Species at Risk Act
Recovery Strategy Series

Recovery Strategy for the Ottoe Skipper (*Hesperia ottoe*) in Canada

Ottoe Skipper

2010

Environment Canada Environnement Canada

Canada

About the *Species at Risk Act* Recovery Strategy Series

What is the *Species at Risk Act* (SARA)?

SARA is the Act developed by the federal government as a key contribution to the common national effort to protect and conserve species at risk in Canada. SARA came into force in 2003, and one of its purposes is *"to provide for the recovery of wildlife species that are extirpated, endangered or threatened as a result of human activity."*

What is recovery?

In the context of species at risk conservation, **recovery** is the process by which the decline of an endangered, threatened, or extirpated species is arrested or reversed, and threats are removed or reduced to improve the likelihood of the species' persistence in the wild. A species will be considered **recovered** when its long-term persistence in the wild has been secured.

What is a recovery strategy?

A recovery strategy is a planning document that identifies what needs to be done to arrest or reverse the decline of a species. It sets goals and objectives and identifies the main areas of activities to be undertaken. Detailed planning is done at the action plan stage.

Recovery strategy development is a commitment of all provinces and territories and of three federal agencies — Environment Canada, Parks Canada Agency, and Fisheries and Oceans Canada — under the Accord for the Protection of Species at Risk. Sections 37–46 of SARA (www.sararegistry.gc.ca/approach/act/default_e.cfm) outline both the required content and the process for developing recovery strategies published in this series.

Depending on the status of the species and when it was assessed, a recovery strategy has to be developed within one to two years after the species is added to the List of Wildlife Species at Risk. A period of three to four years is allowed for those species that were automatically listed when SARA came into force.

What's next?

In most cases, one or more action plans will be developed to define and guide implementation of the recovery strategy. Nevertheless, directions set in the recovery strategy are sufficient to begin involving communities, land users, and conservationists in recovery implementation. Cost-effective measures to prevent the reduction or loss of the species should not be postponed for lack of full scientific certainty.

The series

This series presents the recovery strategies prepared or adopted by the federal government under SARA. New documents will be added regularly as species get listed and as strategies are updated.

To learn more

To learn more about the *Species at Risk Act* and recovery initiatives, please consult the Species at Risk (SAR) Public Registry (www.sararegistry.gc.ca).

Recovery Strategy for the Ottoe Skipper (*Hesperia ottoe*) in Canada

2010

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DECLARATION

This recovery strategy has been prepared in cooperation with the jurisdictions responsible for the Ottoe skipper. Environment Canada has reviewed and accepts this document as its recovery strategy for the Ottoe skipper, as required under the *Species at Risk Act* (SARA). This recovery strategy also constitutes advice to other jurisdictions and organizations that may be involved in recovering the species.

The goals, objectives and recovery approaches identified in the strategy are based on the best existing knowledge and are subject to modifications resulting from new findings and revised objectives.

This recovery strategy will be the basis for one or more action plans that will provide details on specific recovery measures to be taken to support conservation and recovery of the species. The Minister of the Environment will report on progress within five years, as required under SARA.

Success in the recovery of this species depends on the commitment and cooperation of many different constituencies that will be involved in implementing the directions set out in this strategy and will not be achieved by Environment Canada or any other jurisdiction alone. In the spirit of the Accord for the Protection of Species at Risk, the Minister of the Environment invites all responsible jurisdictions and Canadians to join Environment Canada in supporting and implementing this strategy for the benefit of the Ottoe skipper and Canadian society as a whole.

RESPONSIBLE JURISDICTIONS

Environment Canada
Government of Manitoba

CONTRIBUTORS

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Appreciations and thanks are extended to Renee Franken (Environment Canada) who wrote the recovery strategy for the Dakota skipper. Due to the similar biology and habitat requirements of the Dakota and the Ottoe skippers, she was able to draw from the Dakota skipper recovery strategy throughout the development of this report. Thanks to Reginald Webster for providing extensive background information on the Ottoe skipper and to Robert Dana and Jerry Selby for updated Ottoe skipper survey information. Robert Décarie (Environment Canada), David Duncan (Environment Canada), Renee Franken, Jocelyne Lavallée, Medea Curteanu (Environment Canada), and Bill Watkins (Manitoba Conservation) provided valuable input towards the recovery strategy through their review of the report. Thanks are extended to Robert Dana for the use of the cover photograph, and to Reginald Webster, Jerry Selby, and Manitoba Conservation for the use of figures within the strategy.

STRATEGIC ENVIRONMENTAL ASSESSMENT STATEMENT

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

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

This recovery strategy will clearly benefit the environment by promoting the recovery of the Ottoe skipper. The potential for the strategy to inadvertently lead to adverse effects on other species was considered. The SEA concluded that this strategy will clearly benefit the environment and will not entail any significant adverse effects. The reader should refer to the following sections of the document in particular: Habitat and biological needs; Ecological role; Limiting factors; Effects on other species; and Recommended approach for recovery implementation.

RESIDENCE

SARA defines residence as: *a dwelling-place, such as a den, nest or other similar area or place, that is occupied or habitually occupied by one or more individuals during all or part of their life cycles, including breeding, rearing, staging, wintering, feeding or hibernating* **[Subsection 2(1)]**.

Residence descriptions, or the rationale for why the residence concept does not apply to a given species, are posted on the SAR Public Registry: www.sararegistry.gc.ca/sar/recovery/residence_e.cfm.

PREFACE

The Ottoe skipper (*Hesperia ottoe*) was designated Endangered by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC) in 2005 (COSEWIC 2005) and was listed as Endangered under the *Species at Risk Act* (SARA) by the Minister of the Environment in August 2006. SARA (Section 37) requires the competent Minister to prepare a recovery strategy for all listed extirpated, endangered, or threatened species. The Canadian Wildlife Service – Prairie and Northern Region, Environment Canada led the development of this recovery strategy. It was developed in cooperation or consultation with the Government of Manitoba. All responsible jurisdictions reviewed and approved the strategy.

EXECUTIVE SUMMARY

Historically, the Ottoe skipper occurred in the central to north-central portion of the United States and southern Manitoba. This butterfly has not been observed in Manitoba since the late 1980s and it is currently unknown whether the species still exists in Canada. The Ottoe skipper was listed as Endangered in Canada under the *Species at Risk Act* in August 2006, and is listed as Threatened in Manitoba.

Ottoe skippers reside in upland, dry, mixed-grass (bluestem) prairie and sand-prairie habitat. Nectar sources for the Ottoe skipper have never been documented in Manitoba, but Ottoe skippers in Minnesota primarily use narrow-leaved purple coneflower. Ottoe skipper larvae feed on a variety of grass species, but the preferred hosts are bunch grasses such as little bluestem.

Threats to the species include: (1) habitat loss through the conversion of prairie to cultivated land; (2) habitat degradation through burning, over-grazing, and haying; (3) habitat fragmentation; (4) changes in the plant community as a result of succession or invasion of exotic species; (5) the use of insecticides and herbicides to control pests and exotic plants; (6) climate change and natural disasters; and (7) the collection of natural history specimens.

There are unknowns regarding the feasibility of recovery of the Ottoe skipper. Therefore, in keeping with the precautionary principle, a full recovery strategy has been prepared as would be done when recovery is determined to be feasible. The recovery goal is to determine if Ottoe skippers are still extant in Canada.

Because the Ottoe skipper has not been located in Canada since the 1980s, it is not currently possible to set population or distribution objectives. The short-term recovery objectives for the Ottoe skipper are:

1. Determine if any existing Ottoe skipper populations occur in Canada;
2. If species is found to occur in Canada, then, increase knowledge of species biology, life history, and habitat requirements; and
3. If extant populations of the Ottoe skipper are found, then determine population parameters such as distribution, abundance and general trends.

Critical habitat for Ottoe skipper is not identified in this recovery strategy.

An Action Plan for the Ottoe skipper will be completed in 2015, if the presence of species in Canada is confirmed.

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1. BACKGROUND

1.1 Species Assessment Information from COSEWIC

Date of Assessment: May 2005

Common Name (population): Ottoe Skipper

Scientific Name: *Hesperia ottoe*

COSEWIC Status: Endangered

Reason for designation: This species has been found at very few locations in the Canadian prairies where it is associated with fragmented and declining mixed-grass prairie vegetation. It has recently been found at only one location.

Canadian Occurrence: Manitoba

COSEWIC Status History: Designated Endangered in May 2005. Assessment based on a new status report.

1.2 Description of the Species

The Ottoe skipper (*Hesperia ottoe* W.H. Edwards) is a member of the Order Lepidoptera (butterflies and moths), Family Hesperidae (skippers), and subfamily Hesperiinae (the "branded" skippers) (NatureServe 2006).

Like all skippers, Ottoe skippers have hooked antennae, a short, stout body, and a characteristic skipping flight pattern (Royer and Marrone 1992). It is a small to medium-sized butterfly with a wingspan of 2.9 to 3.5 cm (Layberry et al. 1998). There are slight colouration differences between the adult males and females (Figure 1).

Figure 1. Male Ottoe skipper (top), collected in Iowa and female Ottoe skipper (bottom), collected in Michigan. © R. Webster.

The dorsal surface of the male wing is yellowish orange, with a diffuse brownish border and an elongated dark mark (called the brand or stigma, which has specialized scent scales) on the forewing (Figure 1); the ventral surface is pale yellowish orange. The dorsal surface of the female wings is dull brown with pale buff markings (Figure 1). There are usually one or two round, translucent, whitish spots on the front wing among the pale buff band of markings. The underside of the wings is pale orange (similar to males) and there are usually no medial spots on the hind wing.

Ottoe skipper is similar in appearance to the Dakota skipper (*Hesperia dacotae*), the Pawnee skipper (*H. leonardus pawnee*) and the Plains skipper (*H. assiniboia*) and often utilizes similar habitat.

1.3 Life history of the Ottoe Skipper

Ottoe skippers have one generation per year and undergo complete metamorphosis similar to other Lepidoptera. Depending on climatic conditions, adults emerge from pupae in early summer with the flight period occurring from mid-June to mid-August (McCabe and Post 1977, Layberry et al. 1998, Nielsen 1999, Swengel and Swengel 1999). In Manitoba, adults have been collected in late July and mid-August (CNC collection database, Manitoba Conservation, Biological and Conservation Data System data; Klassen et al. 1989), however it has been suggested that due to the higher latitude, Ottoe skipper flight period in Canada might extend into the end of August (Westwood and Friesen 2007). The exact flight period of the Ottoe skipper in Canada needs to be verified.

Within two days after emergence, female Ottoe skippers begin laying single eggs on the underside of leaves or the upper surface of various grasses and forbs (Dana 1991). Eggs hatch within 12-13 days and the new larva construct leaf shelters by fastening two or three grass blades together from the stem of the host plant forming a narrow tube. The larva feed on the host plant undergoing six to seven developing stages (instars) before pupating (Dana 1991). The fourth instar lasts between 14 and 36 days after which it ceases to feed, builds a tubular silk chamber at, or below, the soil surface, and enters a state of diapause throughout the winter (Dana 1991). In Minnesota, Ottoe skipper larvae entered diapause in late September or October and resumed feeding in the subsequent spring (Dana 1991). Once feeding is completed, the last-instar moults into the pupal stage, which lasts 12-19 days under natural conditions (Dana 1991).

Adult Ottoe skippers live for 3-4 weeks (Dana 1991).

1.4 Populations and Distribution

1.4.1 Global range and status

The Ottoe skipper's global range is concentrated in the central to north-central portion of the United States, with the range extending into southern Canada (Selby 2005) (Figure 2). This distribution is restricted to the mixed-grass prairie and sand prairie habitats of the Great Plains and ranges from southern Manitoba into northern Texas, and westward to Colorado (Dana 1991, Opler and Malikul 1992, NatureServe 2006), covering 16 states and one Canadian province. Due to the vast conversion of North America's mixed-grass prairie to agricultural land, the exact historical range of the Ottoe skipper will never be fully determined (COSEWIC 2005).

The global abundance of Ottoe skippers is estimated to be between 1,000 to 100,000 individuals but little information is available on population trends for the species in both United States and Canada (NatureServe 2006). Although Ottoe skipper is widely distributed in the United States, it is often highly localized and generally uncommon to rare at most sites (Dana 1991, NatureServe 2006).

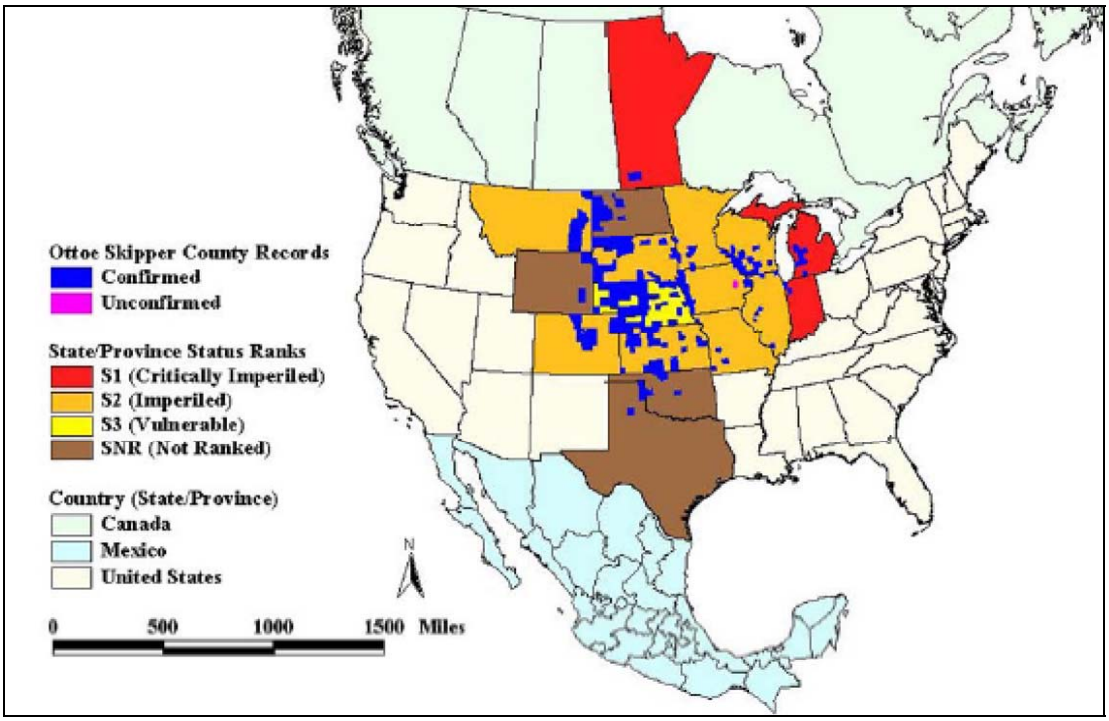

Figure 2. Global range of the Ottoe skipper, with state/province Nature Serve status ranks and distribution records in North America (from Selby 2005, used with permission).

The Ottoe skipper was ranked globally as vulnerable (G3) while in the United States, it was listed nationally as apparently secure to vulnerable (N3N4) (NatureServe 2006). The skipper was ranked as endangered by the state of Indiana, threatened in Illinois, Michigan, and Minnesota, and is considered a "species of concern" in Iowa and Wisconsin. The Ottoe skipper has no legal protection under the *Endangered Species Act* in the US.

1.4.2 Canadian range

The Ottoe skipper has a highly restricted distribution in Canada having been documented from only three areas in southern Manitoba (Figure 3). The species was first collected from the "Aweme" area (about 10 km north of Wawanesa) on July 27, 1921 and later on August 12, 1926 (CNC collection database: Manitoba Conservation, Biological and Conservation Data System data). Another specimen was collected from Rounthwaithe, Manitoba; however no collection data is available for this specimen (CNC collection database, COSEWIC 2005). The Ottoe skipper was not reported again in Canada until 60 years later, when a few individuals were collected by Richard Westwood in the late 1980s at Spruce Woods Provincial Park, Manitoba (Klassen *et al.* 1989).

Recent surveys for Ottoe skippers in Manitoba have not been able to locate any individuals. In 2003, a 7-day survey of previously documented sites resulted in no Ottoe skippers observations (COSEWIC 2005). Ottoe skipper may not have been detected during this survey due to the low population density at which this species may exist, or as a consequence of the drought conditions in the region which resulted in low population numbers of several skipper species (Webster 2005). Additionally, it has been suggested that the timing of the survey, which took place in mid July (Webster 2002), might not have been optimal and might have resulted in the species being unobserved (COSEWIC 2005). The species was also not detected in 2007 in Spruce Woods Provincial Park or Canadian Force Base (CFB) Shilo, despite intensive surveys (Westwood and Friesen 2007).

In the United States, several skipper species such as the Dakota skipper, Plains skipper, and Pawnee skipper occupy similar habitat as the Ottoe skipper (Dana 1991, Layberry *et al.* 1998). However, in Canada, Ottoe skippers were not observed at any of the sites surveyed for Dakota skippers during 2002-2003 (Webster 2005, R. Webster, pers. comm. 2006) nor in 2007 in Spruce Woods Provincial Park and CFB Shilo where both the Plains skipper and Pawnee skipper were relatively common at certain locations (Westwood and Friesen 2007). Nevertheless, the presence of these sympatric species may indicate potential Ottoe skipper habitat for future surveys.

Although it is possible that the Ottoe skipper no longer exists in Canada, relatively undisturbed sand prairie habitats that could potentially support a population of Ottoe skipper still exist in Spruce Woods Provincial Park, CFB Shilo, and adjacent areas (COSEWIC 2005, Westwood and Friesen 2007). Additional surveys are needed before it can be concluded that the species is extirpated at historical sites and within Canada.

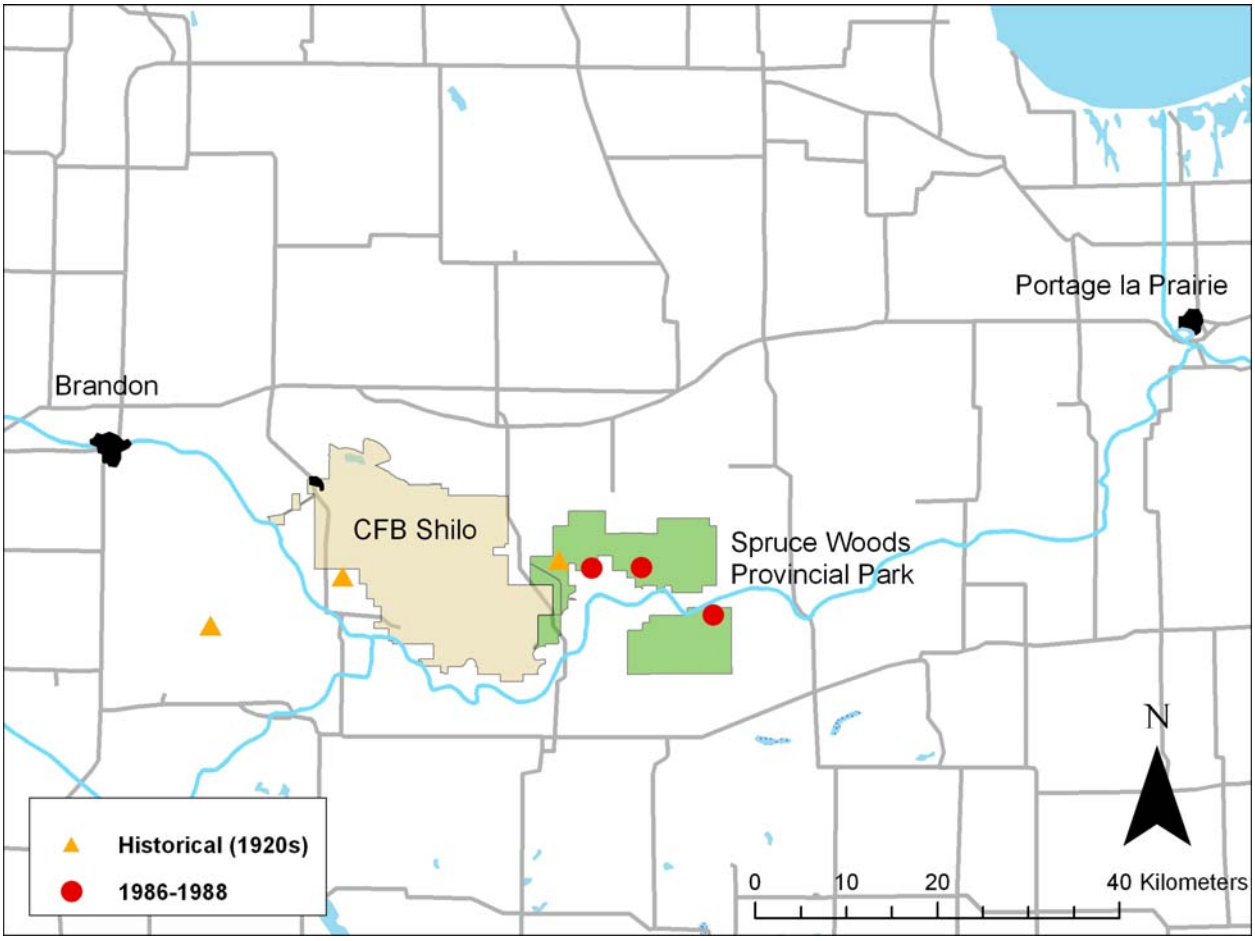

Figure 3. Canadian range of the Ottoe skipper. Historical locations are approximate.

1.4.3 Canadian abundance

Due to the few sightings of Ottoe skipper in Canada, population sizes and trends cannot be estimated at this time. The scarcity of records since the 1920s suggests that this species has always been very rare in Canada.

In Manitoba, most mixed-grass prairie and sand prairie habitats outside of Spruce Woods Provincial Park and CFB Shilo, including those at Aweme, have been degraded by overgrazing and invasion of exotic plants. In addition, most prairie sites west of the CFB Shilo have been converted to forage and cropland, such as potatoes, with some sites being mined for gravel. The Government of Manitoba's Wildlife and Ecosystem Protection Branch implemented a Mixed Grass Prairie Inventory Project in 1996, which is designed to inventory remaining prairie habitat in the province (K. Murray, pers. comm. 2006). According to this inventory, the remaining areas of relatively intact high quality mixed-grass prairie are very small (Figure 4) and it is unknown whether they could support populations of Ottoe skipper.

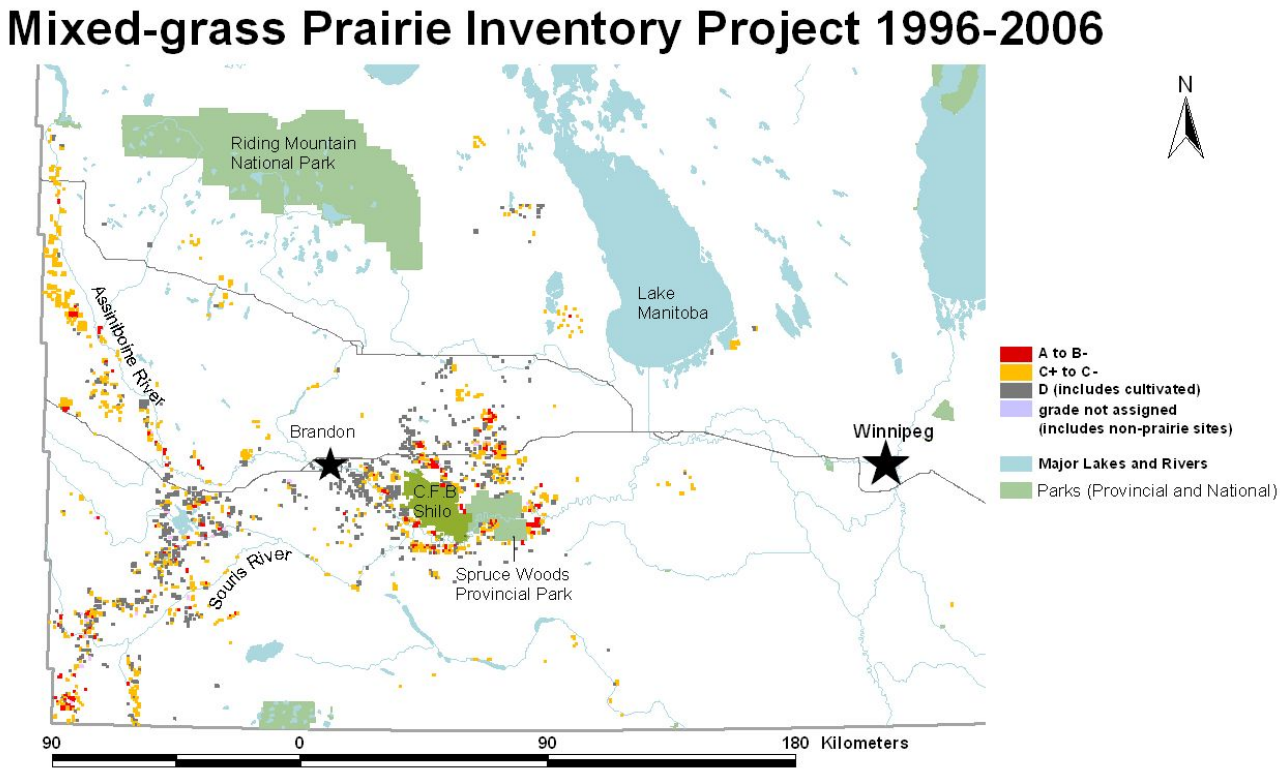

Figure 4. Map of mixed-grass prairie inventory sites (1996-2006) in the Prairie Ecozone of Manitoba. Letter grades for habitat quality are based on species diversity, degree of negative land use impacts and exotic species; grades range from “A” through “D”, where a grade of “A” indicates excellent quality habitat and “D” indicates a community dominated by exotic species (Manitoba Wildlife and Ecosystem Protection Branch 2006, used with permission).

1.5 Needs of the Ottoe Skipper

1.5.1 Habitat and biological needs

Habitat needs

The Ottoe skipper is an obligate resident of upland, dry, mixed-grass (bluestem) prairies and sand prairies; the species cannot survive in altered or disturbed habitats such as agricultural fields (COSEWIC 2005). In the United States, the Ottoe skipper has not been found in the true tall-grass prairie or in mesic mixed-grass prairies (Dana 1991, Swengel and Swengel 1999, NatureServe 2006).

Adult food resources

Access to nectar is essential to many species of butterflies, including the Ottoe skipper; nectar is an important source of energy and water for adults and also allows females to achieve high fecundity (Murphy *et al.* 1983). Adult Ottoe skippers are considered opportunistic foragers utilizing plant species regionally available, although certain flowers tend to be more favoured (COSEWIC 2005). For example, in a dry-mesic bluestem prairie in Minnesota, narrow-leaved

purple coneflower (*Echinacea angustifolia*) was the primary nectar source for Ottoe skippers with over 90% of all flower visitations occurring to this flower species (Dana 1991). Other species of flowers reported to be visited by Ottoe skippers at this site included hoary vervain (*Verbena stricta*), thistle (e.g., *Cirsium flodmanii*), and milkweed (e.g., *Asclepias viridiflora*) (Dana 1991). Conversely, in North Dakota, fleabane (*Erigeron strigosus)* and long-headed coneflower (*Ratibida columnifera*) were the most common nectar sources (McCabe 1981), while in Wisconsin wild bergamot (*Monarda fistulosa*) and blazingstar (*Liatris* sp.) were the primary food sources of the Ottoe skipper (Swengel 1994). In Canada, adult Ottoe skippers have never been observed feeding on any plant species (COSEWIC 2005).

Oviposition sites

Female Ottoe skippers require specific plants to lay eggs which later become important larval host plants. In the United States, a wide variety of grasses have been used for oviposition by the Ottoe skipper, with the most common species being little bluestem (*Andropogon scoparius*), big bluestem (*A. gerardii*), side oats grama (*Bouteloua curtipendula*), and fall rosette grass (*Dichanthelium wilcoxianum*) (Dana 1991). Despite the numerous grass species used, half of all observed ovipositions were on the flower head (capitula) of narrow-leaved purple coneflower. Presently, it is not known which species of grass and forbs are used in Canada for oviposition by the Ottoe skipper.

Larval resources

Ottoe skipper larvae use a number of different grasses for feeding and building shelters. In the United States, larvae have been reported to feed on little bluestem, side oats grama, big bluestem, fall rosette grass and fall witch grass (*Leptoloma cognatum*) (Nielsen 1958, McGuire 1982, Dana 1991). The preferred host of Ottoe skippers in Minnesota was little bluestem (Dana 1991). Bunch grasses, such as little bluestem, have a dense cluster of erect blades and a mass of persistent basal material that remains edible throughout the summer and into the fall. MacNeill (1964) suggested that the architecture of these grasses makes them ideal for shelter construction by the larvae and provides a readily available food source close to the shelter. Although larvae do feed on other species of grasses, some may not be suitable because of different architecture (being too tall) or summer senescence (Dana 1991).

Mating activity sites

No information is available on the Ottoe skipper mating behaviour in Canada, but detailed descriptions of mating have been documented in Minnesota (Dana 1991). Ottoe skippers commonly use flower heads of narrow-leaved purple coneflower as perching platforms for mating, or perch on hill and ridge tops in hilly terrain, and pursue passing females (Dana 1991).

1.5.2 Ecological role

Butterflies are often used as a means of educating the general public on the need for conservation of threatened habitats. This transfer of ecological information to people both within and outside of the scientific community is critical, at a time where habitat conservation and restoration is becoming an important strategy for conserving endangered species (Schultz 2001). Butterflies can also function as indicators of habitat condition and can serve as umbrella species, where their

preservation and the protection of associated habitat can conserve other less captivating creatures (Ehrlich 2002).

The Ottoe skipper is one of a very small group of specialist butterflies that occurs only in native mixed-grass and sand prairie habitats in Canada. This species is now restricted to a series of isolated populations in the United States and may still occur at one site in Canada. The loss of this species from Canada will be the loss of an element of the rare prairie ecosystem remaining within Manitoba.

1.5.3 Limiting Factors

A number of biological factors inherently limit Ottoe skipper populations, including, their dependence on a specific habitat consisting of a suite of host plant species, poor dispersal capabilities, and mortality due to predation and disease.

Habitat requirements and dependence on host plants

The Ottoe skipper lives only in upland mixed-grass (bluestem) prairie and sand 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. The conversion of North America mixed native prairie to agricultural cropland and forage has resulted in direct loss of suitable habitat, host plants and overall range fragmentation.

Few of the required host plant species were present at any of the historical sites for Ottoe skipper in Manitoba during the 2003 and 2007 population surveys (COSEWIC 2005, Westwood and Friesen 2007). For example, Spruce Woods Provincial Park is dominated by spruce (*Picea* sp.) and bur oak (*Quercus macrocarpa*) stands with sand dune complexes and mixed-grass prairies remnant patches occurring as 1- to 20-ha openings (COSEWIC 2005). Plant species such as little bluestem, big bluestem, wild bergamot, snowberry (*Symphoricarpos albus*), cactus (*Opuntia* sp.), and wild onion (*Allium* sp.) are generally common within and along the margins of the prairie openings. During the 2007 surveys of CFB Shilo and Spruce Woods Provincial Park little blue stem and big blue stem were scarce to absent at most sites (Westwood and Friesen 2007). Narrow-leaved purple coneflower, the primary nectar source for adult Ottoe skippers in Minnesota, was rare at Aweme and not observed at Spruce Woods Provincial Park during both 2003 and 2007 population surveys (COSEWIC 2005, Westwood and Friesen 2007). Several plants were observed in CFB Shilo in 2007 (Westwood and Friesen 2007) but the plant is still considered rare.

Dispersal and colonization potential

Little information is available on the dispersal of the Ottoe skipper in Canada or the United States. Because Ottoe skippers do not migrate and have limited dispersal capability, it is unlikely that an extirpated population would be naturally repopulated in a fragmented landscape (Selby 2005). Dana (1991) recorded adult movements of up to 200 m in Minnesota, however anecdotal evidence (R. Dana pers. comm. 2004 in Webster 2005) suggests that this species may move at least 3 km over unsuitable habitat. Selby (1992) found that Ottoe skippers in Iowa moved over 1,700 m between prairie ridges.

Disease, predation, and interspecific competition

Disease, predation, and interspecific competition do not play a large role in the population dynamics of skippers (Dana 1991, Royer and Marrone 1992), however, no data are available on these natural mortality factors on Ottoe skippers in Canada. In Minnesota, eggs and larvae are parasitized by various wasp species and are preyed on by a number of insects (Dana 1991). Potential predators of Ottoe skipper adults are crab spiders, ambush bugs, robber flies and birds (Dana 1991, Royer and Marrone 1992).

Disease is infrequent in the Ottoe skipper (Dana 1991), but skipper larvae have been killed by bacteria in humid conditions (MacNeill 1964). No data are available on interspecific interactions of the Ottoe skipper for Canadian populations.

1.6 Threats

The Ottoe skipper has not been observed or recorded since the 1980s and the extent of threats to this species and its habitat in Canada are undocumented and unknown. However, based on data from US populations and other prairie butterfly specialist (Selby 2005, Shepherd 2005), native prairie habitat loss and degradation are likely the main factors that have contributed to the decline and current vulnerability of Ottoe skipper populations in Canada. Because these skippers require relatively non-disturbed native mixed-grass prairie and sand prairie habitat, they cannot survive in the modified landscapes that surround prairie remnants (Selby 2005).

1.6.1 Habitat loss

Conversion of grasslands to cultivated land

Habitat loss is the leading cause of species endangerment (Schultz 2001). Since European settlement, significant portions of native prairie have been lost in North America, including more than 99% of the native mixed- and tall-grass prairie in Manitoba (Samson and Knopf 1994). Conversion of native prairie for agriculture is one of the greatest threats to the Ottoe skipper because agricultural habitats are completely unsuitable for the survival of this species. Many mixed-grass and sand prairie remnants have probably survived because poor soils (sandy) or steep terrain make them unsuitable for most agriculture. However, most mixed-grass prairie sites immediately west of Shilo (Figure 4) have been recently converted to potato fields or are currently being mined for gravel (Webster 2005).

1.6.2 Habitat degradation

Grazing

Over-grazing is considered a serious threat to the recovery of the Ottoe skipper. In mixed-grass prairie and sand-prairie habitats, specialist butterflies such as the Ottoe and Dakota skippers are very susceptible to over-grazing (McCabe and Post 1977, Royer and Marrone 1992, Royer and Royer 1998, Swengel and Swengel 1999). Over-grazing may result in detrimental changes in the plant community through the direct removal of both nectar and larval sources as well as soil compaction, changes in soil moisture and condition, and trampling of larva (McCabe 1981, Dana

1997, Royer and Marrone 1992, Swengel and Swengel 1999). Additionally, exotic grasses such as Kentucky bluegrass (*Poa pratensis*) have been known to invade and become established in over-grazed areas while over the long term decreasing native species diversity (Dana 1997). It is important to note that light rotational grazing may be beneficial to the Ottoe skipper by preventing succession and maintaining mixed-grass prairie vegetation structure (Dana 1991, Swengel 1998b).

Haying

The timing of haying determines whether the activity is detrimental or beneficial to the Ottoe skipper. Mowing and/or haying activities performed before or during the Ottoe skipper's adult flight period can be detrimental because they can remove critical nectar sources and may favour the growth of exotic species such as Kentucky bluegrass (McCabe 1981, Dana 1997). Conversely, late-season haying (late September to October) can be an important management tool for maintaining Ottoe skipper populations, as it helps to maintain the vegetation structure, prevents or delays succession, and reduces the accumulation of litter on the soil. At this time of the year, skipper larvae have entered their buried shelters and are thus protected from mowing activities (Dana 1991). Haying is not a common practice within CFB Shilo or Spruce Woods Park (R. Westwood, pers. obs.), thus it is not considered a threat to Ottoe skipper.

Fire

Historically, fire was an important process in maintaining native prairie habitat. Some land managers continue to use fire today to maintain native grassland structure and species composition although today's prescribed fires differ from those historical wildfires in timing, intensity, and frequency. Historical wildfires were likely patchy and did not burn the entire habitat occupied by skippers, allowing adults to recolonize new locations (Swengel 1998a). Although prescribed burns may be beneficial for maintaining the prairie flora and certain insect species, they may be devastating to other species of insects (Swengel 2001). Prescribed burning of isolated prairies can cause local extirpations of some insect species, especially prairie habitat specialists such as the Ottoe skipper, the Dakota skipper and the Poweshiek skipperling (*Oarisma poweshiek)* (McCabe 1981, Schlicht and Saunders 1994, Swengel 1996, 1998b, 2001, Orwig and Schlicht 1999).

In Minnesota prairies, significantly lower abundances of Ottoe skipper and other habitat specialists were observed at sites that had been burned relative to sites that had been hayed (Swengel and Swengel 1999, Swengel 1996, 1998b). Additionally, two to four years after early spring burning, the abundances of Ottoe skipper, Dakota skipper and several other habitat specialist butterflies were lower than pre-burn abundances on several Minnesota reserves (Swengel 1996), showing that early spring burning is a major threat to these species.

Currently, controlled burns are not being conducted in Spruce Woods Provincial Park. However, wildfires within the CFB Shilo Military Base periodically burn into the park and could negatively impact the Ottoe skipper should large areas of the park burn (COSEWIC 2005).

Habitat Fragmentation

Before the widespread destruction of the prairie following European settlement, the Ottoe skipper probably existed as a single population throughout much of the almost continuous mixed-grass prairies in the north- and south-central plains of North America (Selby 2005). Habitat destruction, as has occurred across the Canadian prairies, not only results in the loss of habitat, but also the fragmentation of remaining habitat patches, and subsequently the isolation of remaining populations. Small populations can become more susceptible to extinction through demographic, environmental, and genetic stochasticity (Gilpin and Soulé 1986; Hanski *et al.* 1996, Hanski 2003).

The Ottoe skipper presently occurs as a series of isolated populations throughout much of its former range (NatureServe 2006). In Canada, only one population may still exist, and all of the known Canadian sites are within 150 km of known population centres in the United States. The closest population, in North Dakota, was listed as imperiled (S1) in the COSEWIC status report (NatureServe 2003 in Webster 2005); however, at present the North Dakota population is unranked (SNR) (NatureServe 2006). As such, if local extinctions of the Ottoe skipper occur, it is unlikely that natural re-colonization in a fragmented landscape could take place (Selby 2005).

1.6.3 Changes in plant community

Succession

Prairies that lack periodic disturbances such as grazing, mowing or prescribed burns can undergo succession to woody shrubs, accumulate litter, have reduced densities of nectar flowers, and may face increased risk of exotic species invasion (McCabe 1981, Dana 1991, Dana 1997). Late-season haying, in the late summer or fall, may prevent or reduce prairie succession, similar to burning, but with less detrimental impact on the Ottoe skipper population (McCabe 1981).

However, because of high topographic relief on many of the mixed and sand-prairies where the Ottoe skipper occurs, haying may not be feasible. As a result, small controlled rotational burns early in the spring may be the only solution for maintaining the flora and fauna at these sites. Prior to European settlement on the prairies, much of the area was maintained by periodic bison grazing and occasional wildfires. Since much of the original prairie habitat was suitable for the Ottoe skipper, adults were able to re-colonize adjacent prairie regions when forced to leave areas due to grazing or fire events. The suitable habitats that now remain are too widely separated to allow for re-colonization, and must be maintained by artificial means (McCabe 1981).

Exotic or Invasive Species

The invasion of exotic plant species such as leafy spurge (*Euphorbia esula*), Kentucky bluegrass, and smooth brome (*Bromus inermis*), threatens native prairie plants that Ottoe skippers are dependent upon. Once these plant species invade an area, they often become dominant and replace native forbs and grasses used by adult and larval Ottoe skippers. Smooth brome is likely too tall for efficient feeding by Ottoe skipper larvae and it senesces before the period of fall larval grazing (Dana 1991). In addition, smooth brome does not have a dense base like those of the bunch grasses, and so is unlikely to provide effective protection of a larval shelter (Dana

1991). Various densities of leafy spurge have been observed at or near certain sites in Spruce Woods Provincial Park and particularly along roadsides on CFB Shilo (Westwood and Friesen 2007). Leafy spurge has been identified as a threat to mixed-grass prairie habitat quality in southern Manitoba (K. Murray, pers. comm. 2006), thus making it an increasing threat to the remaining Ottoe skipper habitat.

1.6.4 Chemical control

Spraying of insecticides to control agricultural pest species, such as grasshoppers, can indirectly kill non-target insects including skippers (Royer and Marrone 1992). In addition, the use of herbicides to control exotic plant species like leafy spurge can eliminate native forbs and skipper nectar sources (Royer and Marrone 1992). In 2004, Ottoe skipper nectar sources were eliminated near the Aweme site as a direct result of chemical control of leafy spurge that was abundant in the mixed-grass prairie.

1.6.5 Climate and natural disasters

Because the Ottoe skipper is currently restricted to small populations, it is vulnerable to extreme weather conditions such as harsh winters, late frosts, unusually cool and wet growing seasons, drought, or fire that could potentially eliminate an entire population (Selby 2005). It has been shown that inclement weather can have a large effect on butterfly population numbers (Pollard and Yates 1993). In addition, changes in weather and climate could lead to shifts in plant communities and phenology, which in turn could affect the skipper's survival and reproduction if nectar sources are not available during the adult flight period.

1.6.6 Collection of specimens

The collection of individual Ottoe skippers by naturalists is a concern, as it is still not known how many remaining individuals there are in Canada; it has been 20 years since the last sighting of this skipper in southern Manitoba. However, skippers are generally not as popular with most collectors, as they are not particularly showy butterflies.

Worn specimens of Ottoe skipper can be very difficult to distinguish from several other skipper species in the field, therefore collection of individuals has often been necessary to confirm identification (R. Westwood, pers. obs.). However, it is illegal in Manitoba to collect specimens of the Ottoe skipper without a scientific permit, as the species is provincially listed as threatened under its *Endangered Species Act*.

1.7 Actions Already Completed or Underway

- R. Webster conducted skipper surveys in Manitoba and Saskatchewan in 2002-2003 for the 2003 COSEWIC Dakota skipper status report (R. Webster, pers. comm. 2006); no Ottoe skippers were found at these sites (COSEWIC 2005).
- R. Westwood (University of Winnipeg) and C. Morden carried out skipper surveys in 2005 and 2006 (Morden 2006) as part of a study that compared the habitat of the Tall Grass Prairie Preserve (TGPP) and the Interlake region in Manitoba to assess the suitability of reintroducing Dakota skipper to the TGPP. No Ottoe skippers were encountered during these surveys.

- R. Westwood and W. Watkins conducted skipper surveys in the Interlake region of Manitoba in 2006, and discovered a new site with Dakota skippers (R. Westwood, unpublished data); however, no Ottoe skippers were found at these sites.
- An inventory of over 72,000 ha of mixed-grass prairie habitat in southern Manitoba has been completed by the Critical Wildlife Habitat Program. Grades have been assigned to habitat quality at each of the surveyed prairie sites.
- Dakota skipper habitat surveys were conducted in the Interlake region in 2004 by Manitoba Conservation (Stangl and Cantin 2004). The Dakota and Ottoe skippers have been known to occupy the same prairie sites in Minnesota (Dana 1991), so these habitat surveys may be applicable to the Ottoe skipper as well.
- In 2007, R. Westwood (University of Winnipeg) conducted surveys for the Ottoe skipper in Spruce Woods Provincial Park and CFB Shilo. Surveys took place weekly from July 1 to August 12. No Ottoe skippers were found during this time (Westwood and Friesen 2007).
- A study was initiated to evaluate the effects of a number of burn and grazing regimes on Dakota skipper habitat at the Tall Grass Prairie Preserve in southeastern Manitoba and in the Interlake area in 2007 (R. Westwood, unpublished data), which may provide some insight into the effect of burning and grazing practices on the Ottoe skipper also.

1.8 Knowledge Gaps

There are currently many gaps in our knowledge of the Ottoe skipper, including presence, distribution, abundance, habitat requirements and availability, and the general biology of this species in Canada. More specifically, the gaps that need to be addressed are the following:

- Determine if species occurs in Canada by conducting surveys of previously known and potential Ottoe skipper habitat, particularly during mid July to late August.
- If Ottoe skipper is found to occur in Canada, a detailed study of the biology of the species is required.
- Additional survey effort to estimate Ottoe skipper population presence, distribution, and abundance in Canada.
- Identify Ottoe skipper habitat requirements in Canada, including the importance of soil, climate, and physiographic factors on the vegetation community.
- Additional research is needed to assess survival, reproductive success, and population viability of the Ottoe skipper.

2. RECOVERY

2.1 Recovery Feasibility

Based on the following four criteria outlined by Environment Canada (2005), there are unknowns regarding the feasibility of recovery of the Ottoe skipper. Therefore, in keeping with the precautionary principle, a full recovery strategy has been prepared as would be done when recovery is determined to be feasible.

1. Are individuals capable of reproduction currently available to improve the population growth rate or population abundance?

Unknown. It is currently not known whether Ottoe skippers are still present in Canada, as the last record was in Manitoba in the late 1980s and no individuals have been observed in recent surveys carried out in CFB Shilo and Spruce Woods Provincial Park. However, since some prairie skipper species are known to experience unpredictable population fluctuations with some years being more abundant while absent in others (R. Westwood, pers. obs.), consecutive surveys in mixed-grass prairie and sand prairie habitats in Manitoba are required over the next three to five years to determine the presence of this species.

If Ottoe skipper populations are found to be present in Canada, the most likely method of increasing the overall population size will be through securing and enhancing additional suitable habitat to allow for colonization and/or reintroduction into areas from which they have been extirpated.

2. Is sufficient habitat available to support the species or could it be made available through habitat management or restoration?

Unknown. Despite large losses of mixed-grass prairie in Manitoba, there likely exists enough habitat to support a small population of the Ottoe skipper, however, additional suitable habitat may be necessary to recover and maintain a viable population in Canada. Although Ottoe skippers have specific habitat requirements for intact native prairie, it is likely possible to secure and enhance suitable habitat, either adjacent to any current populations or potentially at uninhabited sites, such as Spruce Woods Provincial Park.

3. Can significant threats to the species or its habitat be avoided or mitigated through recovery actions?

Unknown. Although, the main threat to the Canadian Ottoe skipper population is thought to be habitat loss and degradation, which can be mitigated through recovery actions, little is known of the extent of additional threats. If Ottoe skipper populations are found to exist in Canada then recovery actions such as habitat protection and restoration would be undertaken; however more information is required to determine the extent of other potential threats and how to mitigate them.

4. Do the necessary recovery techniques exist and are they known to be effective?

Unknown. The necessary recovery techniques will depend on the confirmation of the presence of the Ottoe skipper in Canada, as well as the locations of any confirmed populations.

2.2 Recovery Goal

The recovery goal for the Ottoe skipper in Canada is to determine if Ottoe skippers are still extant in Canada.

Currently it is not possible to establish population or distribution objectives for the Ottoe skipper in Canada, as no individuals have been located since the 1980s. If an extant population is discovered, sufficient monitoring and research should be undertaken in order to determine reasonable population and distributional objectives. It is possible that this species goes through

dramatic population fluctuations and is able to persist at very small numbers that have not been detected. In addition, it is possible that this species may exist in habitats that have yet to be surveyed. For these reasons, it will be important to conserve and manage the habitat at the historic sites, as well as put some effort into searching historic and additional suitable habitat.

2.3 Recovery Objectives (2010 – 2015)

The short-term recovery objectives for the Ottoe skipper are:

1. Determine if any existing Ottoe skipper populations occur in Canada.
2. If species is found to occur in Canada, then increase knowledge of species biology, life history, and habitat requirements.
3. If extant populations of the Ottoe skipper are found, then determine population parameters such as distribution, abundance and general trends.

2.4 Approaches Recommended to Meet Recovery Objectives

2.4.1 Recovery planning

Table 1 outlines the recommended approaches to meet recovery objectives, grouped by priority, threats addressed and the broad strategy to address threats.

Table 1. Recovery Planning Table

Priority	Threats addressed	Broad strategy to address threat	Recommended approaches to meet recovery objectives
Objective 1: Determine if any existing Ottoe skipper populations occur in Canada.			
High	All	Inventory and Monitoring	• Develop an inventory strategy that describes a scheduled approach to surveying historically occupied sites and areas of potential habitat for the Ottoe skipper.
High			• Identify potential habitat to survey (based on presence of other skipper species with similar habitat requirements) and create a habitat map for the possible range of the Ottoe skipper.
High			• Carry out population surveys in historically and potentially occupied sites.
High			• Record potential threats at all historical and potential sites.
Objective 2: If species is found, increase knowledge in species biology, life history, and habitat requirements.			
High	All	Research	• Identification and prioritization of key knowledge gaps
High			• Initiate study to gain better understanding of species biology, habitat requirements, and life history stages.
High			• Determine exact flight period in Canada.
High			• Identify host plants used, and the importance of soil, climate, and physiographic factors.
Objective 3: If extant populations of the Ottoe skipper are found, then determine population parameters.			
High	All	Inventory and Monitoring	• Monitor population sizes and distribution annually or biennially.
High			• Define, identify, and map habitat used by the Ottoe skipper.
High			• Determine population and distribution trends.

2.4.2 Narrative to support recovery planning

Objective 1: Determine if any existing Ottoe skipper populations occur in Canada.

Additional survey effort is required to determine the presence of the Ottoe skipper in Canada. Ottoe skipper surveys should be implemented on a consecutive year basis at historical locations including Spruce Woods Provincial Park and in the Aweme area from the end of July to end of August. In addition, surveys should be done in other potential habitat areas (i.e., known mixed-grass and sand prairie habitats in southern Manitoba).

Objective 2: If species is found, increase knowledge in species biology, life history, and habitat requirements.

Very little is known about the Canadian Ottoe skipper. The majority of species data comes from populations studied in US. As such, once Ottoe skipper is determined to occur in Canada, further research into the species general biology, including flight period, seasonal phenology, population viability, and habitat characteristics such as host plant associations should be determined. In addition, there are a number of knowledge gaps on the life history of the Ottoe skipper in Canada and these could potentially be addressed if sizable populations are found, including estimating survival rates (adults and larvae) and fecundity rates, estimating dispersal distances, and determining which environmental factors influence survival, and potential effects of various land-uses. Research into potential reintroductions may be helpful for the future management of Ottoe skippers, however reintroductions should only be considered after the maintenance of existing habitat (Thomas 1995).

Objective 3: If extant populations of the Ottoe skipper are found, then, determine distribution, abundance and general trends.

If extant populations of the Ottoe skipper are found, it will be a high priority to survey these populations to assess distribution, abundance, and trends in distribution and abundance over time. Conservation initiatives should be implemented at all sites where the Ottoe skipper is found.

2.5 Performance Measures

The recovery strategy will be evaluated in five years, based on any new information obtained during this period, and will be evaluated according to the performance measures outlined in Table 2.

Table 2. Recovery objectives and their related performance measures

Recovery Objective	Performance Measure
Objective 1. Determine if any existing Ottoe skipper populations occur in Canada.	• Sampling/monitoring system developed to confirm presence and collect demographic data. • Long-term surveys established at several known/potential sites.
Objective 2. If species is found, increase knowledge of species biology, life history, and habitat requirements.	• Identification and prioritization of key knowledge gaps. • Research is initiated to assess life history, seasonal phenology, population viability, productivity and survival. • Knowledge is gained in biology, habitat characteristics, flight period including survival, fecundity and dispersal.
Objective 3. If extant populations of the Ottoe skipper are found, then determine population parameters such as distribution, abundance and general trends.	• Reliable population estimates established for Ottoe skipper in Canada. • Modeling done to assess what is required to obtain a viable population of Ottoe skippers. • Used and potential habitat is identified and mapped.

2.6 Critical Habitat

2.6.1 Identification of the species' critical habitat

Critical habitat is defined as "the habitat that is necessary for the survival or recovery of a listed wildlife species" (*Species at Risk Act*, c. 29, s.2). Critical habitat for Ottoe skipper is not identified in this recovery strategy due to the lack of evidence that this species still occurs in Canada. Critical habitat may be identified when evidence of occurring individuals are documented in Canada. Once occurrence is documented, a method to locate and identify critical habitat characteristics will be implemented (see section 2.6.2 below).

2.6.2 Schedule of studies to identify critical habitat

Table 3 outlines the required studies for identifying critical habitat for the Ottoe skipper.

Table 3. Schedule of studies needed to identify critical habitat for the Ottoe skipper.

Description of Activity	Outcome/Rationale	Timeline
Inventory and monitor potentially occupied habitat.	Identification of site-specific habitat threats, movement barriers, and land ownership.	Within one season of confirmation of occurrence
Conduct research to quantify habitat requirements and use.	Identification of habitat requirements for adults, larva, and host plants. Identification of optimal patch size, and clarification of dispersal capabilities.	Within one season of confirmation of occurrence
Survey similar unoccupied habitat and assess the feasibility of re-establishing populations.	Identification of potential suitable habitat and requirements for reintroduction.	Within one season of confirmation of occurrence

2.7 Existing and Recommended Approaches to Habitat Protection

The Ottoe skipper was assessed as endangered by COSEWIC in 2005 and was officially listed federally under the *Species at Risk Act* in August 2006. The Ottoe skipper is currently listed as threatened by the province of Manitoba under their *Endangered Species Act* (first listed in February, 1998) (CanLII 2009). Under this Act, it is illegal to: (a) kill, injure, possess, disturb or interfere with a threatened species; (b) destroy, disturb or interfere with the habitat of a threatened species, or; (c) damage, destroy, obstruct or remove a natural resource on which a threatened species depends for its life and propagation.

Historical occurrences of Ottoe skipper have been reported from within Spruce Woods Provincial Park, Manitoba. The Park is currently managed by Manitoba government for recreation and conservation purposes and as such Ottoe skipper habitat is protected through the prevention of habitat loss via cultivation, grazing, and development. Additional suitable Ottoe skipper habitat may be identified and protected through various conservation efforts such as habitat stewardship agreements and easements.

2.8 Effects on Other Species

Ottoe skippers are obligate residents of mixed-grass prairie and sand prairie habitat, therefore the conservation of this skipper will also assist in preserving remnants of these rare ecosystems. A number of other Lepidopteran species are found in association with the Ottoe skipper, including a number which are also of conservation concern such as the Dakota skipper, the Poweshiek skippering, the Gold-edged gem (*Schinia avemensis*) and the White flower moth (*S. bimatris*). The Dakota skipper and the Poweshiek skipperling are listed as threatened while the Gold-edged Gem and White flower moth, both occurring in Spruce Woods Provincial Park, are listed as endangered in Canada under the *Species at Risk Act.*

Plant species at risk that could benefit from Ottoe skipper conservation include the hairy prairie-clover (*Dalea villosa* ssp. var. *villosa*), and smooth goosefoot (*Chenopodium subglabrum*), both found in mixed-grass prairie habitat and currently listed as threatened under SARA. Hairy prairie-clover is known to be present at two sites in Manitoba, one being Spruce Woods Provincial Park; smooth goosefoot is found in sand dunes in southwestern Manitoba and has recently been documented in Spruce Woods Provincial Park (C. Foster, pers. comm. 2006). There are also other rare and uncommon plant species that occur in sand prairie habitat in Manitoba, though not listed under SARA (C. Foster, pers. comm. 2006).

2.9 Recommended Approach for Recovery Implementation

The recovery of the Ottoe skipper will likely be a combination of single-species and multi-species approach to consider the needs of other species occurring in mixed-grass and sand prairies, especially Dakota skipper, Poweshiek skipperling, hairy prairie-clover, and smooth goosefoot, in sites where they are found to occur together.

2.10 Statement on Action Plans

An Action Plan for the Ottoe skipper will be completed in 2015 if the presence of the species in Canada is confirmed.

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