desmodium canadense</i>	tick trefoil	G5	S4			1,3,5-6,Sa,L	X	X
<b><i>Desmodium canescens</i></b>	<b>hoary tick-trefoil</b>	G5	S2			1,3,5-6,Sa	X	X
<b><i>Desmodium cuspidatum</i></b>	<b>bracted tick-trefoil</b>	G5	S3			1,3,5-6,Sa,L	X	X
<i>Desmodium dillenii</i>	tick trefoil	G5T?	S4			1,3,5,Sa	X	
<b><i>Desmodium rotundifolium</i></b>	<b>round-leaved tick-trefoil</b>	G5	S2			1,3,5-6,Sa		X
<b><i>Digitaria cognata</i></b>	<b>fall witch grass</b>	G5	S1			1,3,5,Sa	X	
<b><i>Echinacea pallida</i></b>	<b>pale purple coneflower</b>	G4G5	S1			1,3,5,Sa	X	
<i>Elymus canadensis</i>	Canada wild-rye	G5	S4S5			1,3,5,Sa,L	X	X
<i>Equisetum laevigatum</i>	smooth scouring-rush	G5	S4			1,3,5,Sa	X	X
<b><i>Eragrostis capillaris</i></b>	<b>lace grass</b>	G5	S1			1,3,5,Sa		X
<b><i>Eragrostis spectabilis</i></b>	<b>purple love grass</b>	G5	S2			1,3,5,Sa	X	X
<i>Erigeron pulchellus</i>	Robin's plantain	G5	S5			1,3,5-6,Sa	X	X
<b><i>Eupatorium purpureum</i></b>	<b>purple-jointed joe pye weed</b>	G5	S3			1,3,6,Sa		X
<i>Euphorbia corollata</i>	showy spurge	G5	S4			1,3,5,Sa,L	X	X
<b><i>Euthamia gymnospermoides</i></b>	<b>viscid grass-leaved goldenrod</b>	G5	S1			1,3,5-6,11, Sa	X	
<b><i>Fimbristylis puberula</i></b>	<b>hairy fimbristylis</b>	G5	S1			1,3,5,11,Sa	X	
<b><i>Frasera caroliniensis</i></b>	<b>Carolina gentian</b>	G5	S1	VUL		1,3,5-6,Sa	X	X
<b><i>Galium pilosum</i></b>	<b>hairy bedstraw</b>	G5	S3			1,3,6,Sa		X
<b><i>Gaura biennis</i></b>	<b>biennial gaura</b>	G5	S2			1,3,5-6,Sa	X	X
<b><i>Gentiana flavida</i></b>	<b>white prairie gentian</b>	G4	S1	END		1,3,6,8,Sa		X
<b><i>Gentiana puberulenta</i></b>	<b>downy gentian</b>	G4G5	SX			1,3,5,8,Sa	X	X
<b><i>Gentiana quinquefolia</i></b>	<b>stiff gentian</b>	G5	S2			1,5-6,8,Sa, Si	X	X
<i>Geum triflorum</i>	prairie smoke	G4G5	S4			1,3,5,Sa	X	X
<b><i>Gleditsia triacanthos</i></b>	<b>honey locust</b>	G5	S2			3?,5-6,11, Sa,L,Si,C	X	
<i>Helianthemum bicknellii</i>	Bicknell's rock-rose	G5	S4			1,3,5,Sa	X	X
<i>Helianthemum canadense</i>	rock-rose	G5	S4			1,3,5,Sa	X	X
<i>Helianthus decapetalus</i>	thin-leaved sunflower	G5	S5			1,3,6,Sa		X
<i>Helianthus divaricatus</i>	woodland sunflower	G5	S5			1,3,5-6,Sa	X	X
<i>Helianthus strumosus</i>	pale-leaved wood sunflower	G5	S5			1,3,5-6,Sa	X	X
<b><i>Hieracium venosum</i></b>	<b>rattlesnake hawkweed</b>	G5	S2			1,3,6,Sa		X
<i>Houstonia longifolia</i>	bluets	G4G5	S4?			1,3,5-6,Sa	X	X
<b><i>Hypericum gentianoides</i></b>	<b>orange-grass St. John's-wort</b>	G5	S1			1,3,5,Sa	X	

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Scientific Name	Common Name	Grank	Srank	COSEWIC	MNR	Ecology	Prairie	Savanna
<i>Hypericum prolificum</i>	<b>shrubby St. John's-wort</b>	G5	S2			1,3,6,Sa		X
<i>Hypoxis hirsuta</i>	<b>yellow star-grass</b>	G5	S3			1,5-6,Sa	X	X
<i>Juncus acuminatus</i>	<b>sharp-fruit rush</b>	G5	S3			1,3,5,11?,Sa		X
<i>Juncus biflorus</i>	<b>two-flowered rush</b>	G5Q	S1			1,3,5,Sa	X	
<i>Juncus brachycarpus</i>	<b>short-fruited rush</b>	G4G5	S1			1,3,5,11,Sa	X	
<i>Juncus greenei</i>	<b>Greene's rush</b>	G5	S3			1,3,5,Sa	X	
<i>Juncus marginatus</i>	<b>grass-leaved rush</b>	G5	S2			1,3,5,11,Sa		X
<i>Koeleria macrantha</i>	<b>june grass</b>	G5	S2			1,3,5,Sa	X	X
<i>Krigia biflora</i>	<b>two-flowered cynthia</b>	G5	S2			1,3,5,Sa		X
<i>Lechea intermedia</i>	pinweed	G5	S4			1,3,5,Sa	X	X
<i>Lechea pulchella</i>	<b>pretty pinweed</b>	G5	S1			1,3,5,Sa		X
<i>Lechea villosa</i>	<b>hairy pinweed</b>	G5	S3			1,3,5,Sa		X
<i>Lespedeza capitata</i>	round-headed bush-clover	G5	S4			1,3,5,Sa	X	X
<i>Lespedeza hirta</i>	hairy bush-clover	G5	S4			1,3,5,Sa,L	X	X
<i>Lespedeza intermedia</i>	wand-like bush-clover	G5	S4			1,3,5,Sa	X	X
<i>Lespedeza virginica</i>	<b>slender bush-clover</b>	G5	S1	END		1,3,5-6,Sa		X
<i>Liatris aspera</i>	<b>rough blazing-star</b>	G4G5	S2			1,3,5-6,Sa	X	X
<i>Liatris cylindracea</i>	<b>cylindrical blazing-star</b>	G5	S3			1,3,5-6,Sa	X	X
<i>Liatris spicata</i>	<b>dense blazing-star</b>	G5	S3	VUL		1,3,5-6,Sa,L	X	
<i>Linum sulcatum</i>	<b>grooved yellow flax</b>	G5	S3			1,3,5,Sa	X	X
<i>Linum virginianum</i>	<b>slender yellow flax</b>	G4G5	S2			1,3,5,Sa		X
<i>Liparis liliifolia</i>	<b>purple twayblade</b>	G5	S2	THR	THR	1,3,5-6,Sa		X
<i>Lithospermum canescens</i>	<b>hoary puccoon</b>	G5	S3?			1,3,5-6,Sa	X	X
<i>Lithospermum incisum</i>	<b>fringed puccoon</b>	G5	S1			1,3,5,Sa	X	
<i>Lobelia spicata</i>	pale-spike lobelia	G5	S4			1,3,5,Sa	X	X
<i>Ludwigia alternifolia</i>	<b>seedbox</b>	G5	S1			1,3,5,11,Sa	X	
<i>Ludwigia polycarpa</i>	<b>many-fruited false-loosestrife</b>	G4	S2			1,3,5,11,Sa,L	X	
<i>Lupinus perennis</i>	<b>wild lupine</b>	G5	S3			1,3,6,10,Sa		X
<i>Lycopus virginicus</i>	<b>Virginia bugleweed</b>	G5	S2			1,3,6-7?,11,Sa?,L,Si,C?	X	
<i>Lysimachia quadrifolia</i>	whorled loosestrife	G5	S4			1,3,5-6,Sa	X	X
<i>Lysimachia quadriflora</i>	prairie loosestrife	G5?	S4			1,3,5,11,Sa	X	X
<i>Lythrum alatum</i>	<b>winged loosestrife</b>	G5	S3			1,3,5,11,Sa	X	
<i>Monarda fistulosa</i>	wild bergamot	G5	S5			1,3,5-6,Sa,L	X	X
<i>Monarda punctata</i>	<b>spotted bee-balm</b>	G5	S1			1,3,5,Sa	X	X
<i>Muhlenbergia richardsonis</i>	<b>soft-leaf muhly</b>	G5	S2			1,3,5,11,Sa	X	

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Scientific Name	Common Name	Grank	Srank	COSEWIC	MNR	Ecology	Prairie	Savanna
<i>Myrica pensylvanica</i>	bayberry	G5	S1			1,3,5-6,11, Sa,Si?		X
<i>Oenothera clelandii</i>	sand evening-primrose	G3G5	S1			1,3,5,Sa	X	X
<i>Oxypolis rigidior</i>	stiff cowbane	G5	S2			1,6-7,11,Sa, L,Si,C	X	X
<i>Panicum dichotomum</i>	forked panic grass	G5	S2			1,3,6,Sa		X
<b><i>Panicum leibergii</i> var. <i>leibergii</i></b>	<b>Leiberg's Panic Grass</b>	G5T?	S1			1,3,5,Sa	X	
<i>Panicum meridionale</i>	mat panic grass	G5	S1			1,3,5,Sa		X
<i>Panicum oligoanthos</i>	Scribner's panic grass	G5	S4			1,3,5,Sa	X	X
<i>Panicum perlongum</i>	long-stalked panic grass	G?	S1S2			1,3,5,Sa		X
<i>Panicum rigidulum</i>	redtop panic grass	G5	S2S3			1,3,5,11,Sa	X	
<i>Panicum sphaerocarpon</i> var. <i>sphaerocarpon</i>	round-fruited panic grass	G5T5	S3			1,3,5,Sa	X	X
<i>Panicum villosissimum</i>	white-haired panic grass	G5	S3			1,3,5,Sa	X	X
<i>Panicum virgatum</i>	switchgrass	G5	S4			1,3,5,Sa,L	X	X
<i>Paspalum setaceum</i>	slender paspalum	G5	S2			1,3,5,Sa	X	X
<i>Penstemon hirsutus</i>	hairy beardtongue	G4	S4			1,3,5,Sa	X	X
<i>Phlox subulata</i>	moss phlox	G5	S1?			1,3,5,Sa		X
<i>Platanthera leucophaea</i>	eastern prairie white fringed orchid	G2	S2	VUL		1,5,8,10,11, Sa,O	X	
<i>Polygala incarnata</i>	pink milkwort	G5	S1	END		1,3,5,11,Sa	X	
<i>Polygala polygama</i>	racemed milkwort	G5	S4			1,3,5-6,Sa	X	X
<i>Polygala senega</i>	seneca snakeroot	G4G5	S4			1,3,6,Sa	X	X
<i>Polygala verticillata</i>	whorled milkwort	G5	S4			1,3,5,Sa	X	X
<i>Polygonum tenue</i>	knotweed	G5	S2			1,3,5,Sa	X	X
<i>Potentilla arguta</i>	prairie cinquefoil	G5	S4			1,3,5,Sa,L	X	X
<i>Prunus pumila</i> s.l.	sand cherry	G5	S4S5			1,3,5,Sa	X	X
<i>Prunus pumila</i> var. <i>besseyi</i>	<b>Bessey's plum</b>	G5T?	S1			1,3,5,Sa		X
<i>Pycnanthemum tenuifolium</i>	slender mountain-mint	G5	S3			1,3,5,Sa		X
<i>Pycnanthemum verticillatum</i> var. <i>pilosum</i>	hairy mountain-mint	G5T5	S1			1,3,5,Sa		X
<i>Pycnanthemum virginianum</i>	virginia mountain-mint	G5	S4			1,3,5- 6,11,Sa,L,Si, C	X	X
<i>Quercus ellipsoidal</i>	northern pin oak	G4	S3			1,3,5,Sa	X	X
<i>Quercus palustris</i>	pin oak	G5	S3			1,3,5- 6,11,Sa,L,Si, C	X	X



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Scientific Name	Common Name	Grank	Srank	COSEWIC	MNR	Ecology	Prairie	Savanna
<b><i>Quercus prinoides</i></b>	<b>dwarf chinquapin oak</b>	G5	S2			1,3,5,Sa	X	X
<i>Ranunculus fascicularis</i>	early buttercup	G5	S4			1,3,5-6,Sa		X
<b><i>Ranunculus hispidus</i> var. <i>hispidus</i></b>	<b>bristly buttercup</b>	G5T5	S3			1,3,5-6,Sa		X
<b><i>Ranunculus rhomboideus</i></b>	<b>prairie buttercup</b>	G4	S3			1,3,5-6,Sa	X	X
<b><i>Ratibida pinnata</i></b>	<b>gray-headed coneflower</b>	G5	S2S3			1,3,5-6,Sa	X	
<i>Rhus aromatica</i>	fragrant sumac	G5	S5			1,3,5,Sa	X	X
<b><i>Rhus copallina</i></b>	<b>winged sumac</b>	G5	S3S4			1,3,5,Sa	X	X
<b><i>Rosa setigera</i></b>	<b>prairie rose</b>	G5	S3	VUL		1,5,Sa,L,Si, C	X	X
<b><i>Rotala ramosior</i></b>	<b>toothcup</b>	G5	S1			1,3,5,11,Sa	X	
<i>Schizachyrium scoparium</i>	little bluestem	G5	S4			1,3,5,Sa,L	X	X
<b><i>Scirpus clintonii</i></b>	<b>Clinton's bulrush</b>	G4	S2			1,5,Sa	X	
<b><i>Scleria pauciflora</i></b>	<b>few-flowered nut-rush</b>	G5	S1			1,3,5,11?,Sa	X	
<b><i>Scleria triglomerata</i></b>	<b>tall nut-rush</b>	G5	S1			1,3,5,11,Sa, L	X	
<b><i>Scleria verticillata</i></b>	<b>low nut-rush</b>	G5	S3			1,3,5,11,Sa	X	
<b><i>Scutellaria parvula</i> var. <i>leonardii</i></b>	<b>Leonard's small skullcap</b>	G4T4	S1			1,3,5,Sa	X	
<b><i>Senecio plattensis</i></b>	<b>prairie ragwort</b>	G5	S2S3			1,3,5-6,Sa		X
<b><i>Silphium laciniatum</i></b>	<b>compass plant</b>	G5	S1			1,3,5,Sa	X	
<b><i>Silphium terebinthinaceum</i></b>	<b>prairie dock</b>	G4G5	S1			1,3,5,11,Sa	X	X
<b><i>Sisyrinchium albidum</i></b>	<b>white blue-eyed grass</b>	G5?	S1			1,3,5,11,Sa	X	
<b><i>Smilax ecirrhata</i></b>	<b>upright carrion flower</b>	G5?	S3?			1,3,6,11?, Sa,L		X
<b><i>Smilax illinoensis</i></b>	<b>Illinois carrion flower</b>	G4?	S2?			1,3,6,11?, Sa,L		X
<i>Solidago ohioensis</i>	Ohio goldenrod	G4	S4			1,3,5,11,Sa, L	X	X
<i>Solidago ptarmicoides</i>	upland white aster	G5	S5			1,3,5,Sa	X	X
<b><i>Solidago riddellii</i></b>	<b>Riddell's goldenrod</b>	G5	S2S3			1,3,5,11?,Sa L	X	
<b><i>Solidago rigida</i> ssp. <i>rigida</i></b>	<b>stiff goldenrod</b>	G5T5	S3			1,3,5,Sa,Si,L	X	
<b><i>Solidago speciosa</i></b>	<b>showy goldenrod</b>	G5	S1			1,3,5,Sa	X	X
<i>Sorghastrum nutans</i>	Indian grass	G5	S4			1,3,5,Sa,L	X	X
<i>Spartina pectinata</i>	prairie slough grass	G5	S4			1,3,5,11,Sa, L	X	X
<b><i>Sphenopholis obtusata</i></b>	<b>prairie wedge grass</b>	G5	S1			1,3,5- 6,11?,Sa	X	

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Scientific Name	Common Name	Grank	Srank	COSEWIC	MNR	Ecology	Prairie	Savanna
<b><i>Spiranthes lacera</i> var. <i>gracilis</i></b>	southern slender ladies' tresses	G5T4T5	S1			1,3,5,8,11, Sa	X	X
<b><i>Spiranthes magnicamporum</i></b>	Great Plains ladies' tresses	G3G4	S3			1,3,5,8,11, Sa	X	X
<b><i>Spiranthes ochroleuca</i></b>	yellow ladies' tresses	G4	S2			1,3,5,8,11, Sa		X
<b><i>Spiranthes ovalis</i></b>	oval ladies' tresses	G5	S1			1,3,5,8,11, Sa	X	X
<b><i>Sporobolus asper</i></b>	rough dropseed	G5	S1S2			1,3,5,Sa,L	X	
<i>Sporobolus cryptandrus</i>	sand dropseed	G5	S4			1,3,5,Sa	X	X
<b><i>Sporobolus heterolepis</i></b>	prairie dropseed	G5	S2			1,3,5,Sa	X	
<b><i>Stipa avenacea</i></b>	black oat-grass	G5	SH			1,3,5,Sa		X
<b><i>Stipa spartea</i></b>	porcupine grass	G5	S3			1,3,5,Sa	X	X
<b><i>Strophostyles helvula</i></b>	trailing wild bean	G5	S3			1,3,5,Sa		X
<b><i>Tephrosia virginiana</i></b>	goat's rue	G5	S1	THR		1,3,5-6,Sa		X
<b><i>Thalictrum revolutum</i></b>	waxy meadow-rue	G5	S2			1,3,5-6,11, Sa,L,Si,C	X	X
<b><i>Tradescantia ohiensis</i></b>	Ohio spiderwort	G5	S2			1,3,5-6,11, Sa	X	X
<b><i>Trichostema dichotomum</i></b>	forked blue curls	G5	S1			1,3,5-6,Sa		X
<b><i>Valeriana edulis</i></b>	hairy valerian	G5	S1			1,3,5,Sa	X	
<b><i>Vernonia missurica</i></b>	ironweed	G5	S3			1,3,5-6,Sa, L,Si,C	X	X
<b><i>Veronicastrum virginicum</i></b>	culver's-root	G5	S2			1,3,5-6,Sa,L	X	X
<b><i>Vicia caroliniana</i></b>	wood vetch	G5	S2			1,3,6,Sa		X
<b><i>Viola palmata</i> var. <i>dilatata</i></b>	cleft violet	G5T?	S2			1,3,6,Sa		X
<b><i>Viola pedata</i></b>	bird's-foot violet	G5	S1	THR		1,3,5,Sa		X
<b><i>Viola pedatifida</i></b>	prairie violet	G5	S1			1,3,5,Sa		X
<i>Viola sagittata</i>	arrow-leaved violet	G5	S4			1,3,5,Sa	X	X
<b><i>Vulpia octoflora</i></b>	slender eight-flowered fescue	G5	S2			1,3,5,Sa		X
<i>Zigadenus glaucus</i>	death camass	G5	S4			1,3,5,Sa	X	X

**Appendix 2: NHIC list of rare fauna associated with tallgrass prairie and savanna habitat in Ontario**

Scientific Name	Common Name	Grank	Srank	COSEWIC	OMNR	Ecology	Prairie/Savanna
<b>REPTILES</b>							
<i>Coluber constrictor foxi</i>	<b>blue racer</b>	G5T?	S1	END	END	12. Need for relatively large tracts. Recent telemetry study (UofG). 13. Suitable hibernacula critical to survival of local populations. 14. Road mortality a serious problem.	Oak savannas. Restricted to savanna habitats on Pelee Is.
<i>Elaphe vulpina gloydi</i>	<b>eastern fox snake</b>	G5T3	S3			12. Need for relatively large tracts. 13. Suitable hibernacula critical to survival of local populations. 14. Road mortality a serious problem.	Oak savannas and tallgrass prairie. Not entirely restricted to these community types as it occurs commonly in SE Georgian Bay.
<i>Heterodon platirhinos</i>	<b>eastern hognose snake</b>	G5	S3	VUL		9/13. Requires tracts of sandland with good population of toads. 14. Road mortality can be a serious problem in some populations.	Oak savannas and sand barrens. Not entirely restricted to these types by any means.
<i>Thamnophis butleri</i>	<b>Butler's garter snake</b>	G5	S2			2. Occurs in fire dependent habitat, but intolerant of fire.	Tallgrass prairie. Primarily restricted to this type in Ontario. Some occurrences in other types.
<i>Eumeces fasciatus</i>	<b>five-lined skink</b>	G5	S3			2. Probably sensitive to fire. Prescribed burns likely at a time when individuals are sluggish and vulnerable. 14. Evidence of serious poaching of populations, particularly those within parks.	Tallgrass prairie and oak savannas. Not entirely restricted to these types as it occurs extensively in Precambrian rock barrens along the southern edge of the shield.
<i>Sistrurus catenatus catenatus</i>	<b>eastern massasauga</b>	G3G4T3	S3	THR	THR	12. Likely requires fairly extensive tracts of habitat. Telemetry studies from Georgian Bay Island National Park may help to determine. 13. Requires wet prairie patches. 14. Persecution likely a problem in near-urban, Windsor prairie populations.	Tallgrass prairie. Not restricted to this type as it occurs in alvar woodland and grassland, and Precambrian rock barren types.
<b>BIRDS</b>							

**Appendix 2: NHIC list of rare fauna associated with tallgrass prairie and savanna habitat in Ontario**

Scientific Name	Common Name	Grank	Srank	COSEWIC	OMNR	Ecology	Prairie/Savanna
<i>Ammodramus henslowii</i>	<b>Henslow's sparrow</b>	G3G4	S1	END	END	2. Although fire adapted in core of range, likely not so in southern Ontario. 12. Requires $\geq 30$ ha habitat patches. 13. Requires "old-growth" fields with well-developed thatch, upright stems for perching.	Tallgrass prairie. Probably restricted to this type historically, but expanded into ruderal grasslands.
<i>Chondestes grammacus</i>	<b>Lark sparrow</b>	G5	SH			14. Loss of scrubby oak-dominated "old field" and savanna a limiting factor.	Oak savannas. Occurred historically in oak savannas in Ontario. Now extirpated as a breeding species.
<i>Icteria virens</i>	<b>yellow-breasted chat</b>	G5	S2S3	VUL	VUL	14. Loss of scrubby oak-dominated "old field" and savanna a limiting factor. Regeneration of "old field" habitat within PPNP leading to a decline in chats.	Oak savannas. Not restricted to this type, as it also occurs in brushy old fields and open woodlands of all types.
<i>Lanius ludovicianus migrans</i>	<b>eastern loggerhead shrike</b>	G4G5T3	S2			9. Requires adequate supply of orthopterans in late season. 12. Probably requires larger tracts, though limits are inexact. 14. Road mortality appears to be a serious threat.	Tallgrass prairie. Historically, probably restricted to tallgrass prairie and barrens types. With land clearance and subsequent abandonment, expanded into hawthorn pastures.
<i>Parus bicolor</i>	<b>tufted titmouse</b>	G5	S2			Limiting factors in Ontario unknown.	Oak savannas. Not restricted to this type, as it also occurs in open woodland and swampland habitats.
<i>Colinus virginianus</i>	<b>northern bobwhite</b>	G5	S1S2	END		12. Requires reasonably extensive tracts of grassland and savanna. 14. Vulnerable to severe winters and late winter/spring storms, wild and domestic mammal predation and agricultural chemicals.	Tallgrass prairie. Historically, probably restricted to tallgrass prairie. With land clearance and subsequent abandonment, expanded into other ruderal field types. Now almost extirpated in Ontario, with only relatively stable populations on Walpole Is.
<i>Tympanuchus cupido</i>	<b>greater prairie chicken</b>	G4	SX	EXP			Tallgrass prairie historically. Now extirpated from the province.

**Appendix 2: NHIC list of rare fauna associated with tallgrass prairie and savanna habitat in Ontario**

Scientific Name	Common Name	Grank	Srank	COSEWIC	OMNR	Ecology	Prairie/Savanna
<i>Melanerpes erythrocephalus</i>	<b>red-headed woodpecker</b>	G5	S3	VUL	VUL	Reasons for recent decline uncertain. 13. Competition for available nest holes may be a problem, although it is unknown whether this is <i>the</i> limiting factor.	Oak savannas. By no means restricted to this type.
<i>Thryomanes bewickii</i>	<b>Bewick's wren</b>	G5	SH			14. Probably always marginal in southern Ontario. However, declines in northern and eastern portions of its range attributed, at least in part, to predation by domestic cats.	Oak savannas. Formerly a rare breeder in primarily oak savanna. Now extirpated. Associated with a variety of open habitats.
<b>MAMMALS</b>							
<i>Taxidea taxus</i>	<b>badger</b>	G5	S2S3	NAR		9. Prey abundance may be a limiting factor. 12/13. Probably requires relatively extensive tracts of sandland. 14. Incidental catches by trappers and road mortality may be serious limiting factors for the species in Ontario.	Tallgrass prairie and sand barrens. The animals in SW Ontario may belong to the "tallgrass prairie" subspecies, <i>T. t. jacksoni</i> ; however, this fact has not been established.
<b>GRASSHOPPERS, CRICKETS &amp; KATYDIDS (Orthoptera)</b>							
<i>Atlanticus testaceus</i>	<b>short-legged shield-bearer</b>	G?	S1S3			2. Overwinters in the egg stage in dry oak-leaf litter on forest floor, and consequently probably intolerant of spring fire. Adults appear in mid to late summer and would be intolerant of late summer or early autumn burns.	Oak savannas and sand barrens.
<i>Dendrotettix quercus</i>	<b>oak grasshopper</b>	G?	S1			2. Overwinters in the egg stage in dry oak-leaf litter on forest floor, and consequently probably intolerant of spring fire. Somewhat biennial (eggs overwintering for two winters), the species is usually more abundant every other year.	Oak savannas. In black oak savanna at Turkey Point (1940), but recently collected from black oak woodland/savanna near Walsingham.
<b>BEETLES (Coleoptera)</b>							

**Appendix 2: NHIC list of rare fauna associated with tallgrass prairie and savanna habitat in Ontario**

Scientific Name	Common Name	Grank	Srank	COSEWIC	OMNR	Ecology	Prairie/Savanna
<i>Cicindela lepida</i>	little white tiger beetle	G4	S2			4	Sand barrens. Occurs on white sand primarily along beaches and dunes, but also in openings in oak savannas and barrens.
<i>Cicindela patruela</i>	a tiger beetle	G3	S1			4	Openings in oak-pine savanna. Sandy openings in oak-pine woodland and savanna.
<b>MOTHS (Lepidoptera)</b>							
<i>Acronicta albarufa</i>	barrens daggermoth	G3G4	S1			2. May be a fire sensitive species. 9. Reportedly feeds on bur oak, but other species must be involved. Adults fly in July.	Oak savannas and barrens. Known only from the black oak savanna and woodland within Pinery Provincial Park.
<i>Papaipema aweme</i>	aweme borer	GH	SH			Nothing is known of this species (i.e., habitat requirements, host plants, sensitivity to fire, etc.). It is one of the borer moths, larvae of which burrow into the stems and roots of specific host plants.	Oak savannas and barrens. Known from a total of six sites, all now historic and presumed extirpated. In Ontario, known historically only from the "Grand Bend" area.
<i>Papaipema cerussata</i>	ironweed borer		S1?			9. Larvae bore into stems of <i>Vernonia</i> .	Prairie and savanna.
<i>Papaipema sciata</i>	culver's root borer		S1?			9. Larvae bore into stems of <i>Veronicastrum</i> .	Prairie and savanna.
<i>Schinia gloriosa</i>	glorius flower moth	G4	S1			9. Feeds exclusively on <i>Liatris cylindracea</i> . Apparently requires large stands of <i>L. cylindracea</i> .	Oak savannas and barrens. Currently known only from the Pinery-Port Franks-Ipperwash area.
<b>BUTTERFLIES &amp; SKIPPERS (Lepidoptera)</b>							
<i>Erynnis baptisiae</i>	wild indigo duskywing	G5	S1			9. In Ontario, feeds exclusively on <i>Baptisia tinctoria</i> . Apparently requires large stands of <i>Baptisia tinctoria</i> .	Oak savannas and tallgrass prairie.

**Appendix 2: NHIC list of rare fauna associated with tallgrass prairie and savanna habitat in Ontario**

Scientific Name	Common Name	Grank	Srank	COSEWIC	OMNR	Ecology	Prairie/Savanna
<i>Erynnis martialis</i>	<b>mottled duskywing</b>	G4	S2			1. Inasmuch as <i>Ceanothus americanus</i> is fire-adapted, tending to senesce in the absence of fire. 9. Feeds exclusively on <i>Ceanothus</i> , and in Ontario possibly only <i>C. americanus</i> . Apparently requires large, thriving stands of <i>Ceanothus americanus</i> .	Oak savannas and barrens. Many sites now extirpated and declining at others.
<i>Erynnis persius persius</i>	<b>persius duskywing</b>	G4T2T3	SX			1. Inasmuch as <i>Lupinus perennis</i> is fire-adapted, tending to senesce in the absence of fire. 9. Feeds exclusively on <i>Lupinus perennis</i> . Apparently requires large, thriving stands of <i>Lupinus perennis</i> .	Oak savannas.
<i>Incisalia irus</i>	<b>frosted elfin</b>	G4	SX		END	1. Inasmuch as <i>Lupinus perennis</i> is fire-adapted, tending to senesce in the absence of fire.	Oak savannas. Known formerly only from St. Williams.
<i>Lycaeides melissa samuelis</i>	<b>karner blue</b>	G5T2	SX	EXP	END	1. Inasmuch as <i>Lupinus perennis</i> is fire-adapted more vulnerable to hot spring burns than <i>Incisalia irus</i> . 9. With <i>L. perennis</i> . 10. Mutualistic relationship (not known whether facultative or obligate) with <i>Formica</i> sp. ants (protection for sustenance).	Oak savannas. Now extirpated. Last known from St. Williams and the Pinery-Port Franks area.
<i>Mitoura grynea</i>	<b>olive hairstreak</b>	G5	S2			9. Feeds exclusively on <i>Juniperus virginiana</i> . Apparently requires large, thriving stands of <i>J. virginiana</i> .	Red cedar savannas.
<i>Speyeria idalia</i>	<b>regal fritillary</b>	G3	SX				Oak savannas.
<b>WASPS (Hymenoptera)</b>							
<i>Tachysphex pechumani</i>	<b>antennal waving wasp</b>	G3?	S2S3			4. Soil: Sa.	Oak savannas and barrens. A small parasitic wasp of sand barrens. Perhaps overlooked.
<b>LEAFHOPPERS (Homoptera)</b>							
<i>Aceratagallia nana</i>	<b>a leafhopper</b>	G?	S1			2, 8. Nymphs and adults host specific.	Tallgrass prairie. Point Anne, (Hastings Co.), is the only Ontario site.

**Appendix 2: NHIC list of rare fauna associated with tallgrass prairie and savanna habitat in Ontario**

Scientific Name	Common Name	Grank	Srank	COSEWIC	OMNR	Ecology	Prairie/Savanna
<i>Aflexia rubraneura</i>	<b>red-tailed leafhopper</b>	G?	S1			2, 8. Nymphs and adults host specific. Adult flightless.	Tallgrass prairie. South Bay and Goat Island, Manitoulin Dist., are the only Ontario sites.
<i>Chlorotettix fallax</i>	<b>a leafhopper</b>	G?	S1			2, 8. Nymphs and adults host specific.	Tallgrass prairie/oak savannas. Ojibway Prairie Provincial Nature Reserve, Essex Co., is the only Cdn. occurrence.
<i>Fitchiella robertsoni</i>	<b>a planthopper</b>	G?	S1			2, 8. Nymphs and adults host specific.	Tallgrass prairie/oak savannas. Ipperwash Beach, Lambton Co., is the only known Cdn. occurrence.
<i>Graminella mohri</i>	<b>a leafhopper</b>	G?	S1			2, 8. Nymphs and adults host specific.	Tallgrass prairie. Cabot Head, Bruce Co., is the only Cdn. occurrence.
<i>Graminella oquaka</i>	<b>a leafhopper</b>	G?	S1			2, 8. Nymphs and adults host specific.	Tallgrass prairie/oak savannas. Walpole Island, Lambton Co., is the only Cdn. occurrence.
<i>Hecalus flavidus</i>	<b>a leafhopper</b>	G?	S1			2, 8. Nymphs and adults host specific.	Tallgrass prairie/oak savannas. Ojibway Prairie Provincial Nature Reserve, Essex Co., is the only Cdn. occurrence.
<i>Laevincephalus minimus</i>	<b>a leafhopper</b>	G?	S1			2, 8. Nymphs and adults host specific.	Tallgrass prairie. Pointe Anne, (Hastings Co.), is the only Ontario occurrence.
<i>Laevincephalus peronatus</i>	<b>a leafhopper</b>	G?	S1?			2, 8. Nymphs and adults host specific.	Ramsay Alvar, (Renfrew Co.), is the only Ontario occurrence.
<i>Mocuellus strictus</i>	<b>a leafhopper</b>	G?	S1			2, 8. Nymphs and adults host specific.	Tallgrass prairie. Relict prairie on Goat Island, east of Little Current, (Manitoulin Dist.), is the only Ontario occurrence.
<i>Paraphlepsius turpiculus</i>	<b>a leafhopper</b>	G?	S1			2, 8. Nymphs and adults host specific.	Tallgrass prairie. Long Point, (Haldimand-Norfolk R.M.), is the only Ontario occurrence.



**Appendix 2: NHIC list of rare fauna associated with tallgrass prairie and savanna habitat in Ontario**

<b>Scientific Name</b>	<b>Common Name</b>	<b>Grank</b>	<b>Srank</b>	<b>COSEWIC</b>	<b>OMNR</b>	<b>Ecology</b>	<b>Prairie/Savanna</b>
<i>Polyamia compacta</i>	<b>a leafhopper</b>	G?	S1			2, 8. Nymphs and adults host specific.	Tallgrass prairie. Dorcas Bay, Bruce Co., is the only Cdn. site.
<i>Xerophloea peltata</i>	<b>a leafhopper</b>	G?	S1			2, 8. Nymphs and adults host specific.	Tallgrass prairie/oak savannas. Ojibway Prairie Provincial Nature Reserve, Essex Co., is the only Ontario occurrence.

### Appendix 3: Potential participants in recovery plan implementation

The following is an expanded list of groups and agencies whose assistance may be requested in order to implement Recovery Plan objectives. This list is not inclusive; any interested group or agency is invited to participate in Recovery Plan implementation.

Academic institutions	Nature Conservancy of Canada
Agriculture and Agri-Food Canada	Ontario Environmental Farm Plan program
Association of Rural Municipalities	Ontario Farm Environment Coalition
Audubon Cooperative Sanctuary System of Canada	Ontario Federation of Agriculture
Canadian Botanical Conservation Network	Ontario Heritage Foundation
Canadian Wildflower Society	Ontario Hydro
Canadian Wildlife Federation	Ontario Ministry of Agriculture, Food and Rural Affairs
Canadian Wildlife Service	Ontario Ministry of Natural Resources
Carolinian Canada Coalition	Ontario Ministry of Transportation
Centre for Land and Water Stewardship	Ontario Nature Trust Alliance
Christian Farmers Federation of Ontario	Ontario Parks
Committee on the Status of Endangered Wildlife in Canada (COSEWIC)	Ontario Parks Association
Committee on the Status of Species at Risk in Ontario (COSSARO)	Ontario Professional Planners Institute
Conservation authorities	Ontario Soil and Crop Improvement Association
County-based Stewardship Networks	Parks Canada
Department of Parks and Recreation, City of Windsor	Rail line companies (e.g. CNR)
Ducks Unlimited	Recovery of Nationally Endangered Wildlife (RENEW)
Environment Canada	Royal Botanical Gardens
Evergreen Foundation	Rural Lambton Stewardship Network
Federation of Ontario Naturalists, and all affiliated naturalist clubs	Schools – elementary and secondary
Land trusts	Society for Ecological Restoration
Municipalities	Southwestern Ontario Tourist Association
Natural Heritage Information Centre	Tallgrass Prairie and Savanna Association
	Walpole Island Heritage Centre
	Wildlife Habitat Canada
	World Wildlife Fund Canada

**Appendix 4: Carolinian Canada Coalition’s goals for prairie and savanna conservation**

**Prairie/Savanna Goal**

*Protect all significant remaining prairie/savanna habitats and restore the full range of native prairie/savanna communities in appropriate locations.*

<b>One-Year Objectives (April 1998)</b> will be achieved when:	<b>Three-Year Objectives (April 2000)</b> will be achieved when:
A review of existing prairie and savanna sites has been completed and published, opportunities and priorities for action have been identified and at least one additional restoration site has been initiated.	There has been no loss of existing significant prairie or savanna habitat and at least one additional restoration project is under way.
Responsibility for mapping all sites has been established, including a baseline map estimating original vegetation and prairie soils.	All remaining significant prairie/savanna sites have been digitally mapped (suitable for Geographic Information Systems) and identified.
An annotated bibliography of prairie/savanna restoration techniques has been prepared and published.	An Internet website to support access to information concerning prairie/savanna restoration techniques is operational.
Needs for restoration planting stock have been assessed and the results published.	There are commercial businesses producing and marketing native prairie seeds/planting stock to support restoration efforts, and there is at least one pilot of prairie seed growing as an alternative farm crop.
Sources of native species have been identified, and an inventory of stock prepared.	Nurseries and other sources of native prairie/savanna species are identified and well known.
	A long-term education program is in place.
	A program of landowner recognition and encouragement for appropriate use of prairie/savanna restoration is developed.

Source: after Reid and Symmes 1997c.

## Appendix 5: Considerations for developing a site management plan

Every significant tallgrass remnant and creation site should have a management plan developed for it. Such a plan is important to guide activities so that goals for the site can be accomplished. Management plans may be very short and straightforward when dealing with uncomplicated situations, while sites having more complex circumstances may warrant a much more detailed and intricate plan. This section outlines useful content for a management plan, while recognizing that suggested content listed herein will not be equally applicable to all situations.

### 1. Site Description

A description of the site should be included and contain

- size and location
- ownership information
- physical features
- human-made features
- soils
- significant cultural features
- plant and animal life
- past and current site uses
- presence of rare species
- adjacent land uses
- presence of exotic species
- current threats and/or adverse impacts
- official land-use designation
- management constraints and opportunities

### 2. Goals and Objectives

The main purpose of undertaking management should be determined, and more specific objectives should be listed. Possible objectives include:

- maintaining or enhancing native biodiversity
- protecting species at risk
- controlling invasive exotic species
- decreasing soil erosion
- sustainable commercial or agricultural activities
- preventing undesirable human impacts
- providing educational and/or recreational opportunities
- providing research opportunities
- managing in a way that does not conflict with adjacent land uses
- reducing negative impacts of surrounding land uses

### 3. Management Activities

Management activities will differ from site to site, depending on existing and desired conditions. Possible activities include those listed below. Management activities must accommodate any legal restrictions placed on the site. The site management plan should clearly delineate responsibility for each management activity to the appropriate individual or agency.

#### **Prescribed burn (or alternative) management**

The prescribed burn plan should be developed by or in conjunction with experts, such as the OMNR Prescribed Burn Program. This plan will describe all provisions necessary for prescribed burn activities appropriate for the site in question and the overall management objectives. It will include relevant site and conditions information, a timeline, including the frequency and yearly timing of burns, firebreak provisions, considerations for sensitive species (e.g. rotations of partial site burns to leave refugia) and considerations for public safety.

A burn regime should not be initiated until a plan is in place for follow-up burns in subsequent years. A one-time only burning of a site can stimulate weedy species and suckering of shrubs (Wedin, pers. comm.), and the site may require several annual burns to initiate proper control. The presettlement burn frequency of the site is not necessarily the ideal to strive for. Increased nitrogen loading and the influx of exotic species into tallgrass communities means a different fire frequency may be necessary to maintain the native species assemblage (Wedin, pers. comm.).

In areas where fire cannot be used, mowing may be substituted; however, hay must be removed from the site in order to mimic fire by lowering nitrogen levels. Grazing by large herbivores is not a fire substitute, since it increases nitrogen availability instead of decreasing it. In fact, grazed tallgrass communities may require more frequent fire to maintain the dominance of the tallgrass flora (Hobbs *et al.* 1991).

#### **Exotic species management**

A list should be produced outlining exotic species posing a potential risk to site integrity, appropriate management techniques for each species (e.g. burning, mowing, herbicide application, grubbing up, cutting or girdling) and appropriate timing of management activities.

#### **Other restoration activities**

Other restoration activities may be carried out, such as reintroducing or augmenting species populations or managing adjacent land to minimize negative impacts. The rationale and implementation plans for such activities should be outlined in the site management plan.

#### **Risk management**

Provisions should be made to manage any potentially hazardous features present on the site.

#### **Visitor use**

In the case of public property, provisions for visitor management may be required. Possible items include safety, degree of access, permitted and prohibited uses, facility development and maintenance and signage.

### **4. Monitoring**

Monitoring activities should be developed which will allow an assessment of whether current management actions are facilitating progress toward desired objectives. The management plan should outline what monitoring activities are to be implemented and the timing of those activities. Monitoring results should be used to evaluate and, if necessary, modify the site management plan.



World Wildlife Fund's goal is to stop, and eventually reverse, the accelerating degradation of our planet's natural environment, and to help build a future in which humans live in harmony with nature. In Canada, WWF pursues this global mission through four conservation programs – Endangered Species, Endangered Spaces, Wildlife Toxicology, and the International Program.

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