COSEWIC
Assessment and Status Report

on the

Poweshiek Skipperling
Oarisma poweshiek

in Canada

THREATENED
2003

COSEWIC
COMMITTEE ON THE STATUS OF
ENDANGERED WILDLIFE
IN CANADA

COSEPAC
COMITÉ SUR LA SITUATION
DES ESPÈCES EN PÉRIL
AU CANADA

COSEW`IC status reports are working documents used in assigning the status of wildlife species suspected of being at risk. This report may be cited as follows:

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Cover illustration:
Poweshiek Skipperling — Male of *Oarisma poweshiek* showing dorsal and ventral views (Photos by Chris McQuarrie & R.P. Webster).

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COSEWIC
Assessment Summary

Assessment Summary – November 2003

Common name
Poweshiek skipperling

Scientific name
Oarisma powershiek

Status
Threatened

Reason for designation
This species occurs in Canada in a very small restricted area at 15 locations in a single metapopulation which is an isolated disjunct, with the closest population in the United States being about 100 km to the south. In Canada, the species is dependent on native tall-grass prairie, a habitat that has suffered enormous losses in the past, and its populations have likely undergone similar declines. Although remnant prairie habitat that supports the butterfly is unsuitable for agriculture and most of it is protected in a prairie reserve, past fire management to maintain prairie vegetation has been detrimental to the butterfly. Most of the occupied habitat is protected, but even with appropriate management, its range is so small that the butterfly is vulnerable to catastrophe.

Occurrence
Manitoba

Status history
Designated Threatened in November 2003. Assessment based on a new status report.

COSEWIC
Executive Summary

Poweshiek Skipperling
Oarisma powershiek

Species information

The Poweshiek skipperling is a member of the Family Hesperiidae, the skippers, and the Order Lepidoptera, the butterflies and moths. No subspecies are recognized for this species. Adults of the Poweshiek skipperling have a wing span of 24 to 30 mm. There is very little difference in coloration between the sexes. The upper side of the wings is very dark brown with orange over-scaling along the margin and basal area of the front wing. The underside is very distinctive. The underside of the front wing is dark brown with orange areas along the front margin. The veins on the anterior portion of the underside of the hind wing are white with white over-scaling between the veins. This light area sharply contrasts with the very dark brown inner margin of the underside of the hind wing.

The pale yellowish-green eggs are slightly elliptical and about 0.7 mm in diameter. The caterpillars are light green with a dark green dorsal stripe bordered on each side with white. There are six pale (white to cream) lateral stripes. The mature caterpillar attains a length of about 24 mm.

Distribution

The Poweshiek skipperling was first found in Canada in 1985 and is restricted to a 2,300-ha area near Tolstoi, Stuartburn and Gardenton in southeastern Manitoba near the United States border. Globally, this skipper has a very limited and highly fragmented distribution in North America. It occurs in only one area in Michigan and Iowa, and a number of isolated sites in western Minnesota, the eastern Dakotas and southeastern Manitoba.

Habitat

The Poweshiek skipperling is an obligate resident of wet tall-grass prairies in Canada and in much of its range in the United States.

Biology

Like other butterflies, the Poweshiek skipperling has different resource requirements at different stages of its life cycle. There is only one generation per year. Adults are active

for only about three to four weeks, usually from late June to mid- or late July, and peak numbers of adults are usually present during the second week of July.

Once females mate, they lay eggs on the upper surface near the tip of the leaves of the host plant, which is probably slender spike rush and possibly other sedges. The Poweshiek skipperling has seven caterpillar stages (or instars). It passes the winter as a caterpillar in the fifth instar, presumably within the leaf litter at the base of the host plant. The over-wintered caterpillars resume feeding during spring, complete development during June and then form a chrysalis. Adults start emerging during late June or July, depending on the season.

Population sizes and trends

Since the 1850s, over 99% of the tall-grass prairie habitat of the Poweshiek skipperling has been converted to agricultural uses in North America. Only about 50 km^2 of the original 6,000 km^2 of tall-grass prairie is left in Canada. Presumably, Poweshiek skipperling populations have declined in proportion to the loss of tall-grass prairie habitat. Currently, the Poweshiek skipperling is known to occur in only one small area in Canada, near Tolstoi, Manitoba.

Limiting factors and threats

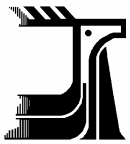
The Poweshiek skipperling is found only in tall-grass prairie habitats. It is extremely susceptible to any disturbances, such as grazing, prescribed burning and row crop agriculture, which alter the floral and structural components of its preferred habitat. Key adult and caterpillar food resources must be present for the long-term survival of this insect. Nectar is extremely important for adult skippers. It provides water, an energy source, and allows females to attain the maximal life-time egg production. The preferred flowers used for nectaring by adults and the preferred species of sedges eaten by the caterpillars are both characteristic of native prairie habitats. These plants rarely occur in agricultural habitats, making these habitats completely unsuitable for the skipper.

Special significance of the species

This skipper is one of a very small group of specialist butterflies that occurs only in native tall-grass prairie habitats in Canada. It occurs in a series of isolated populations in the United States and in one small area in Canada. The loss of this species from Canada would represent the loss of a significant element of the endangered prairie ecosystem.

Existing protection or other status designations

The Poweshiek skipperling has no legal protection in Canada at the national or provincial level. Most of the habitat occupied by this skipper in Canada is protected in the 2,200-ha Tall-grass Prairie Preserve through The Critical Wildlife Habitat Program. A few additional sites outside the preserve are privately owned. Despite habitat protection in the Preserve, current management practices may pose a significant threat to the long-term survival of the skipper in Canada.



COSEWIC HISTORY

The Committee on the Status of Endangered Wildlife in Canada (COSEWIC) was created in 1977 as a result of a recommendation at the Federal-Provincial Wildlife Conference held in 1976. It arose from the need for a single, official, scientifically sound, national listing of wildlife species at risk. In 1978, COSEWIC designated its first species and produced its first list of Canadian species at risk. On June 5, 2003, the *Species at Risk Act* (SARA) was proclaimed. SARA establishes COSEWIC as an advisory body ensuring that species will continue to be assessed under a rigorous and independent scientific process.

COSEWIC MANDATE

The Committee on the Status of Endangered Wildlife in Canada (COSEWIC) assesses the national status of wild species, subspecies, varieties, or other designatable units that are considered to be at risk in Canada. Designations are made on native species and include the following taxonomic groups: mammals, birds, reptiles, amphibians, fishes, arthropods, molluscs, vascular plants, mosses, and lichens.

COSEWIC MEMBERSHIP

COSEWIC comprises members from each provincial and territorial government wildlife agency, four federal organizations (Canadian Wildlife Service, Parks Canada Agency, Department of Fisheries and Oceans, and the Federal Biosystematic Partnership, chaired by the Canadian Museum of Nature), three nonjurisdictional members and the co-chairs of the species specialist and the Aboriginal Traditional Knowledge subcommittees. The committee meets to consider status reports on candidate species.

DEFINITIONS
(After May 2003)

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

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

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

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

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

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Poweshiek Skipperling

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2003

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SPECIES INFORMATION

Name and classification

Oarisma poweshiek (Parker, 1870), the Poweshiek Skipperling, is a member of the Family Hesperiidae, the skippers, and the Order Lepidoptera, the Butterflies and Moths. No subspecies are recognized. The Poweshiek Skipperling was named after Poweshiek County where it was collected. However, the name was misspelled as 'powesheik' in the original description. Section 32.5 of the International Code of Zoological Nomenclature requires that such incorrect original spellings be corrected (International Commission on Zoological Nomenclature 1999). Most literature prior to 1998 will have the older spelling.

Description

The wingspan of *O. poweshiek* ranges from 24 to 30 mm (Layberry et al. 1998). There is very little difference in coloration between the sexes. The upper side of the wings is very dark brown with orange over-scaling along the margin and basal area of the front wing (Figure 1). Females may have slightly more orange over-scaling on the upper side of the wings than males. The underside is very distinctive. The underside of the front wing is dark brown with orange areas along the front margin. The veins on the anterior portion of the underside of the hind wing are white with white over-scaling between the veins. This light area sharply contrasts with the very dark brown inner margin of the underside of the hind wing. Illustrations of the adults are given in Layberry et al. (1998) (Plate 1, figure 28) and in Howe (1975) (Plate 97, figures 3 and 4).

O. poweshiek is sometimes confused with *Oarisma garita* (Reakirt), another closely related prairie skipper. *O. garita* is smaller, much more brightly colored (orange brown), and lacks the contrast on the underside between the inner margin of the hind wing (which is orange) and the rest of the hind wing, which is grayish brown.

The life history and a description of the life stages are given in McAlpine (1972) for a population of *O. poweshiek* from Michigan. The pale yellowish-green eggs are slightly elliptical, 0.8 mm in length, 0.7 mm in width, and 0.5 mm in height (McAlpine 1972). Just prior to hatching, the eggs darken and become blotched with brownish. The larvae are light green with a dark green dorsal stripe which is bordered on each side with white. There are six pale (white to cream) lateral stripes. All larval instars are similar in coloration. The mature caterpillar (seventh instar) attains a length of about 24 mm (McAlpine 1972). Line drawings and black-and-white photos of the immature stages are given in McAlpine (1972).

Figure 1. Male of *Oarisma poweshiek* showing dorsal (left) and ventral (right) views (Photos by Chris McQuarrie & R.P. Webster).

DISTRIBUTION

Global range

O. poweshiek has a very limited range. Historically, it extended from southeastern Manitoba through the eastern Dakotas and western Minnesota to Iowa, with isolated populations in southeastern Wisconsin, northwestern Illinois and southern Michigan (Layberry et al. 1998) (Figure 2). Now, the skipper occurs in only one area in Michigan and Iowa, and in a number of sites in western Minnesota and the eastern Dakotas. Its current range in North America is highly fragmented (Royer and Marrone 1992a).

Canadian range

O. poweshiek was first reported from Canada in 1986 by Catling and Lafontaine (1986). The species is restricted to a 2,300-ha area near Tolstoi, Stuartburn, and Gardenton in southeastern Manitoba near the United States border (Figure 3). Catling and Lafontaine (1986) found the species in seven localities in this area in 1985. In 2002, *O. poweshiek* was found at 15 locations within this same area, but was not found at other prairie sites surveyed in 2002 (Figure 4). Masters (1973) reported *O. poweshiek* from Beulah, Manitoba, based on specimens collected by Jack Dennis between 1902 and 1920. These specimens were misidentified and have proven to be the closely related *O. garita* (Catling and Lafontaine 1986).

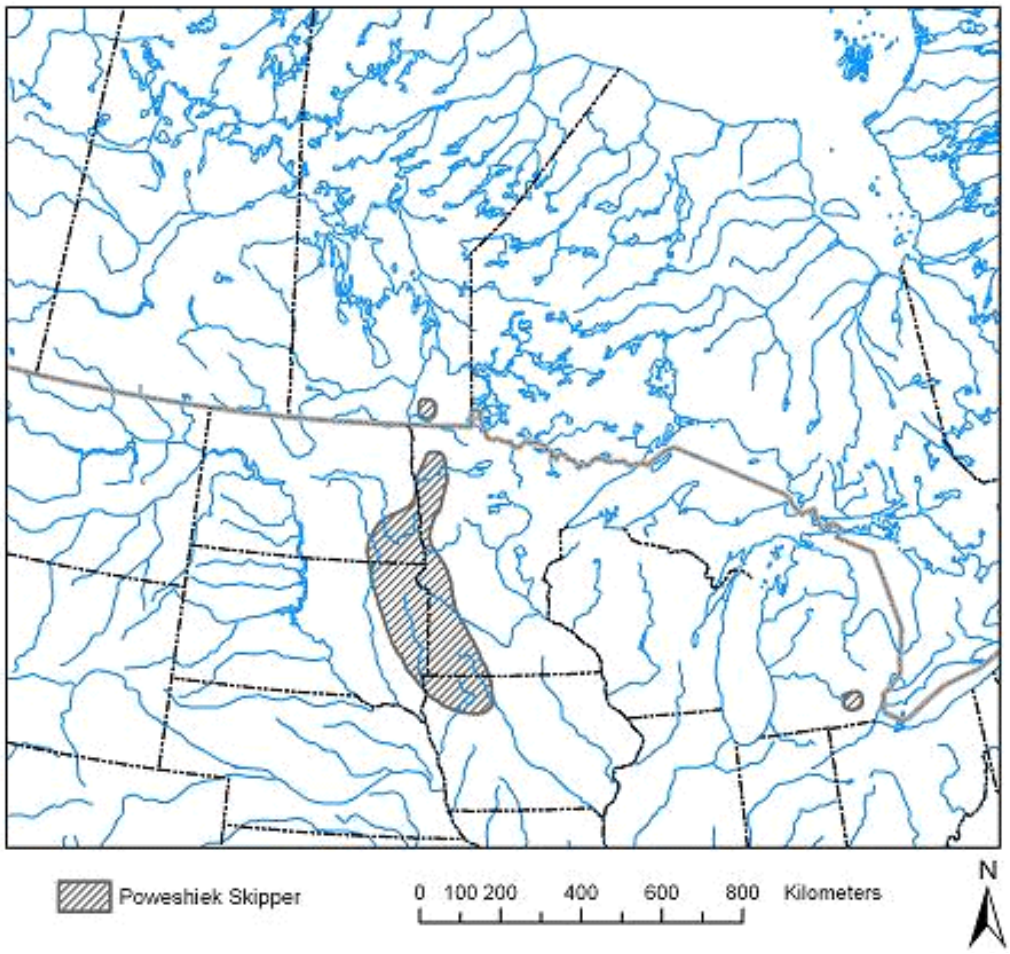

Figure 2. Global range of *Oarisma Poweshiek*.

HABITAT

Habitat requirements

O. poweshiek is an obligate resident of wet to mesic tall-grass prairies in Canada (Catling and Lafontaine 1986). The habitat of this skipper in Michigan is alkaline-fen-like, with Shrubby Cinquefoil*, Pentaphylloides floribunda* (Pursh), as a common shrub (Holzman 1972). However in the Dakotas, Minnesota, and Iowa, this skipper was more common in drier, mesic prairies (Swengel and Swengel 1999).

The wet-mesic tall-grass prairies where *O. poweshiek* occurs in Manitoba, are small (0.4 ha) to large (300 ha), more or less elongated openings among Bur Oak, *Quercus macrocarpa* Michx., and Trembling Aspen, *Populus tremuloides* Michx., groves (Catling and Lafontaine 1986) (Figure 5). These prairies are characterized by low relief

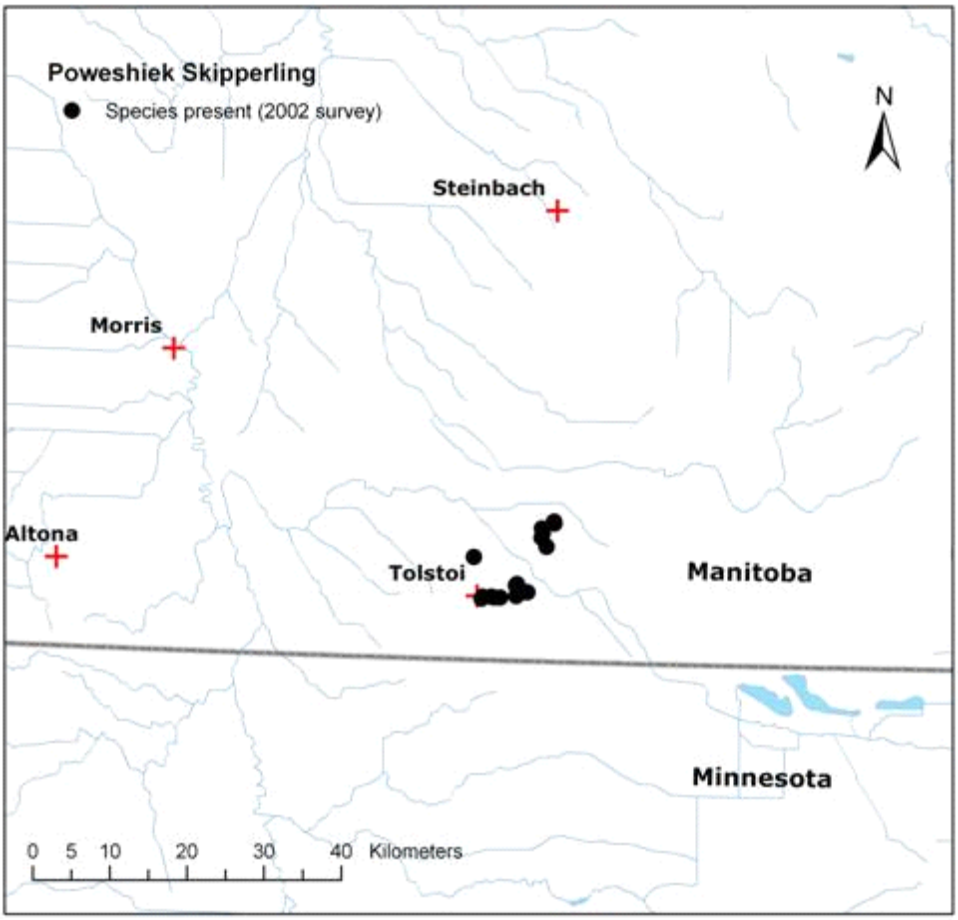

Figure 3. Canadian range of *Oarisma poweshiek*.

(at most one or two metres), and most have alternating lower, periodically wetter, and higher drier sections, each with a distinctive plant community. The lower wetter areas are often dominated by species such as willow species*, Salix* sp., Tufted Hair Grass, *Deschampsia caespitosa* (L.) Beauv*,* Redtop, *Agrotis stolonifera* L., Mat Muhly, *Muhlenbergia richardsonis* (Trin.) Rydb., (all Gramineae), *Carex* species, Slender Spike Rush, *Eleocharis elliptica* Kunth (Cyperaceae), Baltic Rush, *Juncus balticus* Willd. (Juncaceae), Four-flowered Loosestrife, *Lysimachia quadriflora* Sims, (Primulaceae), and Heal-all, *Prunella vulgaris* L. (Labiatae). The endangered Western Prairie Fringed Orchid, *Platanthera praeclara* Sheviak and Bowles, and the Small White Lady's Slipper, *Cypripedium candidum* Willd., are present in some of the wetter areas of the prairies. The higher and drier areas are often dominated by Big Bluestem, *A. gerardii* Vitman, Prairie Dropseed, *Sporobolus heterolepis* A. Grey (Gramineae), and various forbs, such as Smooth Camas or Alkali Grass, *Zigadenus elegans* Pursh (Liliaceae), *Solidago rigida* L., Black-eyed Susan, *Rudbeckia serotina* Nutt., and Blazingstar, *Liatris ligulistylis* (A. Nels.) (Compositae). Pale-spike Lobelia, *Lobelia spicata* (Lobeliaceae), was often

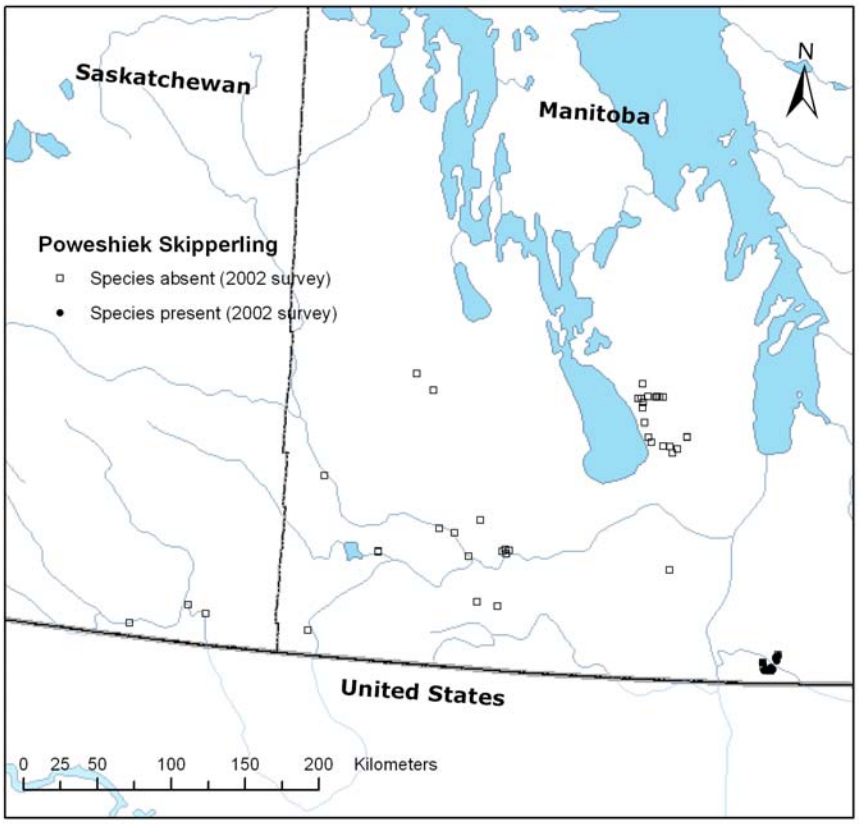

Figure 4. Survey sites of *Oarisma poweshiek* during 2002.

present in the transition areas between the mesic and drier prairie. Shrubby Cinquefoil, *P floribunda*, was a common small shrub in these habitats. *Z. elegans* is considered to be a calciphile and requires a soil pH above 7.0 (Sheviak 1974), indicating that the soils of these prairies are alkaline. At most sites *O. poweshiek* was generally most common on or near the margin of the higher, drier sections of the prairie where *A. gerardii* was common. One of the larval host plants of *O. poweshiek, E. elliptica* (McAlpine 1972, Holzman 1972), occurs in the wetter areas of the prairie habitat (Catling and Lafontaine 1986).

Figure 5. Habitat of *Oarisma poweshiek*. Tall-grass/bluestem prairie near Tolstoi, Manitoba (Photo by R.P. Webster).

Trends

The historical distribution of *O. poweshiek* in North America will never be precisely known as much of the tall-grass prairie habitat had been converted to row-crop agriculture or severely degraded by overgrazing before any surveys for this and other prairie insects were initiated. At one time, there were approximately 34,000,000 ha (340,000 km^2) of tall-grass prairie in North America (Samson and Knopf 1994). Much of this habitat was lost between 1850 and 1920. Now, only about 500,000 ha are left, a decline of over 99%. In Manitoba, 600,000 ha of tall-grass prairie once existed (Samson and Knopf 1994). Now only about 5,000 ha (this includes sites that are under a late fall mowing regime) are left, a decline of 99.5%. *O. poweshiek* populations have presumably declined in proportion to the loss of tall-grass prairie habitat in North America. Most populations of *O. poweshiek* in North America are now highly fragmented and restricted to the few isolated prairie remnants (Royer and Marrone 1992a).

It is not known how widespread *O. poweshiek* once was in Canada. A number of suitable tall-grass prairie habitats (total of about 3,000 ha) are still present in the inter-lake region of Manitoba between LakeS Manitoba and Winnipeg. No populations of *O. poweshiek* are known to occur on any of these prairies, although the related *O. garita* is still common on many of them. It is possible that *O. poweshiek* always had a limited distribution in Canada.

The shallow, rocky, highly calcareous soils in the areas where *O. poweshiek* now occurs in Canada are unsuitable for most agricultural uses. The small size (0.4 to 0.8 ha) of many the prairie openings, coupled with the presence of plant species that are often unsuitable for forage, particularly on the higher ground, make these sites

generally unsuitable for grazing (Catling and Lafontaine 1986). As a result, the flora of these sites has not been significantly altered by agriculture. However, many sites in the U.S.A. have been lost as a result of various anthropogenic activities (Royer and Marrone 1992a).

Protection/ownership

Most populations of *O. poweshiek* are currently protected (at least nominally) in the 2,200-ha Tall-grass Prairie Preserve through The Critical Wildlife Habitat Program. A few additional sites outside the preserve are privately owned.

BIOLOGY

General

Like other butterflies and skippers, each life history stage of *O. poweshiek* often has very different resource and microhabitat requirements.

Adult activity period

O. poweshiek has only one adult generation per year. In Manitoba, collection dates range from June 23 to July 14. Most specimens were collected between June 23 and June 28 (CNC collection database, Manitoba Conservation, Biological and Conservation Data System Data). In 2002, the first adult was observed on July 3, and both sexes were common by July 12. The seasonal peak flight period occurred in mid-July. During a 10-year survey in Iowa, Minnesota and North Dakota, adult density peaked between July 7 and July 9 (Swengel and Swengel 1999). The flight period probably lasts about three to four weeks during each season.

Adult food resources

Access to nectar is important to *O. poweshiek* and other species of butterflies. Nectar provides adults with an energy source and water and allows females to attain maximal fecundity (Murphy et al. 1983). *O. poweshiek* appears to use a variety of plant species for nectaring, the exact species used depending on locality. During a 10-year survey in Iowa, Minnesota and North Dakota, Swengel and Swengel (1999) observed *O. poweshiek* nectaring on 19 species of flowers. In descending order of preference, based on number of occurrences, these were Ox eye, *Heliopsis helianthoides* (L.) sweet, Purple Coneflower, *Echinacea aunustiflia* (DC.) Heller, Coreopsis, *Coreopsis palmate* Nutt., and Black-eyed Susan, *Rudbeckia hirta* L. However, with the exception of *Rudbeckia*, none of these species of plants was present at the *O. poweshiek* localities in Manitoba. Catling and Lafontaine (1986) reported that *O. poweshiek* frequently visited the flowers of *L. spicata*. This species was also the preferred flower in Michigan, but *R. serotina* was also sometimes used (Holzman 1972). During 2002, *O. poweshiek* was observed on numerous occasions on the flowers of *Rudbeckia* at

nearly all sites where the skipper was found in Manitoba. Few *L. spicata* were in flower when *O. poweshiek* was flying, and only a few individuals were observed on its flowers.

Courtship behaviour and fecundity

Few detailed data are available on the courtship behaviour and fecundity of *O. poweshiek*. This skipper appears to be a patrolling species in which males patrol the habitat for unmated females (rather than a perching/pursuing species such as the *Hesperia*). Most males observed during 2002 flew relatively slowly just above the canopy of the grasses. Several very freshly emerged females were observed resting on grass stems near the top of the canopy. However, no mating attempts or mating pairs were observed. More detailed observations on courtship behavior and reproductive biology of this species are required.

Oviposition behaviour and larval resources

In Michigan, *O. poweshiek* larvae eat Slender Spike Rush, *Eleocharis elliptica* Kunth, and an unidentified sedge (Cyperaceae) (Holzman 1972). *E. elliptica* was frequent on the margins of the lower, wetter areas of the prairies where *O. poweshiek* occurs in Manitoba and is probably one of the host plants used in these areas (Catling and Lafontaine 1986). Female skippers lay their eggs on the leaves of *E. elliptica* (Holzman 1972). Confined females laid their eggs on the upper surface near the tip of the host's leaves (McAlpine 1972).

Larval behaviour

The eggs of *O. poweshiek* hatch in 9 to 10 days, and the larvae begin feeding on the foliage of the host. *O. poweshiek* has seven larval instars and over-winters as a larva in the fifth instar (McAlpine 1972, Scott 1986), presumably in the leaf litter at the base of the hostplant. The larvae feed on the host leaves above the soil surface and do not make any kind of shelter (unlike some species of skippers). When not feeding, they rest on the underside of the grass stem. The first three larval instars last from 10 to 15 days, while the fourth lasts about 25 days (McAlpine 1972). In an experimental situation, fifth instar larvae ceased feeding in late September and entered diapause (McAlpine 1972). Larvae that were over-wintered outdoors resumed feeding in early April, molted to the sixth instar in mid-April and to the last instar on May 14. Unfortunately, McAlpine (1972) did not present any data on the time of pupation or on pupation sites. More detailed life history studies are required.

Natural mortality factors

Little information is available on natural mortality factors for this species. Swengel and Swengel (1999) reported predation by a crab spider (Araneida) hidden in a flower of *H. helianthoides* and by two ambush bugs on *R. hirta*. Predation on adults is probably not a significant mortality factor in this species.

Population dynamics

No data are available on year-to-year changes in population numbers of *O. powesiek* in Canada. Royer and Marrone (1992a) reported that this species is subject to great year-to-year fluctuations in numbers in North and South Dakota, but did not present any supporting data. They also suggested that these fluctuations may have been caused in part by anthropogenic factors.

Movements/dispersal

Little information is available on movement patterns of *O. poweshiek* within and between suitable habitats. The slow flight of this species suggests that it probably has poor dispersal capabilities. However, Swengel and Swengel (1999) reported that *O. poweshiek* was the only prairie specialist skipper observed outside prairie habitats in their 10-year study. One individual was observed 0.8 km from the closest prairie along a dirt road running through tilled and old-field habitats. Near the Tall-grass Prairie Preserve in Manitoba, a few adults were observed visiting roadside flowers 0.5 km from the closest tall-grass prairie habitat. This observation suggests that *O. poweshiek* can traverse unsuitable habitats, but it is unlikely that this skipper is capable of moving more than a few kilometers across such habitats.

Interspecific interactions

Although 21 species of butterflies were recorded from the Tall-grass Prairie Preserve, including several skippers, only two interactions of *O. powesiek* with other species of butterflies were observed. Among the skippers, the Long Dash Skipper, *Polites mystic* (W.H. Edwards), was the most abundant in the habitats frequented by *O. poweshiek*. Peck's Skipper, *P. peckius* (W. Kirby), and the Tawny-edged Skipper, *P. themistocles* (Latrielle), were also common, but more so in disturbed sites with meadow-like vegetation. In the two interactions observed, a perching *P. mystic* pursued a patrolling male *O. poweshiek* that flew near its perch. The two individuals broke off after one or two seconds. It is unlikely that courtship-related interspecific interactions interfere (loss of time) with the mating activity of *O. poweshiek*.

Adaptability

O. poweshiek is extremely susceptible to habitat changes and was rarely found in prairies that have been altered (Royer and Marrone 1992a, Schlicht and Saunders 1994, Swengel and Swengel 1999). Although the immature stages and adults can use a variety of plant species for feeding and reproduction, they appear to be restricted to using species associated with undisturbed prairies. Alteration of the native prairie plant community results in the loss of these critical resources. *O. poweshiek* is unlikely to move to new prairie habitats that are more than a few kilometers away from the original habitat. The presumed poor dispersal capabilities and host-plant specificity make this species especially susceptible to habitat degradation, particularly when remnant populations are widely separated.

POPULATION SIZES AND TRENDS

Currently, *O. poweshiek* is only known to occur at several sites in one small area of Canada, within and near the Tall-grass Prairie Preserve near Tolstoi, Manitoba. No detailed population estimates and no data on long-term population trends are available for *O. poweshiek* at any of these sites.

During 2002, very rough population estimates were made at most sites where *O. poweshiek* was found in Canada using the following method. Preliminary survey work revealed that *O. poweshiek* is most common in the drier sections of the open prairies and uncommon in the more marshy, periodically flooded areas. The estimated proportion of wet and drier areas in each prairie surveyed ranged from 10 to 25%. *O. poweshiek* adults were counted in one or more 0.5-ha sections of drier prairie within each prairie surveyed (It usually took about 15-20 minutes to count the adults in a 0.5 ha section of prairie while walking at a slow pace in a zig-zag pattern through the plot). Because of the considerable number of prairies and their size, only small sections of each prairie could be surveyed in 2002. The size of the prairies was estimated visually with the aid of landmarks and topographic maps. A population estimate for each site was based on the density of adults observed in the drier areas and the estimated proportion of the prairie with this kind of habitat [(mean number of adults per hectare in the 0.5 hectare sections counted) x (estimated proportion of drier prairie) x (estimated size of prairie)].

In 2002, 18 localities were surveyed. In total, 154 adult *O. poweshiek* were counted at 15 of these localities. The density of adults varied from zero individuals per hectare on four sites that had been burned during the spring of 2002, to 46 adults per hectare on a site with no recent management. The estimated population size per site ranged from 10 individuals in a 0.8-ha site to 600 individuals in a 65-ha site with extensive drier areas and good stands of *A. gerardii*. The total number of *O. poweshiek* at all sites surveyed in and near the Tall-grass Prairie Preserve was estimated to be near 3,000 individuals on the dates the survey was done. These estimates, however, need to be viewed with caution since each prairie site was not thoroughly surveyed, only about 50% of all the blocks in the reserve were investigated, and surveys were not done at peak flight. The total seasonal population of adults is higher than the one day estimates because not all adults are alive simultaneously. Thus, the total seasonal population of this skipper in this prairie complex may range from 5,000 to 10,000 individuals. However, all tall-grass prairie sites in and near the preserve should be surveyed more thoroughly.

No data are available on long-term population trends at any of the sites where *O. poweshiek* is known to exist. The shallow, rocky, highly calcareous soils of the prairies where *O. poweshiek* occurs and their small size render many of them unsuitable for most agricultural uses (Catling and Lafontaine 1986). As a result, the flora of these sites has not been significantly altered by agriculture, and presumably, *O.poweshiek* population numbers have remained fairly stable. However, prescribed, rotational, early spring burning has been the major management practice used to

prevent growth of woody vegetation and maintain the native flora in these prairies (Borkowsky, pers. com. 2002). During the spring of 2002, over 50% of the reserve was burned, including a major section of the reserve that was burned by an unscheduled wildfire (Borkowsky, pers. com. 2002). Few *O. poweshiek* were observed in blocks that were burned during the spring of 2002. This management practice, in combination with the unscheduled burn, may have significantly reduced the total number of *O. poweshiek* in the preserve during 2002. It is not clear how prescribed burning influences the long-term population trends in the reserve.

LIMITING FACTORS

O. poweshiek is found only in wet, tall-grass prairie habitats. It is extremely susceptible to any habitat changes that alter the floral and structural components of its preferred habitat. Key adult and larval food resources must be present in the habitat for the long-term survival of this species.

Nectar flowers

Regular access by adults to nectar may be critical to the survival of *O. poweshiek*. Nectar provides water critical for life and carbohydrates needed to meet the energetic needs for flight, and allows females to attain maximal fecundity (Murphy et al. 1983). Without a readily available source of nectar, life-time fecundity would likely be reduced, thereby reducing the number of potential offspring in the next generation. An even more critical resource provided by nectar may be water, without which adults will die within hours during hot, dry weather (Dana 1991). Although *O. poweshiek* is a relative generalist, it does prefer to nectar on certain species of flowers (Swengel and Swengel 1999, Catling and Lafontaine 1986). Flower preference varies regionally, in part related to the relative abundance of the plant species in the habitats where the skipper occurs. In the Tall-grass Prairie Preserve, many adults were observed at the flowers of *R. serotina*. Catling and Lafontaine (1986) reported that *L. spicata* was also commonly used at this site. These plant species are characteristic components of undisturbed native prairie habitats in Canada.

Larval host plants

Appropriate larval food plants must be present for the survival of populations of *O. poweshiek*. Slender Spike Rush, *E. elliptica*, is probably one of the host plants used by *O. poweshiek* in the Tall-grass Prairie Preserve (Catling and Lafontaine 1986). This plant, characteristic of undisturbed, wet, tall-grass prairies, is frequent on the upper margins of the lower, wetter areas of the prairies where *O. poweshiek* occurs and is a known host in the United States (Holzman 1972, McAlpine 1973). More study is required to determine the range of hosts used by Canadian populations.

THREATS

Conversion of habitat to non-grassland

Since the 1850s, over 99% of the native North American prairie habitat has been converted to agricultural row crops, or plowed and then converted to hay fields (Samson and Knopf 1994). Agricultural habitats are completely unsuitable for *O. poweshiek.* Remnant prairies where *O. poweshiek* now occurs are generally unsuitable for row-crop agriculture because of the shallow, rocky, highly calcareous soils (Catling and Lafontaine 1986). Most of the habitat of *O. poweshiek* is now protected in a preserve and will not likely be converted to agriculture.

Grazing

Tall-grass prairies appear to be very susceptible to the effects of overgrazing (McCabe and Post 1977, Royer and Marrone 1992a, b, Royer and Royer 1998), which reduces or eliminates critical adult nectar sources for *O. poweshiek* and removes forage for larvae, thereby making the habitat unsuitable for the skipper. In a systematic 10-year survey in three US states, *O. poweshiek* was considerably less abundant in prairies that had been grazed than in those that were idle or hayed (Swengel and Swengel 1999). In Minnesota, grazing cattle reduced numbers of another prairie specialist, *H. dacotae*, in direct proportion to grazing intensity (Dana 1997). Dana (1997) further observed that in grazed prairies, exotic grasses, such as *P. pratensis* and *B. inermis*, become the major or dominate species, and native species richness and diversity declines. Grazing, however, is not always detrimental. Light, rotational grazing in tall-grass prairie may be beneficial by preventing succession (Dana 1997).

Haying

Haying may either be detrimental or beneficial to *O. poweshiek* populations, depending on when in the season it is done. Mowing prairies and removing the cuttings helps to maintain the prairie flora and vegetation structure by preventing or delaying succession to woody plants and reducing the accumulation of litter on the soil. However, if mowing is done before or during the flight period, the critical nectar sources are eliminated and exotic grasses such as *P. pratensis* are favored (McCabe 1981, Royer and Marrone 1992b, Dana 1997, Swengel 2001). These changes can eliminate *O. poweshiek* and other specialist prairie skippers from the prairie. In contrast, late-season (September into October) mowing reduces the adverse effects created by mowing early and may even be highly beneficial to some prairie specialists (McCabe 1981, Swengel and Swengel 1999, Swengel 2001). In a systematic survey in three US states, *H. dacotae* was considerably more abundant in prairies that had been hayed in the fall than in those that were idle, grazed or burned (Swengel and Swengel 1999). *O. poweshiek* populations were as abundant in hayed sites as in idle sites, suggesting that the long-term benefit of haying in this species may be to prevent succession and promote the long-term maintenance of the prairie flora.

Controlled burning

Wildfires were an important element for sustaining the flora and fauna of native prairies prior to their destruction (Bragg 1995). Now, prescribed or controlled burns are often used by managers to maintain the native grassland structure and floral complexes. These burns differ from wildfires in that remnant prairies are often burned far more frequently (sometimes once every three years), more thoroughly (sometimes border to border) and at times during the season when natural wildfires would not normally occur (Orwig and Schlicht 1999).

Although prescribed burns may be beneficial for maintaining the prairie flora, they may be devastating to certain insect species (Swengel 2001). Prescribed burning of isolated prairies can cause local extirpation of certain species of insects, especially habitat specialists like *H. dacotae* and *O. poweshiek* (McCabe 1981, Schlicht and Saunders 1994, Swengel 1996, 1998, Orwig and Schlicht 1999). In three US states, significantly lower abundances of habitat specialists were observed at sites that had been burned than at sites that had been hayed (Swengel and Swengel 1999). Border-to-border burning of one of the best sites for *Oarisma poweshiek* in North Dakota may have caused its extirpation from that site (Schlicht and Saunders 1994). Much variability in the response of *O. powshiek* to burning was observed, however, by Swengel and Swengel (1999). At some sites, abundance was higher on burned sites than those that were idle or hayed; in others, abundance was lower.

Prior to the destruction of the prairies, burns were patchy, which allowed re-colonization of these sites by skippers from adjacent unburned areas (Swengel 1998). Now, there are often no source populations available for re-colonization once a population has been locally extirpated. Studies show that habitat specialists were generally negatively affected by burns, while habitat generalists, in contrast, were as abundant or more abundant on sites that had been burned than on unmanaged sites (Swengel and Swengel 1999).

Prescribed, rotational, early spring burning has been the major management practice used to prevent growth of woody vegetation and maintain the native prairie flora in the Tall-grass Prairie Preserve (Borkowsky, pers. com. 2002). Over 50% of the reserve was burned during the spring of 2002 (a major section of the preserve was burned by an unscheduled wildfire) (Borkowsky, pers. com. 2002). Few *O. poweshiek* and other species of butterflies were observed in blocks that had been burned during the spring of 2002. During 15- to 20-min surveys on 0.5 ha areas of dry (mesic) prairie, the mean number of *O. poweshiek* on 10 sites burned in 2002 was 0.8 individuals. The mean number on seven sites without a recent burn was 15.9 individuals. The larvae of *O. poweshiek* likely diapause within the litter layer and would therefore be highly susceptible to the effects of a fire during the early spring. Very little leaf litter was present on the soil surface in areas that had been burned, suggesting that any species of insects present within the litter layer or even slightly below the soil surface would probably have been killed by the fire. Although prescribed burning is ideal for maintaining the tall-grass prairie flora, this management practice, in combination with

the unscheduled burn, may have significantly reduced the total number of *O. poweshiek* in the preserve during 2002. Burning has been used to control brush long before the preserve was established (Catling and Lafontaine 1986), and *O. poweshiek* is still present. Additional studies are required to examine the effect of rotational spring burning on short- and long-term butterfly abundance and diversity in tall-grass prairies in this preserve.

Succession

Prairies that are protected from all activities, such as grazing, mowing or prescribed burns, will eventually become unsuitable for many prairie species of plants and insects because of the growth of woody shrubs and taller grasses, accumulation of litter, reduction of nectar sources, and invasion by such exotic plants as *B. inermis* (McCabe 1981). It appears that some form of disturbance is required for the long-term persistence of prairie habitat suitable for *O. poweshiek*. During a 10-year survey of prairies in three US states, a significantly lower abundance of *H. dacotae* was observed on unmanaged prairies compared to sites with fall haying (Swengel and Swengel 1999). However, abundance of *O. poweshiek* did not differ from sites that were idle and sites that were hayed.

In view of the detrimental effects of prescribed burning on *O. poweshiek* populations in the Tall-grass Prairie Preserve and the potential threats to the flora of doing no management, probably the best solution for preventing succession is to mow late in the summer or fall and use rotational early spring burning on a smaller scale. McCabe (1981) suggests that the optimal time for mowing is in October, which has no apparent negative impact on the tall-grass prairie flora or fauna. The Hook and Bullet Refuge in Minnesota has been maintained in this way for over 50 years (McCabe 1981).

Prior to the colonization of the prairies by Europeans, most prairie habitats were maintained by occasional prairie fires and by periodic grazing by bison. Since much of the habitat was suitable for the prairie specialist butterflies and skippers, adults were able to re-colonize adjacent suitable habitats when forced to leave areas made temporarily unsuitable by grazing or fires. Now, the remaining suitable habitats are too widely separated to allow for re-colonization and must be maintained by artificial means (McCabe 1981).

Exotic species

Exotic plants, such as Leafy Spurge, *Euphorbia esula* L., Kentucky Blue Grass, *P. pratensis,* and Smooth Brome*, B. inermis,* are significant threats to native prairie habitats in North America. Purple Loosestrife, *Lythrum salicaria* L., is a potential major threat to the wet tall-grass prairie habitats in the Tall-grass Prairie Reserve. This aggressive invader can completely out-compete much of the native flora in wetlands and other seasonally flooded habitats. Once weeds invade a site, they can out-compete and replace the native plants required by *O. poweshiek*, making the habitat unsuitable for this insect. Chemical control of weeds such as *E. esula* often also

eliminates critical nectar sources and may have caused the extirpation of *H. dacotae* from several sites in North Dakota (Royer and Marrone 1992b). It is not known how much of a threat exotic plants pose to prairie habitats and *O. poweshiek* in Manitoba.

Habitat fragmentation

O. poweshiek probably formerly existed as essentially a single population throughout much of the almost continuous tall-grass prairie in the north central plains of North America. Now, it occurs as a series of isolated populations throughout much of its range. Long-distance dispersal over more than a few kilometres is unlikely in this species. Unless source populations exist within a few kilometres, it is unlikely that a population eliminated by fire, overgrazing or other causes will be re-founded by immigrants (McCabe 1981, Swengel 1998). In Canada, only one population exists, and the nearest population in the United States is over 100 km away. The Canadian population(s) could not be re-founded by natural dispersal if they were extirpated. Currently, most or all of the local populations of *O. poweshiek* are probably connected by dispersal and represent one meta-population. Should one of these local populations become extirpated, the site will likely be re-founded by immigrants from adjacent sites. However, the risk of extirpation of the entire meta-population will increase should large segments of the population become lost as a result of over zealous use of prescribed burning, and should further fragmentation of the prairie habitats occur in this region.

Collection of natural history specimens

Collection of natural history specimens probably does not currently pose a significant threat to this species based on current population levels. Skippers are generally not as popular with most collectors of natural history specimens as are other, more showy species of butterflies. Permission must be obtained to collect specimens of this and other species of wildlife and plants in the Tall-grass Prairie Preserve.

SPECIAL SIGNIFICANCE OF THE SPECIES

O. poweshiek is one of a very small group of specialist butterflies that occurs only in native tall-grass prairie habitats in Canada. It now persists in a series of isolated populations in the United States and one population in Canada. The loss of this species from Canada would represent the loss of a significant element of the endangered prairie ecosystem.

EXISTING PROTECTION OR OTHER STATUS

O. poweshiek currently has no legal protection in Canada at the national or provincial level. The habitat of most populations of *O. poweshiek* is protected in the 2,200-ha Tall-grass Prairie Preserve through The Critical Wildlife Habitat Program. A few additional sites outside the preserve are privately owned.

Globally, the World Conservation Union (IUCN) classifies *O. poweshiek* as vulnerable. In the United States, a petition to list this species under the U. S. Endangered Species Act was unsuccessful, leaving the species with no federal protection. This skipper is, however, listed as endangered in Michigan and threatened in Minnesota, but has no legal protection in either North or South Dakota.

SUMMARY OF STATUS REPORT

O. poweshiek is found only in tall-grass prairie habitats. It is extremely susceptible to disturbances that alter the floral and structural components of its preferred habitat. Over 99% of this habitat has been converted to row crops or lost to over-grazing and only about 50 km^2 of tall-grass prairie is left in Canada. In Canada, *O. poweshiek* occurs in only one small isolated area in southeastern Manitoba, more than 100 kilometres from the closest population in the United States. This insect was probably more widespread in southern Manitoba than it is now. Most of the known localities for this skipper are in and near the Tall-grass Prairie Preserve. The populations at all Canadian sites are probably connected by dispersal and may represent one meta-population. Grazing and fire were required elements for the long-term persistence of this ecosystem in the past. Because of the highly fragmented nature of the remaining populations of *O. poweshiek*, these same elements have become major threats to the long-term survival of this species.

TECHNICAL SUMMARY

Oarisma poweshiek
Poweshiek Skipperling — Hespérie de Poweshiek
Range of Occurrence in Canada: Manitoba

Extent and Area Information	
• *Extent of occurrence (EO)(km²)*	22 km²
• *Specify trend in EO*	Probably stable
• *Are there extreme fluctuations in EO?*	No
• *Area of occupancy (AO) (km²)*	22 km²
• *Specify trend in AO*	Probably stable
• *Are there extreme fluctuations in AO?*	No
• *Number of known or inferred current locations*	15 locations in one meta-population
• *Specify trend in #*	Probably stable
• *Are there extreme fluctuations in number of locations?*	No
• *Specify trend in area, extent or quality of habitat*	Probably stable
Population Information	
• *Generation time (average age of parents in the population)*	One year
• *Number of mature individuals*	5,000-10,000
• *Total population trend:*	Recent decline (possibly significant)
• *% decline over the last/next 10 years or 3 generations.*	Probably significant decline during 2002
• *Are there extreme fluctuations in number of mature individuals?*	Possibly, but no evidence available
• *Is the total population severely fragmented?*	Canadian population is disjunct from the other highly fragmented populations in the United States, but the Canadian population itself is not severely fragmented.
• *Specify trend in number of populations*	Stable
• *Are there extreme fluctuations in number of populations?*	No
• *List populations with number of mature individuals in each: Tall-grass Prairie Preserve, estimated at 5,000 to 10,000 individuals*	
Threats (actual or imminent threats to populations or habitats)	
-Habitat loss and degradation due to: -Conversion of habitat to row crops -Grazing -Early summer or mid-summer haying -Controlled burning -Succession -Invasion by exotic species and their control -Habitat fragmentation	

Rescue Effect (immigration from an outside source)	Low
Status of outside population(s)? **USA:** Threatened, in decline.	
• *Is immigration known or possible?*	Unlikely from farther than a few km
• *Would immigrants be adapted to survive in Canada?*	Yes
• *Is there sufficient habitat for immigrants in Canada?*	Yes
• *Is rescue from outside populations likely?*	No
Quantitative Analysis	**Not performed**
Current Status **COSEWIC:** No previous COSEWIC designation **IUCN: V**ulnerable. **USA:** Michigan: Endangered in Michigan Minnesota: Threatened	

Status and Reasons for Designation

Status: Threatened	**Alpha-numeric code:** D2
Reasons for Designation: This species occurs in Canada in a very small restricted area at 15 locations in a single metapopulation which is an isolated disjunct, with the closest population in the United States being about 100 km to the south. In Canada, the species is dependent on native tall-grass prairie, a habitat that has suffered enormous losses in the past, and its populations have likely undergone similar declines. Although remnant prairie habitat that supports the butterfly is unsuitable for agriculture and most of it is protected in a prairie reserve, past fire management to maintain prairie vegetation has been detrimental to the butterfly. Most of the occupied habitat is protected, but even with appropriate management, its range is so small that the butterfly is vulnerable to catastrophe.	

Applicability of Criteria

Criterion A (Declining Total Population):
-it cannot be applied as there are insufficient data to be able to quantify decline.

Criterion B (Small Distribution, and Decline or Fluctuation):
-the EO is << 5,000 km^2 (B1);
-the AO is << 500 km^2 (B2);
-the population is not severely fragmented and is known to exist at 15 locations in one metapopulation.
-there is no evidence for continuing declines, although there are some fluctuations resulting from habitat management.
-the population likely does not undergo extreme fluctuations in numbers of mature individuals.

Criterion C (Small Total Population Size and Decline):
-the number of mature individuals is likely <10,000 (C).
-there is no quantitative information enabling a calculation of decline rate.
-there are fluctuations but no solid evidence for a continuing decline in the number of mature individuals.

Criterion D (Very Small Population or Restricted Distribution):
- the total number of mature individuals is >1,000;
- the AO is approximately 20 km^2 (D2) and the species occurs at >5 locations (15 locations).

Criterion E (Quantitative Analysis):
- the available information is insufficient to do a quantitative analysis of the probability of extinction.

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