PROPOSED

Species at Risk Act
Recovery Strategy Series

Recovery Strategy for the Prairie Skink (*Plestiodon septentrionalis*) in Canada

Prairie Skink

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For copies of the recovery strategy, or for additional information on species at risk, including the Committee on the Status of Endangered Wildlife in Canada (COSEWIC) Status Reports, residence descriptions, action plans, and other related recovery documents, please visit the Species at Risk (SAR) Public Registry[1].

Cover illustration: Pamela Rutherford

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[1] http://www.registrelep-sararegistry.gc.ca

Preface

The federal, provincial, and territorial government signatories under the Accord for the Protection of Species at Risk (1996)[2] agreed to establish complementary legislation and programs that provide for effective protection of species at risk throughout Canada. Under the *Species at Risk Act* (S.C. 2002, c.29) (SARA), the federal competent ministers are responsible for the preparation of recovery strategies for listed Extirpated, Endangered, and Threatened species and are required to report on progress within five years after the publication of the final document on the SAR Public Registry.

The Minister of Environment and Climate Change is the competent minister under SARA for the Prairie Skink and has prepared this recovery strategy, as per section 37 of SARA. To the extent possible, it has been prepared in cooperation with the province of Manitoba and the Department of National Defence.

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 and Climate Change Canada, or any other jurisdiction alone. All Canadians are invited to join in supporting and implementing this strategy for the benefit of the Prairie Skink and Canadian society as a whole.

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

The recovery strategy sets the strategic direction to arrest or reverse the decline of the species, including identification of critical habitat to the extent possible. It provides all Canadians with information to help take action on species conservation. When the recovery strategy identifies critical habitat, there may be future regulatory implications, depending on where the critical habitat is identified. SARA requires that critical habitat identified within a national park named and described in Schedule 1 to the *Canada National Parks Act*, the Rouge National Urban Park established by the *Rouge National Urban Park Act*, a marine protected area under the *Oceans Act*, a migratory bird sanctuary under the *Migratory Birds Convention Act, 1994* or a national wildlife area under the *Canada Wildlife Act* be described in the *Canada Gazette*, after which prohibitions against its destruction will apply. For critical habitat located on other federal lands, the competent minister must either make a statement on existing legal protection or make an order so that the prohibition against destruction of critical habitat applies. For any part of critical habitat located on non-federal lands, if the competent minister forms the opinion that any portion of critical habitat is not protected by provisions in or measures under SARA or other Acts of Parliament, or the laws of the province or

[2] http://registrelep-sararegistry.gc.ca/default.asp?lang=en&n=6B319869-1#2

territory, SARA requires that the Minister recommend that the Governor in Council make an order to prohibit destruction of critical habitat. The discretion to protect critical habitat on non-federal lands that is not otherwise protected rests with the Governor in Council.

Acknowledgments

The initial draft of this recovery strategy was prepared by Jennie Pearce (Pearce & Associates Ecological Research) based on the draft Manitoba Provincial Conservation and Recovery Strategy for the Prairie Skink. Andrew Didiuk and John Conkin (Environment and Climate Change Canada, Canadian Wildlife Service – Prairie & Northern Region), Allison Krause Danielsen (Manitoba Conservation and Water Stewardship), Pamela Rutherford (Brandon University, Manitoba), Sherry Punak-Murphy (Canadian Forces Base (CFB) Shilo , Manitoba) and Rebekah Neufeld (National Conservancy of Canada) completed the preparation of this recovery strategy.

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Executive Summary

The Prairie Skink is the only lizard species found in Manitoba where it is at the northern extent of its range. Prairie Skinks are small, olive-brown terrestrial lizards with four light stripes running the length of the body with males developing a reddish-orange patch on the chin during the breeding season. Skinks inhabit mixed-grass prairies and oak savannas but may also be found occupying the edges and possibly the interior of deciduous or mixed forest. In Canada, the species is only found in two areas of post-glacial Upper Assiniboine Delta soil formations in Manitoba, with the great majority found in the Brandon Sandhills area and another very small population in the Lauder Sandhills.

The Prairie Skink is listed as Endangered under Schedule 1 of the *Species at Risk Act* and under Manitoba's *Endangered Species and Ecosystem Act*, due to its small area of occupancy in Canada, threats to its prairie habitat, and isolation from the nearest population in the United States. Current and historic threats to the species include: residential and commercial development, agriculture and aquaculture, transportation and service corridors, biological resource use, human intrusions and disturbance, natural system modifications, and invasive and other problematic species and genes.

Recovery is considered feasible for this species. The population and distribution objective for the Prairie Skink is to maintain the current distribution of the two Canadian populations by maintaining all local populations within the currently occupied 1 km x 1 km UTM grid cells, plus any new local populations discovered in the future. Broad strategies to be taken to address the threats to the survival and recovery of the Prairie Skink are presented in the section on Strategic Direction for Recovery.

Critical habitat for the Prarie Skink is partially identified in southwest Manitoba based on best available information. The biophysical attributes of critical habitat for the Prairie Skink are open native grassland habitat and adjacent trees and shrubs which provide a range of thermal conditions for activity and shelter in the active season, and loose sandy soils which accommodate shallow burrowing during the active season and deeper burrowing in winter. Natural cover objects (woody debris, stones and rocks, clumps of dense vegetation) are included as they are used for foraging, predator avoidance, thermoregulation, and nesting by skinks. Grassy tracks, utility corridors, the right-of-ways of paved roads, gravel roads and railways are included if they have suitable soil and vegetation characteristics similar to adjacent habitat. There was a total of 604 reported occurrences of the Prairie Skink of which 569 occurrences had sufficient information to be used in the identification of critical habitat. There were 116 polygons of critical habitat identified in the Brandon Sandhills area (total 5.13 km^2) associated with 562 occurrences and 1 critical habitat polygon in the Lauder Sandhills area (total 0.08 km^2) associated with 7 occurrences of the Prairie Skink.

One or more action plans will be completed for this species by 2021.

Recovery Feasibility Summary

Based on the following four criteria that Environment and Climate Change Canada uses to establish recovery feasibility, recovery of the Prairie Skink has been deemed feasible.

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

Yes. There are two populations of Prairie Skink in southwest Manitoba, a larger population in the Brandon Sandhills region and a very small population in the Lauder Sandhills. Young-of-the-year have been observed in both populations indicating successful reproduction, although the possible extremely small size of the Lauder Sandhills population makes it particularly vulnerable to extirpation. Additional genetic analyses are required before any population augmentation can be considered.

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

Yes. Sufficient suitable habitat exists within the species range to achieve the population and distribution objectives, although habitat protection, management and stewardship are required to mitigate threats. Areas of potential suitable habitat that may support Prairie Skinks, currently unoccupied or not surveyed within the Brandon Sandhills and Lauder Sandhills areas, would allow for an expansion of the Canadian population. Research is necessary to better understand microhabitat use by Prairie Skinks.

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

Yes. Agriculture has been identified as a primary threat and this can be avoided or mitigated through stewardship and protection activities. Other possible threats, such as residential and commercial development, transportation and service corridors, biological resource use, human intrusions and disturbance, natural system modifications, and invasive and other problematic species and genes,require more studies to determine their significance.

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

Yes. The main recovery techniques will be monitoring and surveying of local populations, habitat and threats to refine potential recovery actions; stewardship and education to mitigate threats to habitat; and habitat management and conservation. These techniques are believed to be effective for maintaining and enhancing habitat for the Prairie Skink.

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1. COSEWIC* Species Assessment Information

Date of Assessment: May 2004

Common Name (population): Prairie Skink

Scientific Name: *Plestiodon septentrionalis*

COSEWIC Status: Endangered

Reason for Designation: This lizard is confined to a small region (less than 1700 km^2) in Manitoba. It requires sandy soils and mixed grass prairie. Prairie habitat is being fragmented and lost to cultivation, aspen succession and invasion by exotic leafy spurge. The Manitoba population is isolated from the rest of the species in the USA by over 100 km.

Canadian Occurrence: Manitoba

COSEWIC Status History: Designated Special Concern in April 1989. Status re-examined and designated as Endangered in May 2004.

*COSEWIC (Committee on the Status of Endangered Wildlife in Canada)

2. Species Status Information

The Prairie Skink (*Plestiodon septentrionalis)* consists of three subspecies: the Northern Prairie Skink (*P.s. septentrionalis*), the Southern Prairie Skink (*P. s. obtusirostris*) and the Pallid Skink (*P.s. pallidus*) (Crother et al. 2012), with the range of each subspecies being disjunct. The Northern Prairie Skink is found from southwest Manitoba south through the central United States from eastern North Dakota, Minnesota and western Wisconsin south to extreme northeastern Oklahoma. This recovery strategy applies to the *P.s. septentrionalis* subspecies, which is the only subspecies that occurs in Canada.

The Prairie Skink is designated as Endangered on Schedule 1 of the federal *Species at Risk Act* (SARA), and as Endangered under Manitoba's *Endangered Species and Ecosystem Act*. The Prairie Skink has a global status of secure (G5) but it has not been ranked (NNR) in Canada (NatureServe 2015). In Manitoba, the provincial conservation rank has been changed from not ranked (SNR) to critically imperiled (S1) (C. Frisen, Manitoba Conservation Data Center). The global, national, and sub-national rankings for the Prairie Skink species and the Northern Prairie Skink subspecies are provided in Table 1.

The Canadian range represents a small (<5%) proportion of the global range for this species (COSEWIC 2004).

Table 1. Conservation status of the Prairie Skink species and the Prairie Skink subspecies (from NatureServe 2015).

	Global (G) Rank[1]	National (N) Rank[1]	Sub-national (S) Rank[1]	SARA Status	IUCN
Prairie Skink (*Plestiodon septentrionalis*)	G5	Canada – N1	Manitoba - S1		Least Concern
		United States – N5	Arkansas - S2 Iowa - S3 Kansas - S4 Louisiana - S1 Minnesota - S5 Missouri - SNR Nebraska - S5 North Dakota - S2S3 Oklahoma - S4 South Dakota - S5 Texas - S5 Wisconsin - S3		
Northern Prairie Skink (*P.s. septentrionalis*)	G5T5	Canada - NNR	Manitoba – S1	Schedule 1, Endangered	
		United States - N5	Missouri - S3		

[1] Rank: 1– critically imperiled; 2– imperiled; 3- vulnerable to extirpation or extinction; 4- apparently secure; 5– secure; T – infraspecific taxon, NR – status not ranked

3. Species Information

3.1 Species Description

Prairie Skinks are small, burrowing terrestrial lizards (55 - 91 mm snout-vent length) with olive-brown backs and sides and four light stripes running the length of the body and onto the tail (COSEWIC 2004). The tail is approximately the same length as the body, but may be shorter if the tail has previously been lost and regenerated. The tails of juvenile skinks are bright blue, fading to grey when they reach at least 50 mm snout-vent length (Breckenridge 1943). Female Prairie Skinks may grow larger than males (Nelson 1963, Bredin 1989), and males develop a reddish-orange patch on the chin during the breeding season (COSEWIC 2004).

Prairie Skinks enter hibernation by mid-September and emerge from mid- to late- April depending on weather conditions (Bredin 1989) with only five months available for growth, survival and reproduction (Breckenridge 1943; Nelson 1963; Bredin 1989). Males emerge first, followed by females and then by juveniles (Breckenridge 1943; Nelson 1963; Bredin 1981, 1989).

Male and female Prairie Skinks reach sexual maturity at a snout-vent length of 55 - 65 mm, and females breed for the first time after the second or third winter (Manitoba Prairie Skink Recovery Team 2014; Bredin 1989; P. Rutherford,

unpub. data). Hatching occurs within the first week of August after an incubation period of 35 days (Breckenridge 1943; Nelson 1963; Bredin 1989). Hatchlings remain in the nest with the adult female for up to two days (Somma 1987).

The longevity of Prairie Skinks is not known although one skink captured as an adult was recaptured 5 years later suggesting a longevity of at least 7 years (Bredin 1989). Based on five years of mark-recapture data, the annual survivorship for seven local populations of Prairie Skinks at CFB Shilo, Manitoba, was estimated to be 0.65 for juveniles and 0.75 for adults (Rutherford 2015).

3.2 Population and Distribution

In Manitoba, Prairie Skinks are found in the Brandon Sandhills area and the Lauder Sandhills area (Figure 1), which are considered to be two separate populations. In both areas, skinks tend to be highly localized with each known occurrence likely associated with an aggregation of unknown size and considered to be a local population (Bredin 1989; Manitoba Prairie Skink Recovery Team 2014). The extent of occurrence is approximately 6815 km^2 and the area of occupancy is approximately 592 km^2 (COSEWIC 2014).

The Brandon Sandhills area, within the Shilo Ecodistrict of the post-glacial Upper Assiniboine Delta deposits (Wolfe 2010), extends from Neepawa in the north to Glenboro in the south, and from the Assiniboine River in the west to approximately 12 km north of Treherne in the east. Many local populations of the Prairie Skink in this area occur within Canadian Forces Base (CFB) Shilo and Spruce Woods Provincial Park.

The Lauder Sandhills area occurs within the Oak Lake Ecodistrict of the Souris Till Plain. This Prarie Skink population occupies an area less than 1 ha in extent (Manitoba Prairie Skink Recovery Team 2014) and is found within the Lauder Sandhills Wildlife Management Area.

Prairie Skinks in the Lauder Sandhills area and the Brandon Sandhills area are separated from one another by 80 km and both populations are isolated from the nearest Prairie Skink population in Minnesota by approximately 150 km (COSEWIC 2004; Manitoba Prairie Skink Recovery Team 2014). The area between all these populations is characterized by heavier soil types that would not support overwintering by Prairie Skinks (Cook 1964).

Despite this geographic separation, Fuerst and Austin (2004) found that gene sequences within two regions of mitochondrial DNA from skinks in the Brandon Sandhills were not significantly different from sequences obtained from skinks in the northern United States. More recent genetic analyses of Brandon Sandhills local populations indicated there are two genetic clusters, north and south of the Assiniboine River (Siu 2011). These analyses did not reveal any indication of population fragmentation arising from more recent barriers due to agriculture or roads, but changes

in genetic composition may not be detectable due to the small number of loci available and small sample sizes. It may also take a longer time for genetic signatures of barriers to develop for species with limited dispersal ability (Landguth et al. 2010). No genetic analyses of the Lauder Sandhills local population have been conducted.

It is not possible to estimate population size of Prairie Skinks in Canada because they are very cryptic and difficult to survey, and few surveys have been undertaken on private land (Manitoba Prairie Skink Recovery Team 2014). Mark-recapture data are available for the years 2007-2011 for some local populations within CFB Shilo, Manitoba, in the Brandon Sandhills area, with local population estimates ranging from 28-178 animals and with density varying from 1.3 - 26.8 skinks/ha (mean 6.8 ± 5.01) (COSEWIC 2014). However, information is lacking as to how many local sub-populations exist within the Brandon Sand Hills. Therefore extrapolating local sub-population sizes to estimate the size of the population in the Brandon Sand Hills is not possible at this time. No population studies have been conducted in the Lauder Sandhills area. In Minnesota, Prairie Skink local population densities of 160 skinks/ha (Nelson 1963) and 58-206 adults/ha (Pitt 2001) have been reported using different survey methods.

There is no information on population trends for any of the Brandon Sandhills and Lauder Sandhills local populations. However, some local populations in the Brandon Sandhills have persisted for at least 20 years (COSEWIC 2004).

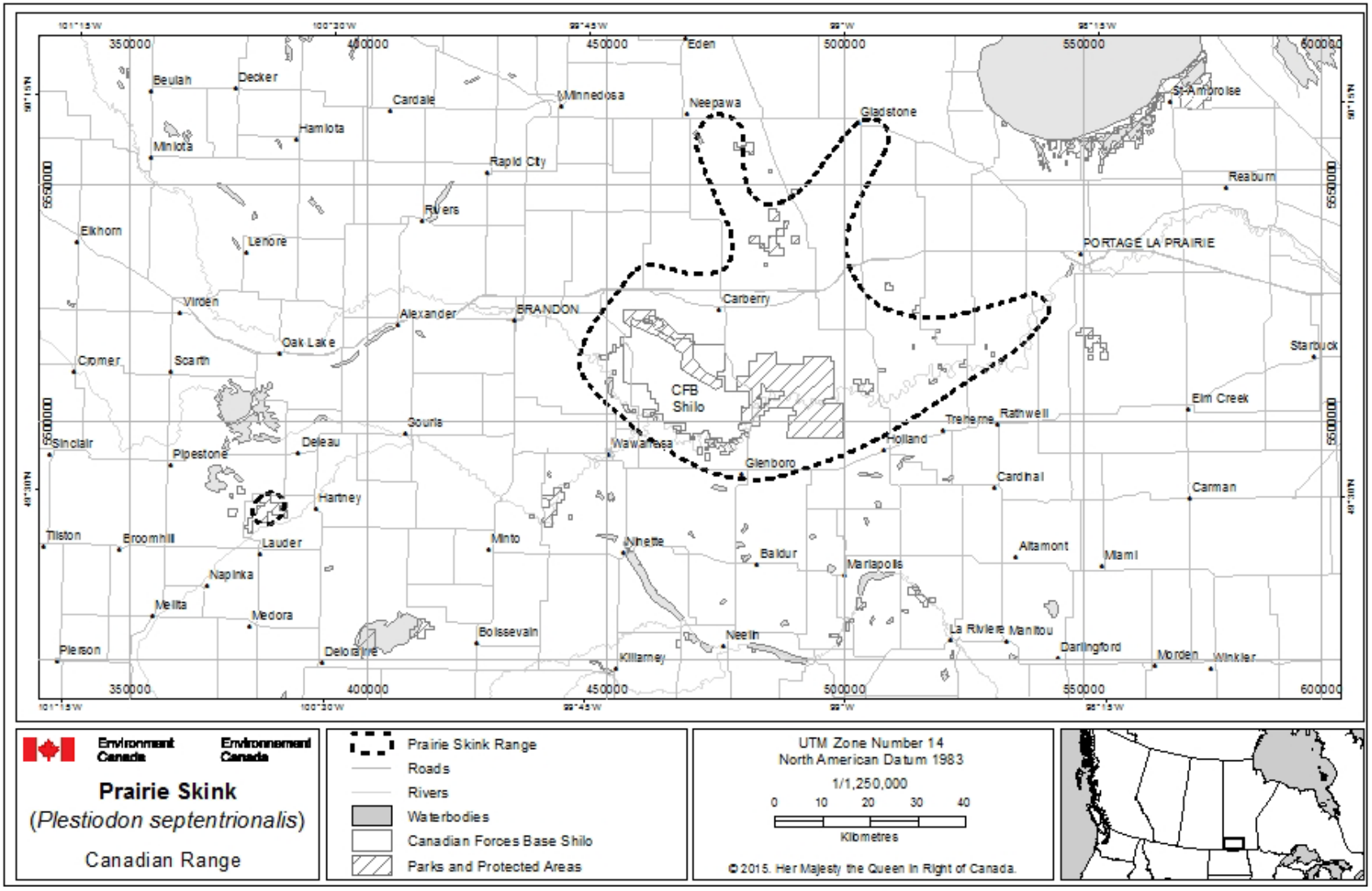

Figure 1. The Canadian range of the Prairie Skink with two disjunct populations in the Brandon Sandhills area and in the Lauder Sandhills area of southwest Manitoba.

3.3 Needs of the Prairie Skink

3.3.1 Biological Needs

Throughout its range the Prairie Skink is associated with open habitats of mixed-grass prairies and oak savannas (Breckenridge 1943). In Manitoba native mixed-grass prairie vegetation is characterized by sedges (*Carex* spp.), Little Bluestem (*Schizachyrium scoparium*), and Blue Grama (*Bouteloua gracilis*), as well as sparsely distributed shrubs such as Creeping Juniper (*Juniperus horizontalis)* (Scott 2005).

Prairie Skinks select suitable thermal microhabitats and use basking to maintain body temperature within the preferred thermal range of 22-35 ºC (Nelson 1963). Prairie Skinks in Manitoba preferred microhabitats with a temperature range of 33.5 ± 0.77 ºC when placed in a laboratory setting but in the wild they selected lower temperatures (25.3 ± 0.22 ºC) (Manitoba Prairie Skink Recovery Team 2014). The lower temperature preference in the wild compared to in the laboratory may be due to a combination of avoiding high lethal ground temperatures and predator avoidance. The use of retreat sites affected by interplay between thermal conditions, social advantages and predator avoidance has been documented for other reptiles (Huey et al. 1989; Seburn 1993; Downes and Shine 1998; Civantos et al. 1999).

The requirement for thermoregulation affects diurnal activity patterns with skinks typically active from late-morning to mid-afternoon and moving beneath cover objects or burying to a depth of 5-8 cm in sandy soils to escape high surface temperatures (Nelson 1963). Sand substrates can become very hot at the surface but because sand is a poor conductor of heat the temperature may be cooler just below the surface (Tsoar 1990; Hays et al. 2011).

Prairie Skinks are generalized predators of invertebrates, preying on grasshoppers, spiders, leaf-hoppers, beetles, and moths and butterflies (Breckenridge 1943; Nelson 1963).

3.3.2 Habitat Needs

General habitat

Within prairie habitat, Prairie Skinks may be generalists in their use of vegetation. A mixture of native and non-native vegetation may be acceptable as long as vegetation structure provides the appropriate heterogeneity in microclimate for thermoregulation and protection from predators (Larkin 2011; Krause Danielsen et al. 2014).

Prairie Skinks move through deciduous or mixed forest and they have been captured on the edges of these habitat types (Larkin 2011; Krause Danielsen et al. 2014; Manitoba Prairie Skink Recovery Team 2014; P. Rutherford, unpub. data). Forest edges likely provide skinks with areas to which they can escape from predators and from lethal high

summer temperatures found in more open habitats, while still allowing nearby access to warm temperatures required for gestation.

Prairie Skinks also require relatively loose, well-drained sandy soil for burrowing and hibernation (Breckenridge 1943; Bredin 1989). Prairie Skinks in the Brandon Sandhills area are found only on Stockton Loamy Sand and Miniota Sands of the post-glacial Assiniboine Delta deposits (Bredin 1989). Within these areas skinks tend to occur on south- and west-facing slopes (Bredin 1989). Scott et al. (2003) found that north- and east-facing slopes tended to be dominated by trees rather than prairie. In the Lauder Sandhills area Prairie Skinks are found on sandy soils of the Souris Till Plain (Bredin 1989).

Home ranges are typically small ranging from 30 to 100 m in diameter and the same home range may be occupied for several years (Nelson 1963). Preliminary analyses of telemetry data (S. Pratt, unpub. data) indicated Prairie Skinks in the Brandon Sandhills area moved within an activity area up to a maximum of 6912 m^2 (mean 1412 m^2) and the shapes of these activity areas varied among individuals.

Summer habitat

Summer habitat for foraging and nesting consists of open areas near forest edges or mixed-grass prairie with heterogeneous structure (i.e. patches of tall and dense grasses or low shrubs separated by more open habitats) to enable skinks to avoid predation and to provide them with a broad range of temperatures for thermoregulation and gestation." (Manitoba Prairie Skink Recovery Team 2014).

Cover objects are important habitat features with a wide variety of natural cover objects used depending on their availability, including woody debris, stones and rocks, and clumps of vegetation [e.g. Little Bluestem, Creeping Juniper, Smooth Brome (*Bromus inermis)*, Leafy Spurge (*Euphorbia esula*)]. Skinks will occasionally use anthropogenic cover objects if present (e.g. carpet, plywood and boards, rail ties and scrap metal), but such artificial cover objects are rarely encountered in areas occupied, or potentially occupied, by skinks (Bredin 1981; Nelson 1963; Scott 2005; Larkin 2011, Krause Danielsen 2012; Manitoba Prairie Skink Recovery Team 2014). Prairie Skinks typically use these cover objects for foraging, predator avoidance, thermoregulation, and nesting. Prairie Skinks appear to be more abundant in areas with an abundance of cover material (Larkin 2011; Krause Danielsen et al. 2014) which has also been observed in other species of burrowing skinks (e.g. Seburn 1993). Fidelity to cover objects has been observed (COSEWIC 2004).

Females excavate nests under logs and other cover objects (Taylor 1935; Breckenridge 1943; Bredin 1989) from the end of June to the beginning of July (Breckenridge 1943; Somma 1987). Females lay a single clutch of an average of 8 eggs (Breckenridge 1943; Bredin 1989) and will attend the nest during incubation to protect the eggs (Bredin 1989). Communal nesting occurs but it is not common (Nelson 1963). Females may not reproduce every year (Bredin 1989; Manitoba Prairie Skink Recovery

Team 2014), but information on reproduction of Prairie Skinks in southwest Manitoba is limited.

Soil moisture is an important factor in nest site selection in a related species, the Five-lined Skink (*Plestiodon fasciatus)* (Hecnar 1994). Eggs that are too wet may decay from fungal infections while those that are too dry may desiccate (Hecnar 1994). Female Five-lined Skinks will move eggs in response to changing moisture levels (Hecnar 1994) and brooding significantly increases the survival of eggs (Fitch 1954; Seburn 1993). This behaviour has also been observed in a laboratory setting for the Prairie Skink (Somma and Fawcett 1989) and in the field (P. Rutherford, unpub. data). The relative value of different cover objects as nesting habitat for Prairie Skinks is unknown.

Overwintering habitat

Hibernation habitat, with sandy soils that skinks can burrow into, may be up to 25 m from the summer habitat (Nelson 1963). In Minnesota, Prairie Skinks have been found up to 75 cm below the soil surface during the winter months (Nelson 1963). There is no information for hibernation habitat in southwest Manitoba (COSEWIC 2004).

Dispersal habitat

Dispersal distances in Prairie Skinks are unknown. Habitat that may facilitate movement and dispersal is unknown. Hatchlings in a related species, the Five-lined Skink, have been observed to move over 100 m (Seburn 1993).

3.3.3 Limiting Factors

Prairie Skinks in southwest Manitoba are at the northern limit of their range and survive winter by hibernating underground. The presence of loose, sandy soil types that enable overwintering survival may limit the distribution of Prairie Skinks in the northern United States and in southwest Manitoba (Fuerst and Austin 2004).

Weather influences the ability of Prairie Skinks to successfully complete nesting and increase body stores adequately for hibernation and reproduction in the following year. A cold and wet spring may delay emergence from hibernation which would delay mating and nesting. Cold and wet summers may limit reproductive activity and hatching success. Particularly cold winters with deep frost penetration may reduce overwintering survival (Manitoba Prairie Skink Recovery Team 2014). Hatchlings have a short period to forage and increase fat stores before hibernation, and as a result those reared in poor habitat conditions may be particularly vulnerable to overwintering mortality although this has not been confirmed (COSEWIC 2004).

4. Threats

4.1 Threat Assessment

The Prairie Skink threat assessment is based on the IUCN-CMP (World Conservation Union–Conservation Measures Partnership) unified threats classification system. Threats are defined as the proximate activities or processes that have caused, are causing, or may cause in the future the destruction, degradation, and/or impairment of the entity being assessed (population, species, community, or ecosystem) in the area of interest (global, national, or subnational). Limiting factors are not considered during this assessment process. Historical threats, indirect or cumulative effects of the threats, or any other relevant information that would help understand the nature of the threats are presented in the section Description of Threats section.

Table 2. Threat Classification Table for the Prairie Skink based on the International Union for Conservation of Nature and Natural Resources (IUCN) threats classification system.

Threat #	Threat description	Impact[a]	Scope[b]	Severity[c]	Timing[d]	Detailed threats
1	Residential & commercial development	Unknown	Unknown	Slight	High	
1.1	Housing & urban areas	Unknown	Unknown	Slight	High	Long-term ability of skinks to survive on acreages is unknown
2	Agriculture & aquaculture	Medium	Small	Unknown	High	
2.1	Annual & perennial non-timber crops	Medium	Small	Unknown	High	Extent of future conversion of skink habitat to cropland is unknown
2.3	Livestock farming & ranching	Unknown	Unknown	Unknown	High	Use of pastures by skinks and impacts of grazing are unknown
4	Transportation & service corridors	Low	Small	Unknown	High	
4.1	Roads & railroads	Low	Small	Unknown	High	Effects of roads upon dispersal and survival of skinks are unknown
4.2	Utility and service lines	Low	Small	Unkown	High	Effects of roads upon habitat quality for skinks are unknown
5	Biological resource use	Negligible	Negligible	Negligible	High	
5.1	Hunting & collecting terrestrial animals	Negligible	Negligible	Negligible	High	Collecting of individual skinks as pets make occur rarely
6	Human intrusions & disturbance	Unknown	Unknown	Unknown	High	
6.1	Recreational activities	Unknown	Unknown	Unknown	High	The extent and impacts of all-terrain vehicle use upon skinks is unknown
6.2	War, civil unrest, & military exercises	Unknown	Restricted	Unknown	High	
7	Natural system modifications	Unknown	Large	Unknown	High	
7.1	Fire & fire suppression	Unknown	Large	Unknown	High	Effects of fire regimes and succession upon skinks are unknown

8	Invasive & other problematic species & genes	Unknown	Small	Unknown	High	
8.1	Invasive non-native/alien species	Unknown	Small	Unknown	High	Effects of invasive plants and predation by pets unknown

[a] **Impact** – The degree to which a species is observed, inferred, or suspected to be directly or indirectly threatened in the area of interest. The impact of each threat is based on Severity and Scope rating and considers only present and future threats. Threat impact reflects a reduction of a species population or decline/degradation of the area of an ecosystem. The median rate of population reduction or area decline for each combination of scope and severity corresponds to the following classes of threat impact: Very High (75% declines), High (40%), Medium (15%), and Low (3%). Unknown: used when impact cannot be determined (e.g., if values for either scope or severity are unknown); Not Calculated: impact not calculated as threat is outside the assessment timeframe (e.g., timing is insignificant/negligible or low as threat is only considered to be in the past); Negligible: when scope or severity is negligible; Not a Threat: when severity is scored as neutral or potential benefit.

[b] **Scope** – Proportion of the species that can reasonably be expected to be affected by the threat within 10 years. Usually measured as a proportion of the species' population in the area of interest. (Pervasive = 71–100%; Large = 31–70%; Restricted = 11–30%; Small = 1–10%; Negligible < 1%).

[c] **Severity** – Within the scope, the level of damage to the species from the threat that can reasonably be expected to be affected by the threat within a 10-year or three-generation timeframe. Usually measured as the degree of reduction of the species' population. (Extreme = 71–100%; Serious = 31–70%; Moderate = 11–30%; Slight = 1–10%; Negligible < 1%; Neutral or Potential Benefit $\underline{>}$ 0%).

[d] **Timing** – High = continuing; Moderate = only in the future (could happen in the short term [< 10 years or 3 generations]) or now suspended (could come back in the short term); Low = only in the future (could happen in the long term) or now suspended (could come back in the long term); Insignificant/Negligible = only in the past and unlikely to return, or no direct effect but limiting.

4.2 Description of Threats

IUCN Threat 1. Residential & commercial development

Threat 1.1 Housing & urban areas

Some prairie habitat adjacent to Spruce Woods Provincial Park and CFB Shilo is being converted to small residential acreages. Residential development results in changes to prairie habitat including replacing native prairie with gardens and Kentucky Bluegrass (*Poa pratensis*) lawns. These anthropogenic habitats have a thermal environment different from that of mixed-grass prairie, being cooler on average and with less variable substrate temperatures (Krause Danielsen et al. 2014). Prairie Skinks survive and can reproduce in these exurban landscapes but the species appears to be more abundant in prairie habitats (Krause Danielsen et al. 2014). There is no information describing the extent of acreage development within the range of the Prairie Skink.

Changes to the floristic composition of prairie habitat may not be important as long as an appropriate vegetation structure is available to provide suitable microhabitat conditions (Krause Danielsen et al. 2014). It may be possible to mitigate negative effects of residential development on Prairie Skinks through stewardship on those small acreages where Prairie Skinks use remnant prairie habitat. Landscaping with many different types of plants rather than with lawns may allow Prairie Skinks to exist by providing heterogeneity in vegetation cover (Krause Danielsen et al. 2014). Adding appropriate cover objects or leaving existing debris may also improve exurban habitat (Krause Danielsen et al. 2014). Residential development can also affect Prairie Skink habitat through vegetation and soil disturbance and the introduction and spread of invasive species. (Threat 8.1)

IUCN Threat 2. Agriculture & aquaculture

Threat 2.1 Annual & perennial non-timber crops

Historical loss of suitable habitat may be the most important factor limiting Prairie Skinks in southwest Manitoba with loss of habitat through cultivation being the highest concern. In the Brandon Sandhills area over 5,000 ha of mixed grass prairie was lost to cultivation between 1995-1998 (Mansell and Moore 1999). Not all of this lost habitat was suitable for Prairie Skinks although a 19% loss of suitable Prairie Skink habitat due to cultivation was documented in the Brandon Sandhills area from 1966 to 2000 (P. Rutherford, unpub. data; Manitoba Prairie Skink Recovery Team 2014.). Cultivation may also fragment suitable habitat if the remaining scattered prairie patches lack dispersal corridors (Pitt 2001). The future rate of conversion of native habitat to crop or forage production is unknown although much of the remaining habitat has low potential for agricultural production.

Threat 2.3 Livestock farming & ranching

Prairie Skinks are associated with structurally heterogeneous prairie habitats and the simplified structure of vegetation associated with excessive grazing may be detrimental to Prairie Skinks. There have been no surveys to determine if Prairie Skinks utilize natural grasslands or improved pastures grazed by livestock. Grazing by livestock could possibly reduce habitat quality and functionality for the Prairie Skink if grazing intensity, frequency, and duration were excessively high. Prolonged heavy grazing can change soil structure and alter vegetation structure and community composition in prairie habitats (Bragg and Steuter 1996; Ludwig et al. 2000) and reduce habitat quality for the Prairie Skink. Intensive grazing tends to homogenize plant structure (Hadar et al. 1999) and favour short-statured species such as Blue Grama (Mack and Thompson 1982).

Consequently, if skinks use grazed land rotational grazing of lower intensity may be beneficial by preventing succession yet maintaining vegetation structure (Bragg and Steuter 1996, McNaughton 1983). Grazing may also maintain some surface litter throughout the year, and may also be used to manage habitat at sites where the use of prescribed fire may not be possible.

Research is required to identify use of grazed lands by skinks, and if used the importance of intensity, frequency and timing of grazing that may disrupt succession to woody vegetation and the effects on the habitat of the Prairie Skink.

IUCN Threat 4. Transportation and service corridors

Threat 4.1 Roads & railroads

Roads or trails, and clearing and maintenance of ditches, may provide both positive effects (creating some open habitat) and negative effects (excessive very open areas) upon the habitat of Prairie Skinks related to thermoregulation requirements of the skink. Paved roads are considered to be a barrier to movements of Prairie Skinks (Krause Danielsen et al. 2015). Recent genetic analyses did not detect population fragmentation arising from roads in the Brandon Sandhills area (Siu 2011), but this may be a result of the relatively recent development of roads compared to the time required for genetic differentiation to occur.

Disturbance of substrates by vehicles increases soil compaction (McKernan 1984) which may be detrimental to burrowing by Prairie Skinks. Invasive plant species (Threat 8.1), which are of uncertain impact to Prairie Skinks, are often associated with roads and trails (Larkin 2011).

Road creation, modification or expansion are frequently associated with residential development and may result in the loss of prairie habitat and increased mortality of Prairie Skinks.

Threat 4.2 Utility and service lines

Installation and maintenance of utility lines and utility line access routes, may also negatively impact habitat suitability depending upon the nature and degree of vegetation and substrate alteration and disturbance.

IUCN Threat 5. Biological resource use

Threat 5.1 Hunting & collecting terrestrial animals

Some skink populations in Canada, such as the Five-lined Skink in Ontario, are subject to heavy collection for the pet trade (Hecnar 1991). This does not seem to be important in southwest Manitoba for the Prairie Skink (Manitoba Prairie Skink Recovery Team 2014). It has been noted that campers in Spruce Woods Provincial Park have collected skinks and disturbed cover boards used for research purposes (Manitoba Prairie Skink Recovery Team 2014). However, since much of the range of the Prairie Skinks occurs within CFB Shilo where access is highly restricted, collection of individuals is a negligible threat .

IUCN Threat 6. Human intrusions and disturbance

Threat 6.1 Recreational activities

High intensity use of all-terrain vehicles in local areas of the Lauder Sandhills creates permanent or semi-permanent trails that may contribute to habitat loss although the extent of this habitat alteration has not been quantified and any potential negative effects have not been confirmed (Manitoba Prairie Skink Recovery Team 2014).

Threat 6.2 War, Civil unrest, & military exercises

Military activities at CFB Shilo have been extensive since 1910. Tank and other vehicle exercises at this site may increase habitat for Prairie Skinks by increasing the amount of small patches of bare ground and litter as well as the cover of Blue Grama and *Carex* spp. (McKernan 1984), improving opportunities for thermal shuttling by lizards to optimize their opportunities for activity . This potential improvement of habitat for skinks may be offset by areas of soil compaction. Creation and maintenance of fire guards are necessary for fire suppression at the base, but here and at other sites within the range of the Prairie Skink, fire guards (Threat 7.1) may enhance habitat heterogeneity.

IUCN Threat 7. Natural system modifications

Threat 7.1 Fire & Fire suppression

Increasing aspen (*Populus* sp.) encroachment on prairie habitat is a management concern within and adjacent to Spruce Woods Provincial Park (Bredin 1993; Schykulski and Moore 2000). Historically, frequent fires and grazing by Plains Bison (*Bison bison*

bison) helped maintain native mixed-grass prairie (Daubenmire 1968; Hurlbert 1969; Anderson 1982) and these natural disturbances maintained the open, heterogeneous conditions required by Prairie Skinks (Bredin 1981, Pitt 2001, Scott 2005). In the absence of frequent fires and bison grazing, mixed-grass prairie is succeeded by aspen forest. While Prairie Skinks have been observed to use both open habitats and deciduous and mixed forest edges, and to move through oak forest, they do not use dense oak forest (Larkin 2011; P. Rutherford, unpub data; Manitoba Prairie Skink Recovery Team 2014).

At CFB Shilo fire has been shown to reduce litter and standing crop biomass and to increase the frequency of bare ground (Wilson and Shay 1990; Shay et al. 2001) but the impact of fire at CGB Shilo upon skinks is unknown. Any effects of fires upon skinks and skink habitat may vary depending on the frequency, intensity, extent and timing of the fires. Bare soil absorbs more solar radiation, creating higher soil surface temperatures in burned than unburned prairies (Shay et al. 2001). This may provide greater opportunities for thermoregulation by Prairie Skinks which use thermal shuttling from more open to more shaded sites. Fire may alter vegetation composition and the species composition of invertebrate prey to the benefit of the species (e.g. Evans 1984). In Minnesota Prairie Skinks were more abundant in old fields that had burned regularly although the causal link between fire frequency and habitat characteristics was unclear (Pitt 2001). However, Krause Danielsen et al. (2014) found that Prairie Skinks were more likely to use habitat with a higher percentage of leaf litter, and repeated burns may reduce this leaf litter (Shay et al. 2001).

While disturbance is required to disrupt succession to woody vegetation and to maintain the heterogeneous habitat conditions required by Prairie Skinks, the species tolerance to fire disturbance is unknown. In some situations the application of fire to manage habitat may not be possible, and fire may negatively affect the extent and nature of the surface conditions. Research is required to identify the importance of intensity, frequency and timing of fires that may disrupt succession to woody vegetation and the effect on the habitat of the Prairie Skink.

Direct mortality of skinks from fire may occur to an unknown extent as many variables are associated with fires (e.g. intensity of fire related to fuel supply). It is likely that many individuals may survive fires, and in some situations immigration may occur from adjacent areas that have not burned.

The effects of creation and maintenance of fire guards upon habitat and survival of the Prairie Skink are unknown but they may enhance habitat heterogeneity.

IUCN Threat 8. Invasive & other problematic species and genes

Threat 8.1 Invasive non-native/alien species

Introduced plant species can cause major reductions in native plant cover in mixed-grass prairie. Non-native invasive species, including Kentucky Blue-grass,

Smooth Brome, Leafy Spurge, and Baby's Breath (*Gypsophila paniculata*), have been recorded within Spruce Woods Provincial Park and CFB Shilo. Leafy Spurge grows up to one meter in height, can spread rapidly, and dense stands are associated with reduced native plant abundance and species richness (Belcher and Wilson 1989; Wilson and Belcher 1989; Butler and Cogan 2004; Larson and Larson 2010). Leafy Spurge is generally associated with anthropogenic disturbances such as vehicle tracks that remove vegetation cover and expose soil (Belcher and Wilson 1989).

The impact of invasive plants upon Prairie Skinks is not clear. Bredin (1993) and COSEWIC (2004) hypothesised that reduced structural heterogeneity associated with dense stands of Leafy Spurge could negatively affect Prairie Skink habitat by altering thermal characteristics of skink habitat. However, Larkin (2011) reported that Prairie Skinks did not avoid Leafy Spurge habitat and the thermal conditions under Leafy Spurge were not significantly different from those in adjacent prairie habitat. Telemetry data indicated extensive use of stands of Smooth Brome by Prairie Skinks at CFB Shilo, but the impact of the prevalence of Smooth Brome is unknown (P. Rutherford, unpub. data).

The Prairie Management Plan (Schykulski and Moore 2000) addresses the invasion of Leafy Spurge in Spruce Woods Provincial Park. Various management techniques, including biological control (e.g. Black Dot and Brown Dot Beetles, *Aphthona nigriscutis* and *A. cyparissiae*, respectively), goat grazing and herbicide application have been used to control Leafy Spurge in designated regions in the Park (Schykulski and Moore 2000). Within Candian Forces Base Shilo biological control of leafy spurge is the main management technique. Research is required to determine if and how invasive plants, in particular Leafy Spurge, may be negatively affecting habitat for the Prairie Skink.

The expansion of small acreage residential developments, adjacent to Spruce Woods Provincial Park and CFB Shilo, may result in mortality of Prairie Skinks due to the higher abundance of roaming domestic pets. Domestic pets, particularly cats, can pose a threat to lizards (Audsley et al. 2006; Krause Danielsen 2014). Predation pressure may also force Prairie Skinks to seek cover more often and disrupt thermoregulatory behaviour resulting in reduced fitness (Krause Danielsen et al. 2014). This disruption of activity has not been examined in Prairie Skinks but it has been suggested for other small lizard species (e.g. Cooper 1998; Downes 2001).

5. Population and Distribution Objectives

Occurrence of the Prairie Skink has been confirmed for only a very small proportion of apparently suitable habitat in southwest Manitoba. Estimates of population size are unlikely to be obtained without extremely high survey effort due to the low detectability of skinks arising from their small size, cryptic behaviour and apparent low density in occupied habitats. Therefore it is not feasible at this time to set quantitative population objectives.

The population and distribution objective for the Prairie Skink is to maintain the current distribution of the two Canadian populations by maintaining all known local populations within the currently occupied 1 km x 1 km UTM grid cells, plus any new local populations discovered in the future.

The species is, and likely has always been, rare and highly localized in Canada where the species is at the northern fringe of its global range. Thus there is no reasonable expectation that the Prairie Skink could ever become abundant and common in Canada. It is therefore recognized that the population and distribution objective and general approaches to meet objectives outlined in this document may never result in de-listing the species.

6. Broad Strategies and General Approaches to Meet Objectives

6.1 Actions Already Completed or Currently Underway

Monitoring and Assessment

- Manitoba Conservation Data Centre staff have identified potential skink habitat at several locations in Manitoba during plant species at risk inventories (Reimer and Hamel 2002; Hamel and Foster 2005; Foster and Hamel 2006; Murray and Friesen 2012).
- CFB Shilo and Nature Conservancy of Canada monitor persistence of local populations of skinks.

Habitat Assessment, Management, Conservation and Protection

- Prescribed burns are conducted within Spruce Woods Provincial Park at sites designated by the Prairie Management Plan (Schykulski and Moore 2000), at CFB Shilo, and at various sites managed by Nature Conservancy of Canada .
- Sandhill habitat securement in the Lauder Sandhills area by the Nature Conservancy of Canada.
- Nature Conservancy of Canada applies a Multi-Species at Risk Management and Recovery planning framework to inform active management of lands that it manages. This framework includes the Prairie Skink as a targeted species.

Research

- Research has been undertaken to improve understanding of microhabitat selection by Prairie Skinks within native mixed-grass prairie and within rural residential developments (Larkin 2011; Krause Danielsen 2012; Krause Danielsen et al. 2014).

Communication, Collaboration and Engagement

- Community outreach occurs through a ‘Save our Skink’ website *http://www.naturenorth.com/Skink/SOS.html*

- Annual Skinkfest celebrations occur at Spruce Woods Provincial Park *http://www.naturenorth.com/Skink/SOS.html#fest*
- Community outreach with landowners has occurred during Prairie Skink research (Krause Danielsen 2012)

6.2 Strategic Direction for Recovery

Table 3. Recovery Planning Table

Threat or Limitation	Priority*	General Description of Research and Management Approaches
Broad Strategy 1: Habitat Assessment, Management, Conservation and Protection		
Threat 1.1 Housing & urban areas Threat 2.1 Annual & perennial non-timber crops Threat 2.3 Livestock farming & ranching Threat 4.1 Roads & railroads Threat 4.2 Utility and service lines Threat 6.1 Recreational activities Threat 6.2 War, civil unrest, & military exercises Threat 7.1 Fire & fire suppression Threat 8.1 Invasive Non-native/alien species	High	• Create a list of unprotected or high-risk local populations for long-term stewardship and habitat securement • Engage landowners and land managers in conservation or stewardship including best management practices and protection of critical habitat • Monitor and assess effectiveness of conservation agreements to protect/conserve skinks and their habitat
All threats	High	• Identify approaches for protection and recovery of the Prairie Skink in provincial park, resource or land use management plans and multi-species at risk recovery plans including action plans and provincial plans
Broad Strategy 2: Monitoring, Assessment and Research		
Knowledge Gaps	High	• Conduct surveys to detect new locations of occurrence • Continue monitoring of known local populations to determine persistence, size and trend • Document and monitor habitat quality trends • Coordinate survey and monitoring efforts with the Manitoba Conservation Data Centre
	Medium	• Conduct research to identify important microhabitat and landscape-scale characteristics, to determine genetic composition of local populations, and to determine hibernation and nesting site requirements
Threat 2.3 Livestock Farming & Ranching	Medium	• Conduct research to evaluate effects of grazing upon skink habitat and skink survival
Threat 7.1 Fire & Fire Suppression	Medium	• Conduct research to evaluate effects of fire regimes upon skink habitat and skink survival
Threat 8.1 Invasive Non-Native/Alien Species	Low	• Conduct research to evaluate effects of invasive plant species upon skink habitat and skink survival

All threats	Medium	• Determine effects of threats and implemented management practices upon survival of species and the quality of its habitat • Apply research results addressing threats and management practices to develop local population or location-specific best management practices to reduce threats, improve habitat and sustain or increase local populations
Broad Strategy 3. Communication, Collaboration and Engagement		
All threats	High	• Develop a communications strategy to raise awareness of the species and its needs. The strategy should also address protection and management of the species and its habitat, targeting landowners, land managers, recreationalists, land use planners, and municipalities • Encourage landowners to report Prairie Skink observations to the Manitoba Conservation Data Centre, and to the Manitoba Herps Atlas website

* “Priority” reflects the degree to which the broad strategy contributes directly to the recovery of the species or is an essential precursor to an approach that contributes to the recovery of the species.

6.3 Narrative to Support the Recovery Planning Table

Habitat Assessment, Management, Conservation and Protection

Stewardship is an important strategy for the conservation and recovery of the Prairie Skink since the main threats are conversion of native habitat to crop and forage production and possibly encroachment by woody vegetation. It will be necessary to secure the support of the community and develop local stewardship plans that address threats on public and private land.

Unprotected or high-risk local populations will be identified for long-term stewardship or protection. Landowners and land managers at all locations, with a focus on high priority local populations, should be encouraged to participate in conservation or stewardship agreements, to implement best management practices and to protect critical habitat. A number of best management practices already exist for mixed-grass prairies and where applicable the use of these practices should be encouraged with new best management practices developed as required. Integrating the management of the Prairie Skink with these pre-existing approaches to conserving native prairie habitat would be more effective than developing stand-alone approaches.

Stewardship approaches and best management practices to maintain or enhance habitat for the Prairie Skink should be included in park, resource, and land management plans within the known and potential range of the species.

Adaptive management should be encouraged by integrating local population and habitat assessments in best management practice programs to monitor the effectiveness of stewardship approaches.

Monitoring, Assessment and Research

An expanded program for detecting occurrence and monitoring persistence of local populations is required. Improved estimates of area of occupancy are required for all local populations of the Prairie Skink. Surveys to estimate Prairie Skink population size should be expanded to include more local populations and be conducted regularly, to allow for monitoring of trends in the relative abundance of the species.

Surveys in new areas of potential habitat, particularly on private lands, are required to clarify the distribution of Prairie Skinks in southwest Manitoba. This information is required to facilitate genetic connectivity between local populations if appropriate, for possible population expansion, and to measure progress towards meeting the population and distribution objective.

Assessment of threats for each local population should be incorporated into the monitoring protocol to ensure protection and stewardship will maintain suitable habitat for any future population expansion and to facilitate dispersal among local populations.

Knowledge gaps requiring investigation include the distribution and abundance of the Prairie Skink on private land, primary habitat characteristics required for survival and reproduction (including temporary den sites, nesting sites and hibernation sites), and the sensitivity of the species to anthropogenic disturbances including grazing, fire regimes, all-terrain vehicles and invasion by invasive plants. Obtaining this information is necessary to ensure that appropriate recovery approaches are implemented, and to facilitate monitoring of the results of stewardship programs. Additional genetic analyses are necessary prior to consideration of any local population augmentation.

Communication, Collaboration and Engagement

Education and communication efforts are needed to ensure that Prairie Skink local populations on public and private lands are detected during land use planning and land management activities. Raising awareness among landowners, land managers and land users will facilitate implementation of appropriate land management practices.

Increasing public awareness of the Prairie Skink and its habitat needs will improve stewardship of Prairie Skink habitat on private land, and improve the understanding of the distribution of the species by encourageing private landowners and volunteer citizen scientists to report Prairie Skink sightings to the Manitoba Conservation Data Centre and the Manitoba Herp Atlas website.

7. Critical Habitat

7.1 Identification of the Species' Critical Habitat

Critical habitat is defined in the *Species at Risk Act (*SARA) section 2(1) as "the habitat that is necessary for the survival or recovery of a listed wildlife species and that is identified as the species' critical habitat in the recovery strategy or in an action plan for the species". Section 41 (1)(c) of SARA requires that recovery strategies include an identification of the species' critical habitat, to the extent possible, as well as examples of activities that are likely to result in its destruction.

Critical habitat for the Prairie Skink is partially identified in this recovery strategy, to the extent possible, based on the best available information (Krause Danielsen et al. in prep.).

The biophysical attributes of critical habitat for the Prairie Skink are open native grassland habitat and adjacent trees and shrubs which provide a range of thermal conditions for activity and shelter in the active season, and loose sandy soils which accommodate shallow burrowing during the active season and deeper burrowing in winter. Natural cover objects (woody debris, stones and rocks, clumps of dense vegetation) are included as they are used for foraging, predator avoidance, thermoregulation, and nesting by skinks. Grassy tracks, utility corridors the right-of-ways

of paved roads, gravel roads and railways are included if they have suitable soil and vegetation characteristics similar to adjacent habitat

Critical habitat was identified as the habitat matching the biophysical attributes within a 100 m radius of known Prairie Skink occurrence locations. The presence of biophysical attributes was confirmed through inspection of high-resolution aerial imagery and knowledge of sites by researchers. A radius of 100 m was chosen to accommodate the daily and seasonal movements of the Prairie Skink as the maximum extent of the species' home range has been recorded to be up to 100 m (Nelson 1963), and hatchlings of a related species have been observed moving over 100 m (Seburn 1993). In some cases there were multiple occurrences in proximity to one another resulting in overlapping polygons that are consolidated as a single critical habitat polygon.

Although most occurrences of Prairie Skinks are located within open grassland habitat, the species also uses forest edges. Areas of tree cover were therefore included in the critical habitat polygons regardless of tree density.

From 1965 to 2014 there were 604 occurrences (unique locations) of the Prairie Skink available for review. Sufficient location information was available for 569 occurrences, reported from 2001 to 2014, to be used in the identification of critical habitat. There was insufficient location information available for the remaining 35 occurrences (34 occurrences in the Brandon Sandhills area and 1 occurrence in the Lauder Sandhills area). There were 116 polygons of critical habitat identified in the Brandon Sandhills area (total 5.13 km^2) associated with 562 occurrences, and 1 critical habitat polygon in the Lauder Sandhills area (total 0.08 km^2) associated with 7 occurrences of the Prairie Skink.

The areas containing critical habitat for the Prairie Skink are presented in Figure 2 for the Brandon Sandhills area and in Figure 3 for the Lauder Sandhills area. Critical habitat for the Prairie Skink in Canada occurs within the 1 km x 1 km standardized UTM grid squares where the biophysical attributes of critical habitat and methodology described in this section are met. Unsuitable habitats, including permanent water bodies, wetlands, open areas of sand, surfaces of paved and gravel roads and railway beds, those right-of-ways of roads and railways which do not possess suitable soil and vegetation characteristics similar to adjacent habitat, anthropogenic features such as buildings, driveways, gardens, commercial, industrial and agricultural activity areas, and anthropogenic cover objects, do not possess the attributes necessary for survival of the Prairie Skink and are not identified as critical habitat. The UTM grid squares shown on these figures are part of a standardized national grid system that highlights the general geographic area containing critical habitat for land use planning and/or environmental assessment purposes.

Detailed critical habitat mapping is not presented in this document owing to the extremely small size of the many critical habitat polygons distributed throughout a relatively large geographic area. The 151 quarter-sections within which critical habitat occurs in southwest Manitoba are listed in Appendix B. More detailed information on the

location of critical habitat to support protection of the species and its habitat may be requested, on a need-to-know basis, by contacting Environment and Climate Change Canada's Recovery Planning section at: ec.planificationduretablissement-recoveryplanning.ec@canada.ca.

For the reasons stated above, critical habitat can only be partially identified at this time. A schedule of studies (Table 4) has been developed to provide the information necessary to complete the identification of critical habitat that will be sufficient to meet the population and distribution objectives. The identification of critical habitat will be updated when the information becomes available, either in a revised recovery strategy or action plan.

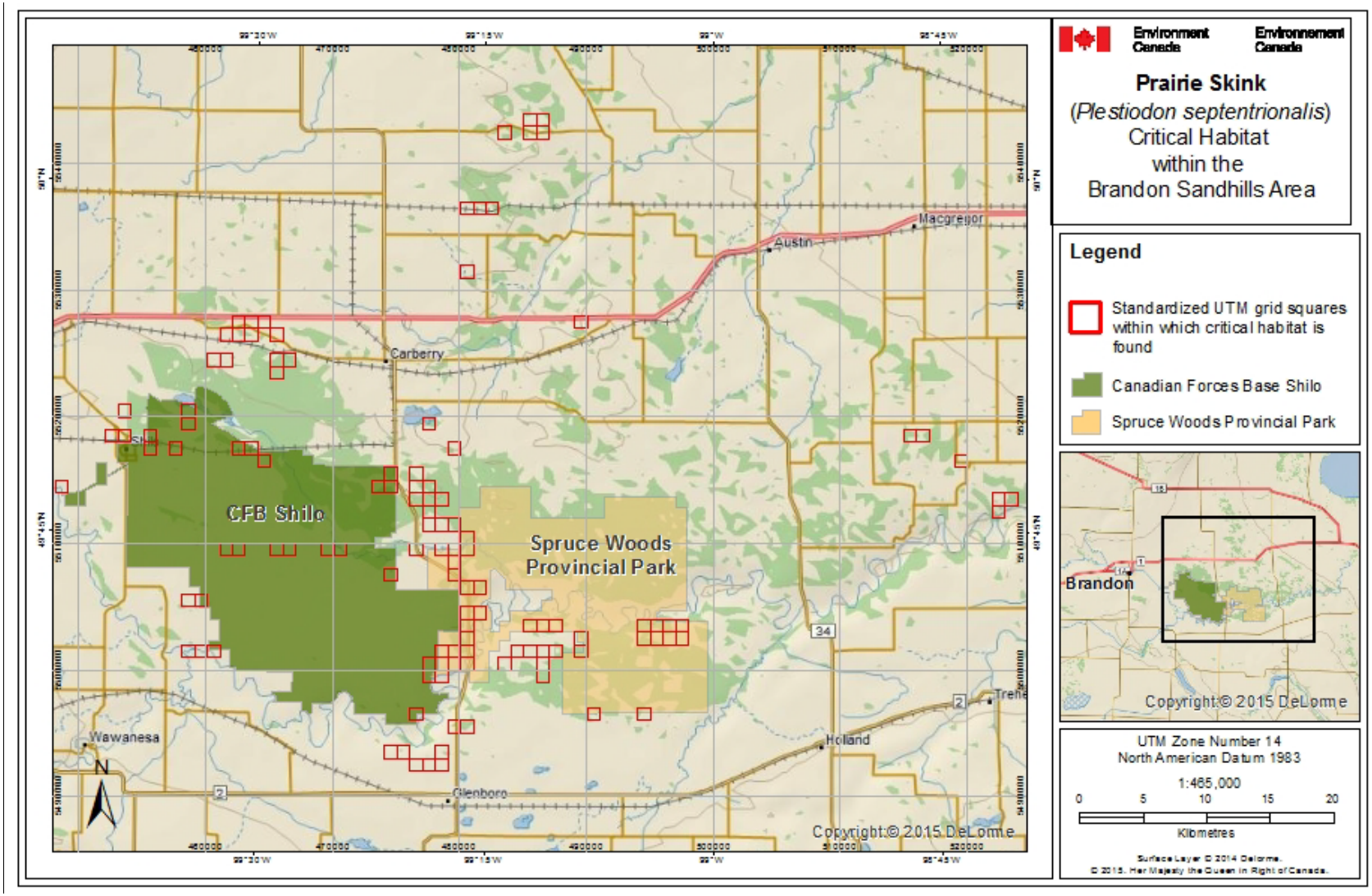

Figure 2. *Critical habitat for the Prairie Skink in the Brandon Sandhills area of southwest Manitoba occurs within the 1 km x 1 km UTM grid squares (red outline) where the criteria set out in Section 7.1 are met. This standardized national grid system indicates the general geographic area containing critical habitat and detailed critical habitat polygons are not shown. Based on the identification criteria, the grid squares indicated contain approximately 5.13 km^2 of critical habitat.*

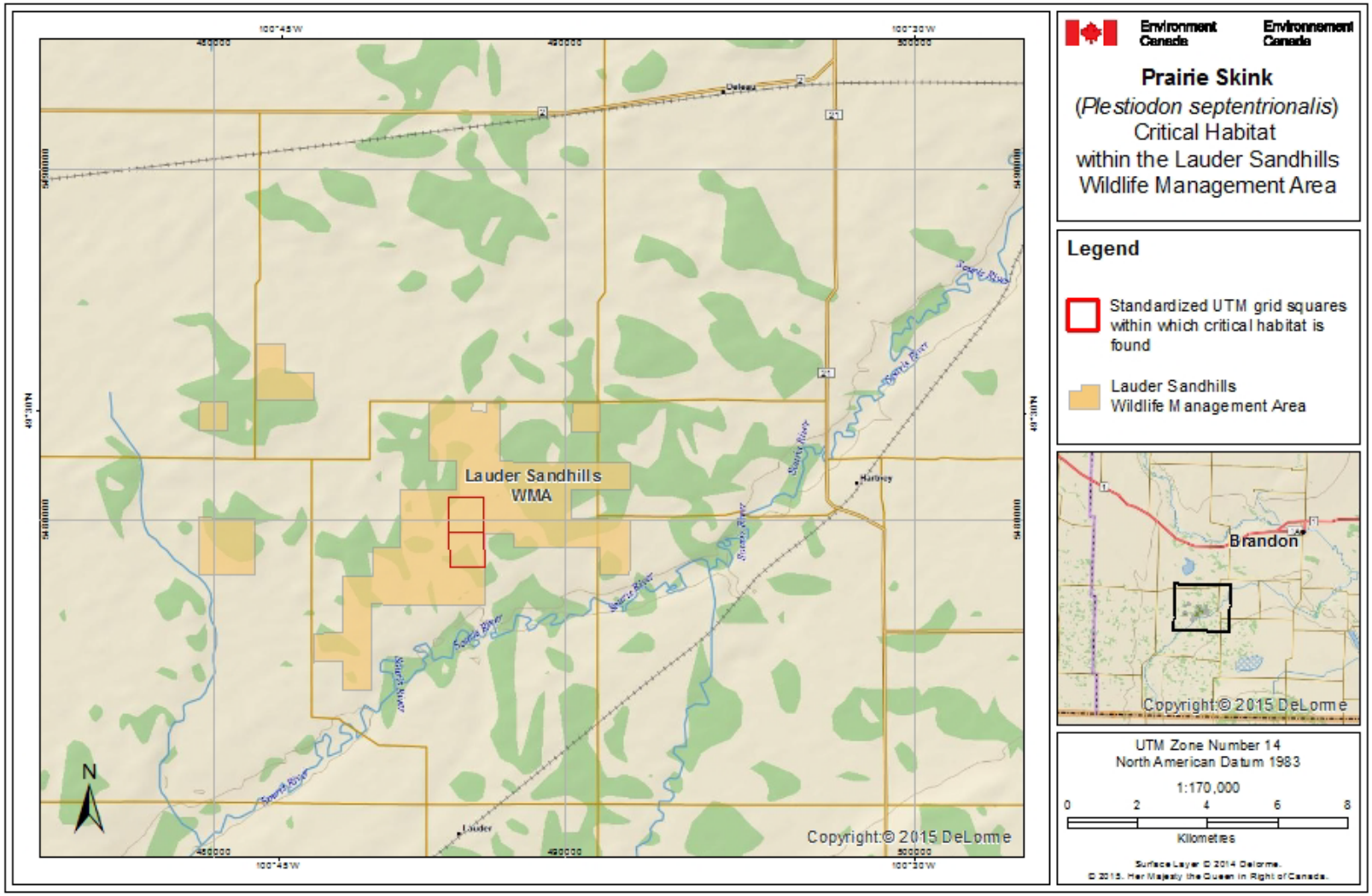

Figure 3. *Critical habitat for the Prairie Skink in the Lauder Sandhills area of southwest Manitoba occurs within the 1 km x 1 km UTM grid squares (red outline) where the criteria set out in Section 7.1 are met.This standardized national grid system indicates the general geographic area containing critical habitat and detailed critical habitat polygons are not shown.Based on the identification criteria, the grid squares indicated contain approximately 0.08 km^2 of critical habitat.*

7.2 Schedule of Studies to Identify Critical Habitat

Table 4. Schedule of Studies to Identify Critical Habitat

Description of Activity	Rationale	Timeline
Conduct surveys to confirm the existence and location of skink local populations and biophysical attributes of the habitat at or near the 35 reported occurrences without sufficient location information.	By using details provided by the original observers (e.g. habitat characteristics, directions) and using the biophysical attributes of suitable skink habitat in combination with high resolution imagery, surveying of areas near the reported occurrences may detect and confirm the location of these reported occurrences.	2016 - 2020

7.3 Activities Likely to Result in the Destruction of Critical Habitat

Destruction of critical habitat is determined on a case by case basis. Destruction would result if part of the critical habitat were degraded, either permanently or temporarily, such that it would not serve its function when needed by the species. Destruction may result from a single or multiple activities at one point in time or from the cumulative effects of one or more activities over time. Activities described in Table 4 outline examples of activities likely to cause destruction of critical habitat for the Prairie Skink; however, destructive activities are not limited to those listed.

Some activities that result in a temporary alteration of critical habitat (e.g. grazing, prescribed burns) may have the potential to contribute to the future quality of critical habitat, given proper management. Some disturbance to Prairie Skink habitat may be beneficial to the species by maintaining heterogeneous habitat and managing invasive species or woody vegetation succession at a given site, but research is required to determine best management practices for grazing, fire regimes and other habitat manipulations.

Table 5. Activities Likely to Result in the Destruction of Critical Habitat

Description of Activity	Description of effect (on biophysical attributes or other) in relation to loss of function of critical habitat	Additional Information
Removal or alteration of prairie habitat by activities such as cultivation, road construction, high frequency all-terrain vehicle use, large-scale vegetation removal, landscape leveling and high-intensity prolonged grazing.	Removal or alteration of prairie habitat will eliminate the mixed-grass prairie habitat used for foraging, breeding and hibernation by Prairie Skinks. These activities can result in the direct loss of habitat needed by the Prairie Skink to maintain an appropriate thermal environment and to avoid predators.	This activity must occur within the bounds of critical habitat to cause its destruction, can be a direct or cumulative effect and is applicable at all times of the year.
Compression, covering, inversion, or excavation or extraction of soil. Examples of compression include the creation or expansion of permanent or temporary structures, trails, roads, repeated motorized traffic, and activities that concentrate livestock and alter current patterns of grazing pressure such as new bale locations, building of new corrals, adding more salting stations or adding more water troughs. Examples of covering the soil include the creation or expansion of permanent or temporary structures, spreading of solid waste materials, or roadbed construction. Examples of soil conversion include new or expanded cultivation, road construction, or stripping of soil.	Alterations to the soil surface may negatively affect the ability of skinks to avoid predators, maintain appropriate body temperature or overwinter successfully.	This activity must occur within the bounds of critical habitat to cause its destruction, can be a direct or cumulative effect and is applicable at all times of the year.
Fire management practices that result in inappropriate intensity, frequency and extent of fires.	Inappropriate fire management activities that reduce litter and cover objects can result in short-term destruction of critical habitat because these features are needed by the Prairie Skink for foraging, predator avoidance, thermoregulation, and nesting.	This activity must occur within the bounds of critical habitat to cause its destruction, and can be a direct or cumulative effect.
Removal of natural cover objects	Prairie Skinks may show fidelity to cover objects within and among summer seasons. Removal of objects would remove habitat that is used for thermoregulation, predator avoidance, foraging, nesting and shelter.	This activity must occur within the bounds of critical habitat to cause its destruction, can be a direct or cumulative effect and is applicable at all times of the year.

8. Measuring Progress

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

- Continued maintenance of the current distribution of the two populations in the Brandon Sandhills area and the Lauder Sandhills area by maintaining all local populations within the currently occupied 1 km x 1 km UTM grid cells , plus any new local populations discovered in the future.

9. Statement on Action Plans

One or more action plans will be completed for the Prairie Skink by December 2021.

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Appendix A: Effects on the Environment and Other Species

A strategic environmental assessment (SEA) is conducted on all SARA recovery planning documents, in accordance with the *Cabinet Directive on the Environmental Assessment of Policy, Plan and Program Proposals*[3]. 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 and to evaluate whether the outcomes of a recovery planning document could affect any component of the environment or any of the Federal Sustainable Development Strategy's[4] (FSDS) goals and targets.

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

The Prairie Skink shares mixed-grass prairie and sandhill habitat with a number of species at risk including: Hairy Prairie Clover (*Dalea villosa*, SC), Western Spiderwort (*Tradescantia occidentalis*, TH), Smooth Goosefoot (*Chenopodium subglabrum*, TH), Ottoe Skipper (*Hesperia ottoe*, EN), Gold-edged Gem (*Schinia avemensis*, EN), White Flower Moth (*Schinia bimatris*, EN), Pale Yellow Dune Moth (*Copablepharon grandis*, SC), Dusky Dune Moth (*C. longipenne*, EN), Sprague's Pipit (*Anthus spragueii*, TH) and Baird's Sparrow (*Ammodramus bairdii*, COSEWIC recommends SC).

The potential for this recovery strategy to have adverse effects on other species was considered. At this time, recovery actions for the Prairie Skink focus on protection, restoration and stewardship of prairie and sandhill habitat, as well as research into the sensitivity of Prairie Skinks to controlled burns and grazing intensity within these habitats. In general, stewardship actions for the Prairie Skink will also benefit other species associated with mixed-grass prairie and sandhill habitat. In order to avoid potential negative effects on other species at risk, the ecological risks to other species of habitat management actions for the Prairie Skink will be assessed before they are undertaken. Overall, this recovery strategy will benefit the environment and will not entail significant adverse effects.

[3] http://www.ceaa.gc.ca/default.asp?lang=En&n=B3186435-1
[4] http://www.ec.gc.ca/dd-sd/default.asp?lang=En&n=CD30F295-1

Appendix B: Legal Land Description of Quarter Sections that Contain Critical Habitat for Prairie Skink in Southwest Manitoba.

Note: within these quarter sections, critical habitat exists only where the criteria set out in Section 7 are met.

Quarter	Section	Township	Range	Meridian
NE	8	6	24	W1
NE	12	9	16	W1
NW	12	9	16	W1
NW	8	9	15	W1
SE	17	9	15	W1
SW	17	9	15	W1
NE	8	9	15	W1
NE	11	9	16	W1
SE	5	9	15	W1
SW	34	8	16	W1
NE	15	8	16	W1
SW	16	9	15	W1
NW	34	8	16	W1
SE	22	8	16	W1
SW	22	8	16	W1
SW	23	8	16	W1
NW	14	8	16	W1
SW	4	9	15	W1
SW	6	10	15	W1
NE	28	9	17	W1
NW	21	7	14	W1
NW	33	7	14	W1
SW	21	7	14	W1
NE	21	7	14	W1
SW	35	7	14	W1
SE	21	7	14	W1
NW	20	7	14	W1
SW	27	7	14	W1
SE	15	9	14	W1
SW	14	9	14	W1
SE	17	9	14	W1
SW	32	9	14	W1
SE	15	9	15	W1
SE	26	8	14	W1

Quarter	Section	Township	Range	Meridian
SW	26	8	14	W1
NE	26	8	14	W1
NE	10	9	14	W1
NW	26	8	14	W1
SW	14	9	15	W1
SE	29	8	13	W1
SE	35	8	14	W1
SW	35	8	14	W1
NE	35	8	14	W1
SE	32	9	14	W1
NE	31	9	14	W1
SW	33	9	14	W1
SE	31	9	14	W1
SE	10	9	14	W1
SE	29	9	14	W1
SE	22	8	13	W1
NW	5	9	14	W1
NW	27	8	13	W1
SW	23	9	14	W1
SW	31	9	14	W1
NE	29	9	14	W1
NE	3	9	14	W1
NW	10	9	14	W1
NE	27	8	13	W1
SE	2	9	14	W1
SE	16	8	14	W1
SW	23	8	14	W1
NE	23	8	14	W1
SW	20	8	13	W1
SW	22	8	14	W1
SW	27	9	14	W1
NW	28	9	14	W1
SW	28	8	13	W1
NW	14	8	14	W1
NE	9	8	14	W1
SE	28	8	13	W1
SE	21	8	13	W1
SW	15	8	14	W1
NE	15	8	14	W1
NE	14	8	14	W1
NE	10	9	15	W1
NE	28	9	14	W1

Quarter	Section	Township	Range	Meridian
SW	28	9	14	W1
SE	28	9	14	W1
SW	22	9	14	W1
NE	16	8	13	W1
SW	16	8	13	W1
SE	17	8	13	W1
NW	16	8	13	W1
SE	22	9	14	W1
NE	6	9	14	W1
SW	21	8	13	W1
SW	18	8	13	W1
NW	10	8	14	W1
NW	18	8	13	W1
NE	21	9	14	W1
SW	21	9	14	W1
NW	36	8	14	W1
SW	1	9	14	W1
NE	3	10	14	W1
NW	3	10	14	W1
NW	32	7	12	W1
SE	29	8	12	W1
SW	29	8	12	W1
NW	20	8	12	W1
NE	21	8	12	W1
NE	20	8	12	W1
NW	21	8	12	W1
SW	5	8	12	W1
SW	2	8	13	W1
SW	2	10	10	W1
SE	3	10	10	W1
NW	19	9	9	W1
SW	30	9	9	W1
SW	9	10	10	W1
NW	35	9	10	W1
SE	8	10	10	W1
NE	24	9	10	W1
NW	9	10	10	W1
SE	30	12	13	W1
SE	23	11	14	W1
SW	28	12	13	W1
NE	23	11	14	W1
SE	2	12	14	W1

Quarter	Section	Township	Range	Meridian
NW	28	12	13	W1
SE	29	12	13	W1
NW	2	11	13	W1
SW	1	12	14	W1
NE	2	11	13	W1
SE	1	12	14	W1
NW	26	10	16	W1
NE	26	10	16	W1
NW	6	11	15	W1
NW	32	10	15	W1
NE	1	10	16	W1
SE	1	11	16	W1
SW	29	10	15	W1
NE	29	10	15	W1
NW	29	10	15	W1
NE	6	11	15	W1
SE	6	11	15	W1
NW	5	11	15	W1
SE	5	11	15	W1
SE	30	10	15	W1
SE	35	10	16	W1
SW	35	10	16	W1
SW	16	10	14	W1
NW	9	10	14	W1
SW	18	10	16	W1
SW	8	10	16	W1
SE	7	10	16	W1
SE	16	10	16	W1
NE	6	10	16	W1
NW	5	10	16	W1
NW	4	10	16	W1
SE	13	10	17	W1