PROPOSED

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Management Plan Series

Management Plan for the Five-lined Skink (*Plestiodon fasciatus*), Great Lakes/St. Lawrence population, in Canada

Five-lined Skink

2013

Canada

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PREFACE

The federal, provincial, and territorial government signatories under the Accord for the Protection of Species at Risk (1996) agreed to establish complementary legislation and programs that provide for effective protection of species at risk throughout Canada. Under the *Species at Risk Act* (S.C. 2002, c.29) (SARA), the federal competent ministers are responsible for the preparation of management plans for listed Special Concern species and are required to report on progress within five years.

The Minister of the Environment and the Minister responsible for the Parks Canada Agency are the competent ministers under SARA for the Five-lined Skink – Great Lakes/St. Lawrence population and have prepared this plan, as per section 65 of SARA. It has been prepared in cooperation with the province of Ontario.

Success in the management 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 plan and will not be achieved by Environment Canada, the Parks Canada Agency, or any other jurisdiction alone. All Canadians are invited to join in supporting and implementing this plan for the benefit of the Five-lined Skink – Great Lakes/St. Lawrence population and Canadian society as a whole.

Implementation of this management plan is subject to appropriations, priorities, and budgetary constraints of the participating jurisdictions and organizations.

ACKNOWLEDGMENTS

Development of this management plan was facilitated by Angela McConnell, Christina Rohe and Kari Van Allen (Canadian Wildlife Service – Ontario). Early drafts of the plan were prepared by David Seburn, Seburn Ecological Services. Steve Hecnar, Briar Howes, and Carolyn Seburn provided their expertise during management plan development. Contributions from Angela Darwin, Susan Humphrey, Lesley Dunn, Barbara Slezak and Madeline Austen (Canadian Wildlife Service – Ontario), Manon Dubé and Paul Johanson (Canadian Wildlife Service – National Capital Region), Amelia Argue, Joe Crowley, Corina Brdar, Jennifer Hoare, Brianne Fennema, Megan Rasmussen, Suzanne Robinson and Valerie Vaillancourt (Ontario Ministry of Natural Resources) and Kim Borg, Briar Howes, Josh van Wieren and Andrew Promaine (Parks Canada Agency) are also gratefully acknowledged.

EXECUTIVE SUMMARY

The Five-lined Skink (*Plestiodon fasciatus*) is the only lizard native to the province of Ontario. Juveniles and some adults can be readily identified by five cream-coloured stripes that extend down the length of their green-black bodies. This species becomes more uniformly bronze with age, though hatchlings and juveniles have bright blue tails.

The Five-lined Skink is found across much of eastern North America, from Florida and Texas in the south, to Ontario and Minnesota in the north. Within Canada, it is limited to the province of Ontario, where it is found in two disjunct regions and therefore divided into two separate populations: the Five-lined Skink (*Plestiodon fasciatus* – Carolinian population of southwestern Ontario and the Five-lined Skink (*Plestiodon fasciatus*) – Great Lakes/St. Lawrence population. The Carolinian population of the Five-lined Skink is listed as Endangered on Schedule 1 of the *Species at Risk Act* (SARA) and is addressed under a separate recovery strategy. The Great Lakes/St. Lawrence population is listed as a species of Special Concern on Schedule 1 of the *Species at Risk Act* and is the focus of this management plan.

An element occurrence is an area of land or water in which a species or natural community is, or was, present. There are 178 element occurrences for the Great Lakes/St. Lawrence population of the Five-lined Skink, of which 43 are considered viable and one is considered extirpated. Adequate data are lacking to determine the viability of the remaining 134 element occurrences.

The Great Lakes/St. Lawrence population of the Five-lined Skink is mainly restricted to the southern edge of the Canadian Shield, where it is found on rocky outcrops in areas of mixed coniferous or deciduous forest. It appears to be a habitat specialist, showing a preference for areas of exposed bedrock with loose rocks on the surface. Nesting typically occurs under rocks on a thin layer of soil, moss, or lichen.

Known threats to the Five-lined Skink – Great Lakes/St. Lawrence population include, but are not limited to, alteration or suppression of the fire regime, recreational activities and development for housing or recreational structures. Other potential threats to the species exist, but little is known about the extent or severity of these threats on the Great Lakes/St. Lawrence population. Some examples of these threats include altered predator-prey dynamics, road mortality and collection for the pet trade.

The objective of this management plan is to maintain the distribution and number of viable element occurrences of Five-lined Skink – Great Lakes/St. Lawrence population. The focus has been placed on the number of viable element occurrences because these local populations are known to contain adequate numbers of Five-lined Skink to ensure persistence for at least 20 years and, as such, represent a greater conservation value for the species. An additional 134 element occurrences (currently considered to be either extant or historical) are not included in the management objective at this time; due to the difficulty in determining Five-lined Skink abundance, it is unknown whether these element occurrences represent individuals or local populations.

The broad strategies and conservation measures for this species provide further direction on determining the viability of element occurrences. As element occurrences are identified as viable (including those that are currently considered extant, but whose viability has not been assessed, and those that are considered to be historical) they will be captured in the management objective for the species.

Broad strategies and conservation measures to achieve the objective of this management plan include determining the relative importance of confirmed threats and identifying the significance of other potential threats on the species, and educating target groups about the Five-lined Skink – Great Lakes/St. Lawrence population and existing legislation that protects the species.

The conservation measures proposed in this management plan are not expected to have any significant negative effects on other species.

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1. COSEWIC* SPECIES ASSESSMENT INFORMATION

Date of Assessment: April 2007

Common Name (population): Five-lined Skink – Great Lakes/St. Lawrence Population

Scientific Name: *Plestiodon fasciatus*

COSEWIC Status: Special Concern

Reason for Designation: The species is the only lizard in Eastern Canada. This small and secretive species is known from about 84 local populations, but has a small geographic distribution. Threats to the skink include loss and degradation of habitat, alteration of microhabitat, illegal collection, increased depredation by cats and dogs and increased mortality on roads. Increasing development in the species' range will make populations more isolated and more susceptible to stochastic events on small sites.

Canadian Occurrence: ON

COSEWIC Status History: The species was considered a single unit and designated Special Concern in April 1998. Split into two populations in April 2007. The Great Lakes / St. Lawrence population was designated Special Concern in April 2007.

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

2. SPECIES STATUS INFORMATION

The global conservation rank for the Five-lined Skink (*Plestiodon fasciatus*) is secure[1]/ vulnerable[2] (G5T3). In the United States, the national conservation status is secure (N5), though the subnational conservation status varies from critically imperiled[3] to secure in the 35 states in which it is found (NatureServe 2011, Appendix 1).

In Canada, the Five-lined Skink is known only from the province of Ontario. In April 2007, based on genetic evidence, range disjunction, and biogeographic distinction, the single Ontario population was reclassified from a single unit to two disjunct populations (COSEWIC 2007); the first is referred to as the Five-lined Skink – Carolinian population and the second Five-lined Skink – Great Lakes / St. Lawrence population.

[1] Globally common, widespread and abundant.
[2] Vulnerable in the jurisdiction due to a restricted range, relatively few populations, recent and widespread declines, or other factors making it vulnerable to extirpation.
[3] Critically imperiled in the jurisdiction because of extreme rarity or because of some factor(s) such as very steep declines making it especially vulnerable to extirpation from the jurisdiction.

This management plan is specific to the Five-lined Skink – Great Lakes/St. Lawrence population, which is listed as Special Concern[4] on Schedule 1 of the federal *Species at Risk Act* (SARA). In Ontario, the Five-lined Skink – Great Lakes/St. Lawrence population is listed as Special Concern[5] under the provincial *Endangered Species Act, 2007* (ESA). The national conservation status of the Five-lined Skink – Great Lakes/St. Lawrence population is vulnerable (N3) and the subnational conservation rank in Ontario is vulnerable (S3) (NatureServe 2011).

The percentage of the global range found in Canada is estimated to be less than 5%[6].
The Five-lined Skink – Great Lakes/St. Lawrence population is located at the northern limit of its North American Range.

3. SPECIES INFORMATION

3.1. Species Description

The Five-lined Skink is the only lizard native to the province of Ontario. It is small-bodied and can grow to approximately 86 mm in body (snout-vent) length (COSEWIC 2007). Juveniles and some adults can be readily identified by five cream-coloured stripes that extend down the length of their green-black bodies. Five-lined Skinks become more uniformly bronze with age, although females tend to retain more of the juvenile pattern (COSEWIC 2007). Adult males have wider heads than females and develop orange colouration around the jaws and chin during the spring breeding season. The species' characteristic bright blue tail is most obvious in hatchlings and juveniles, the colour fading as the lizards age. The Five-lined Skink can lose all or part of its tail when attacked by a predator. The tail will regenerate, but it is somewhat shorter than the original and lighter in colouration, consistent with the skink's body colour.

3.2. Population and Distribution

The Five-lined Skink is found from Florida and Texas in the south to Minnesota and Ontario in the north (Figure 1). The range spans over 2.5 million square kilometres.

[4] A wildlife species that may become a Threatened or an Endangered species because of a combination of biological characteristics and identified threats.
[5] A species is classified as Special Concern if it lives in the wild in Ontario, is not Endangered or Threatened, but may become Threatened or Endangered due to a combination of biological characteristics and identified threats.
[6] Based on the approximate global range of the species and the estimated extent of occurrence in Canada provided in the COSEWIC status report.

Figure 1. Global distribution of the Five-lined Skink[7] (range distribution based on Royal Ontario Museum (2011).

As previously described, in Canada, the Five-lined Skink is limited to the province of Ontario, where it is found in two widely separated areas (COSEWIC 2007). The Five-lined Skink – Carolinian population is restricted to a small area of southwestern Ontario, close to the shorelines of Lakes Erie, St. Clair, and Huron. The estimated extent of occurrence is 3,946 km^2 (COSEWIC 2007). The Five-lined Skink – Great Lakes / St. Lawrence population is located along the southern edge of the Canadian Shield, from Georgian Bay in the west, to Leeds and Grenville County in the east. The estimated extent of occurrence in Canada is 29,842 km^2 (COSEWIC 2007).

[7] Map in Figure 1 above illustrates the North American distribution of all Five-lined Skink populations, including the Great Lakes/St. Lawrence population and the Carolinian population, the latter being located in the extreme southwestern portion of Ontario. The species has also been reported in South Dakota, Nebraska, Minnesota and Indiana (Conant and Collins 1998; COSEWIC 2007), but the exact distribution in those states is unknown.

The Natural Heritage Information Centre of the Ontario Ministry of Natural Resources identifies a total of 178 element occurrences[8] for the Great Lakes/St. Lawrence population. Of these 178 element occurrences, one (<1%) is considered extirpated[9] and 43 (24%) are considered viable[10] (NHIC 2010). The remaining 134 (75%) element occurrences lack sufficient data to determine whether or not they are viable (NHIC 2010).

Estimating population abundance of Five-lined Skinks is difficult both because they spend much of their time concealed under or inside cover objects making them difficult to survey and because activity patterns change throughout the year (COSEWIC 2007). Abundance data for the Great Lakes/St. Lawrence population is lacking at most Ontario locations, however, up to 100 individuals have been documented to occur at certain locations (Wick 2004). Effective population sizes[11] have been calculated for seven element occurrences in the Great Lakes/St.-Lawrence population and have ranged from 177-342 (COSEWIC 2007). Estimates of effective population size cannot be compared to estimates of census population size, but are certainly less than census size (Frankham 1995). While the ratio of effective population size varies among species, it is typically 11% of census estimates (Frankham 1995).

There is virtually no information on population trends in the Great Lakes/St. Lawrence population. The large number of element occurrences ranked as historical[12] by the Ontario Natural Heritage Information Centre may indicate a reduction in the number of element occurrences or merely a lack of recent observations. Five-lined Skink populations can vary naturally as a result of variable reproductive success from one year to the next (Fitch 1954) and human disturbance can lead to population declines (Hecnar and M'Closkey 1998).

[8] An element occurrence (EO) is an area of land and/or water in which a species or natural community (i.e., the Element) is, or was, present. In the case of species Elements, an EO often corresponds with the habitat occupied by a local population. However, when it is appropriate, the element occurrence may be the habitat occupied by a portion of a population (e.g., long distance dispersers) or a group of nearby populations (e.g., metapopulation). Because they are defined on the basis of biological information, EOs may cross jurisdictional boundaries.

[9] An element occurrence for which there is documented destruction of its habitat or environment, or persuasive evidence of its eradication based on adequate survey (i.e., thorough or repeated survey efforts by one or more experienced observers at times and under conditions appropriate for the Element at that location).

[10] Viable element occurrences are those that are thought to have adequate numbers of Five-lined Skink to ensure that the local population will persist for a period of at least 20 years (NatureServe 2002).

[11] Effective population size is the number of individuals in a population who contribute offspring to the next generation. It is typically significantly lower than population census size.

[12] An element occurrence for which there is a lack of recent (i.e., within the last 20 years in the case of the Five-lined Skink – Great Lakes/St. Lawrence population) field information verifying the continued existence of the EO. A historical rank may be assigned if there have been no known surveys for the species within the last 20 years as well as if surveys were not conducted by an experienced observer at a time and under conditions appropriate for the species at a location where it was previously reported.

3.3. Needs of the Five-lined Skink – Great Lakes/St. Lawrence Population

3.3.1. Habitat and biological needs

Across its range, the Five-lined Skink is associated with a range of habitats including rocky outcrops, stabilized sand dunes, riparian forests, open deciduous forests and forest clearings (COSEWIC 2007). The Great Lakes/St. Lawrence population of the Five-lined Skink is mainly restricted to the southern edge of the Canadian Shield, where it is generally found on rocky outcrops in areas of mixed coniferous or deciduous forest (Howes and Lougheed 2004). Such environments contain appropriate microhabitats to meet the needs of the species (e.g. thermal regulation, food and mate acquisition, protection from predators).

Exposed bedrock with cover rocks on the surface is the best known predictor of the presence of Five-lined Skinks from the Great Lakes/St. Lawrence population (Howes and Lougheed 2004). This is because cover rocks lying on a bedrock substrate afford the best opportunities for Five-lined Skinks – Great Lakes/St. Lawrence population to optimize body temperatures (i.e., thermoregulate), while simultaneously receiving protection from predators (Howes and Lougheed 2004; Quirt et al., 2006). Quirt et al. (2006) found that Five-lined Skinks from the Great Lakes/St. Lawrence population tended to select rocks that were 55.2 ± 2.1 cm long on average for cover. The same study found that Five-lined Skink-occupied rocks were found in areas with a more open canopy (canopy closure of 7.2 ± 1.2%) compared to unoccupied areas. In Minnesota, Five-lined Skink populations have been associated with water, such as ponds, or even temporary pools in rock areas (Lang 1982). Adults and juveniles in the Carolinian population have also been known to climb trees (Fitch and von Achen 1977, Seburn 1993).

Female Five-lined Skinks in the Great Lakes/St. Lawrence region typically lay their eggs under rocks on a thin layer of soil, moss, or lichen (Seburn and Seburn 1989; Wick 2004). Rocks used for nesting averaged 39.3 ± 3.1 cm long and 15.6 ± 1.0 cm thick at one site in Ontario (Wick 2004). Throughout their range, Five-lined Skinks have also been known to nest in holes in trees (Fitch and von Achen 1977) as well as in old fire pits constructed of rocks (Seburn and Seburn 1989) and under wooden boards (Hecnar 1994).

There has been no research on habitat use for hibernation in the Great Lakes/St. Lawrence region; however, Five-lined Skinks have been documented hibernating in crevices in rock formations or building foundations in other jurisdictions (Harding 1997). They have been discovered hibernating two to three metres below the surface in rock fissures at an active quarry in Minnesota (Lang 1982). Given that Five-lined Skinks have been observed hibernating within their summer home range in Kansas, it is likely, though not documented, that Five-lined Skinks hibernate near or within their summer home ranges in Ontario (Fitch 2006b).

The Five-lined Skink preys on a variety of invertebrates, primarily arachnids[13], insects and their larvae, and earthworms (Judd 1962; Hecnar et al. 2002; COSEWIC 2007). It is an active hunter, locating prey by sight or chemical perception through tongue-flicking. Studies from southern Ontario have documented crickets (Judd 1962) and arachnids (Hecnar et al. 2002) as the most common prey of Five-lined Skink inhabiting Rondeau Provincial Park and Point Pelee National Park, respectively. These studies suggest that the Five-lined Skink may forage opportunistically on those invertebrates available to them.

3.3.2. Limiting factors

The Great Lakes/St. Lawrence population of the Five-lined Skink is at the northern portion of the species' continental range. Sites with Five-lined Skinks in this population may be limited to the warmest and sunniest areas. Cooler areas may not provide a long enough active season for the Five-lined Skink, which hibernates for at least half of the year. Overwintering locations may also be a limiting factor as the species must hibernate in areas below the frost line but above the water table (Seburn 2010).

The Five-lined Skink appears to be a habitat specialist in the Great Lakes/St. Lawrence population as occupied sites are largely restricted to open areas of rock outcrops with loose rock present. Such habitat is not abundant across much of the range and it is therefore a limiting factor for the species. The eastern limit of the Five-lined Skink in Ontario appears to be set by the presence of moist lowlands (Ussher and Cook 1979).

[13] An arachnid is an invertebrate (i.e., organism lacking a backbone) that belongs to the class Arachnida. Arachnids have an exoskeleton (external skeleton), four pairs of jointed legs, and a body that is divided into two parts. Examples of arachnids include spiders, ticks and mites.

4. THREATS

4.1. Threat Assessment

Table 1. Threat Assessment Table

Threat	Level of Concern[1]	Extent	Occurrence	Frequency	Severity[2]	Causal Certainty[3]
Changes in Ecological Dynamics or Natural Processes						
Alteration or suppression of fire regime (which results in an increase in vegetation cover)	Medium	Unknown	Current	Continuous	Unknown	Medium
Habitat Loss or Degradation						
Recreational Activities	Medium	Unknown	Current	Seasonal (spring to fall)	Moderate	Low
Development for Housing or Recreational Structures	Low - Medium	Unknown	Current & Anticipated	Unknown	Low - Moderate	Low-Medium

[1] *Level of Concern: signifies that managing the threat is of (high, medium or low) concern for the management of the species, consistent with the management objective. This criterion considers the assessment of all the information in the table).*

[2] *Severity: reflects the population-level effect (High: very large population-level effect, Moderate, Low, Unknown).*

[3] *Causal certainty: reflects the degree of evidence that is known for the threat (High: available evidence strongly links the threat to stresses on population viability; Medium: there is a correlation between the threat and population viability e.g. expert opinion; Low: the threat is assumed or plausible).*

4.2. Description of Threats

Alteration or suppression of fire regime[14] (which results in an increase in vegetation cover)
Five-lined skinks are ectothermic; they regulate their body temperature based on their position relative to sunlight and other sources of heat. As a result, they require open areas in order to persist at the northernmost edge of their range. Reducing the amount of open habitat available to Five-lined Skinks can result in population declines. There is limited data on how significant or widespread alteration or suppression of the fire regime is as a threat to the Five-lined Skink in Ontario, but at least one area where Five-lined Skink – Great Lakes/St. Lawrence population was known to have occured has become overgrown and the lizards have apparently become extirpated (COSEWIC 2007; van Wieren pers. comm. 2010).

[14] A fire regime refers to the intensity, frequency, spatial pattern (i.e., extent) and timing of wildfires that prevail in an area.

Elsewhere in the range of the Five-lined Skink increasing vegetation cover is a known threat. From 1940 to 1980, open habitat declined by roughly two-thirds at known Five-lined Skink sites in Minnesota partially as a result of fire suppression (Lang 1982). Over the last 50 years, the Five-lined Skink has been almost eliminated from the Fitch Natural History Reservation in Kansas as a result of alteration or suppression of the fire regime (Fitch 2006a, b). A survey of historical Five-lined Skink – Carolinian population locations in southwestern Ontario also indicated that vegetation succession had reduced the amount of habitat available for the species (Hecnar and Hecnar 2000).

Recreational Activities

Disturbance and removal of cover objects is known to be a significant threat to Five-lined Skinks in the Carolinian population (Hecnar and M'Closkey 1998). There is evidence that cover objects have been disturbed or removed from sites where the Five-lined Skink - Great Lakes/St. Lawrence population is known to occur (COSEWIC 2007). These cover objects (usually rocks) can be taken away to build rock gardens and other structures, or to facilitate trail riding by ATVs and dirt bikes (COSEWIC 2007). They also are piled together to create cairns or decorative inukshuks. Only a subset of cover objects provide the right thermal environment for Five-lined Skinks (Quirt et al. 2006) so the removal of such objects could pose a significant threat to the species.

The removal of rocks has been documented to be a threat to at least one species of Australian snake (Shine et al. 1998). Disturbance at Australian rock outcrops was prevalent at sites up to 450 m from trails or roads (Goldingay and Newell 2008). Even small displacements of cover objects (30 cm) can result in altered microclimates under the rocks and decreased usage (Pike et al. 2010).

Development for Housing or Recreational Structures

Any type of development that results in habitat conversion can pose a threat to the Five-lined Skink. For the Great Lakes/St. Lawrence population, human settlement in rural areas and development of cottages and other recreational structures are the activities most likely to result in land conversion (COSEWIC 2007). They can reduce the amount of total habitat available to the species, degrade existing habitat, isolate habitat patches from each other and/or result in increasing disturbance. Such impacts have most commonly been encountered in southwestern Ontario where the Five-lined Skink – Carolinian population has undergone decline due to increased urban settlement and agriculture (COSEWIC 2007). Habitat alteration appears to be a less serious threat for the Five-lined Skink Great -Lakes/St. Lawrence population, but no analysis of habitat changes has been conducted for this species.

Potential Threats

The following threats are known to act upon the Five-lined Skink in parts of its range; however, at this time, there is insufficient information available to identify the extent, severity or occurrence of these threats on the Five-lined Skink – Great Lakes/St. Lawrence population. As such, they are identified as potential threats to this population.

Altered Predator-prey Dynamics

Elevated populations of predators can significantly impact prey populations. In North America, predators of the Five-lined Skink include foxes, hawks, weasels, skunks, short-tailed shrews and snakes (COSEWIC 2007). Cats and dogs have also been identified as predators of Five-lined Skink – Carolinian population (Oldham and Weller 2000 *in* COSEWIC 2007) as have raccoons (Hecnar and Hecnar 2005). Predation attempts can result in tail loss in Five-lined Skinks, which in turn leads to reduced sprint speed for a few weeks, potentially exacerbating the risk of predation (Goodman, R.M 2006 *in* Seburn 2010), but no studies have been conducted on the impact of altered predator-prey dynamics on the Great Lakes/St. Lawrence population.

Road mortality

Several studies have documented Five-lined Skink road mortality in the Carolinian population. For example, 16 Five-lined Skinks were found dead on roads in Point Pelee National Park and 18 in Rondeau Provincial Park during an intensive study of road mortality in 2005 (Farmer 2007). Traffic mortality has also been identified as a threat in Florida (Aresco 2005) and Illinois (COSEWIC 2007). No studies have been conducted on road mortality of the Five-lined Skink in the Great Lakes/St. Lawrence population. Five-lined Skinks typically move less than 200 m (straight line distance) over the course of an active season (Fitch 1954, Seburn 1990, 1993) so it is possible that traffic mortality is a limited threat to the Great Lakes/St. Lawrence population, but this remains uncertain until further research is conducted.

Pet trade (i.e., collection of individuals)

Low numbers of Five-lined Skinks in locations with high levels of human disturbance (e.g, beach access points) and low numbers of hatchlings present in late summer suggested that illegal collecting of Five-lined Skink – Carolinian population and/or their nests was a significant threat at Point Pelee National Park (Hecnar and M'Closkey 1998)[15]. Local pet stores were selling Five-lined Skinks and one employee even admitted collecting Five-lined Skinks from Point Pelee National Park (Hecnar and M'Closkey 1998). Collection of Five-lined Skinks from the Great Lakes/St. Lawrence population may also be occurring. As most females nest under rocks in the open, it would be easy for a collector to catch numerous females and their eggs from any occupied site. Commercial collecting is likely not a significant threat given that Five-lined Skinks would not sell for a high price given their abundance in the United States. Incidental collecting for personal use may be more common. A cursory search on the internet revealed numerous mentions of people keeping them as pets (including one from Ontario), as well as pet care information forms and videos of Five-lined Skinks kept as pets (Seburn pers obs. 2011).

5. MANAGEMENT OBJECTIVE

The objective of this management plan is to maintain the distribution and number of viable element occurrences of Five-lined Skink – Great Lakes/St. Lawrence population. The focus has been placed on the number of viable element occurrences because these local populations are known to contain adequate numbers of Five-lined Skink to ensure persistence for at least

[15] Significantly less Five-lined Skinks occurred in areas with high use by people, even when differences in the availability of woody cover objects were accounted for. Disturbed (i.e., high use) areas were marked by features such as a lack of stabilized dune vegetation, disturbed woody debris and trampled substrates, nests and individuals.

20 years and, as such, represent a greater conservation value for the species. An additional 134 element occurrences (currently considered to be either extant[16] or historical) are not included in the management objective at this time; due to the difficulty in determining Five-lined Skink abundance, it is unknown whether these element occurrences represent individuals or local populations. As element occurrences are identified as viable (including those that are currently considered extant, but whose viability has not been assessed, and those that are currently considered to be historical) they will be captured in the management objective for the species.

6. BROAD STRATEGIES AND CONSERVATION MEASURES TO MEET OBJECTIVES

The broad strategies of this management plan are as follows:

1. Conduct surveys to determine the distribution and viability of element occurrences in the Five-lined Skink – Great Lakes/St. Lawrence population.
2. Determine the relative importance of confirmed threats such as development for housing and recreational structures, and recreational activities on the Five-lined Skink – Great Lakes/St. Lawrence population. Identify the significance of other potential threats on the species.
3. Develop and implement management measures to maintain the amount and quality of habitat available for viable element occurrences by mitigating threats.
4. Utilize communication tools to increase the awareness of existing legislation, policies and best management practices for the Five-lined Skink – Great Lakes/St. Lawrence population.

6.1. Conservation Measures

The conservation measures and implementation schedule proposed to meet the broad strategies outlined above are presented in Table 2.

[16] Still in existence; not lost destroyed or extinct

Table 2. Conservation Measures and Implementation Schedule

Conservation Measure	Priority	Threats or Concerns Addressed	Timeline
1. Assessment of Population and Distribution			
1.1 Conduct surveys for Five-lined Skinks at priority[17] sites along with studies of habitat use, typical movements and dispersal abilities in order to obtain better population-level data and to identify which element occurrences are viable.	High	Data gaps: Population	2013-2018
1.2 Survey element occurrences ranked as historical to determine presence and abundance of Five-lined Skink – Great Lakes/St. Lawrence population and to identify which element occurrences are viable.	High	Data gaps: Population Data gaps: Distribution	2013- 2018
2. Analysis of Threats			
2.1 Conduct threat analysis at priority sites[18] across the range of the population.	High	All threats	2013- 2018
3. Habitat Management			
3.1 Develop and implement habitat conservation guidelines.	Medium-High	1) Development for Housing or Recreational Structures 2) Recreational Activities 3) Alteration or suppression of fire regime	2013- 2018
3.2 Maintain, and if possible, increase the amount of habitat and microhabitat available for Five-lined Skinks.	Medium	1) Development for Housing or Recreational Structures 2) Recreational Activities 3) Alteration or suppression of fire regime	2013- 2018
4. Outreach and Communication			
4.1 Contact target groups (e.g., landowners, park visitors) to inform them about Five-lined Skinks; Promote compliance with existing legislation.	Low	1) Recreational Activities	Ongoing

[17] To be determined in cooperation with the Province of Ontario and species' experts as is also recommended in the Recovery Strategy for the Common Five-lined Skink (*Plestiodon fasciatus*) – Carolinian and Southern Shield populations in Ontario (Seburn 2010). For example, these surveys may be concentrated in areas where element occurrences are known to be extant, but where surveys have not been conducted in the last twenty years.

[18] To be determined in cooperation with the Province of Ontario and species' experts as is also recommended in (Seburn 2010). For example, this analysis could be conducted at sites where there has been a marked decrease in abundance, but where threats have not been assessed.

7. MEASURING PROGRESS

Every five years, success of this management plan implementation will be measured against the following performance indicators:

> The number of viable element occurrences and distribution of the Five-lined Skink – Great Lakes/St. Lawrence population has been maintained.

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9. PERSONAL COMMUNICATIONS

S. Hecnar. 2010. Professor, Department of Biology, Lakehead University, Thunder Bay, Ontario.

B. Howes. 2010. Critical Habitat Biologist, Parks Canada, Gatineau, Quebec.

C. Seburn. 2010. Recovery Science Specialist, Canadian Wildlife Service, Gatineau, Quebec.

J. van Weiren. 2010. Park Ecologist, Parks Canada, St Lawrence Islands National Park, Ontario.

APPENDIX 1: NATURESERVE RANKS AND DEFINITIONS

Table 3. Subnational Conservation Ranks (S-ranks) for the Five-lined Skink in North America (NatureServe 2011)

Country	State/Province and NatureServe status ranks
Canada	Ontario (S3)
United States	Alabama (S5), Arkansas (S5), Connecticut (S1), Delaware (S5), District of Columbia (S4), Florida (SNR), Georgia (S5), Indiana (S4), Iowa (S4), Kansas (S5), Kentucky (S5), Louisiana (S5), Maryland (S5), Massachusetts (SX), Michigan (S3), Minnesota (S3), Mississippi (S5), Missouri (S5), Nebraska (S1), New Jersey (SU), New York (S3), North Carolina (S5), Ohio (SNR), Oklahoma (S5), Pennsylvania (S4), South Carolina (SNR), South Dakota (SU), Tennessee (S5), Texas (S5), Vermont (S1), Virginia (S5), West Virginia (S5), Wisconsin (S4)

S1: Critically Imperiled; S2: Imperiled; S3: Vulnerable; S4: Apparently Secure; S5: Secure; SNR: Unranked – Status not yet assessed; SU: Unrankable; SX: Presumed Extirpated.

APPENDIX 2: EFFECTS ON THE ENVIRONMENT AND OTHER SPECIES

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

Recovery planning is intended to benefit species at risk and biodiversity in general. However, it is recognized that plans 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 plan itself, but are also summarized below in this statement.

Recovery activities that protect the habitat of the Five-lined Skink will likely also benefit a number of other species that make use of similar habitats. In particular, other reptiles such as snakes that make use of open rocky outcrops to bask in the sun, will likely benefit from management activities (Table 4).

Table 4. Species that may benefit from conservation and management of Five-lined Skink habitat in Canada in the areas where the Five-lined Skink occurs.

Common Name	Scientific Name	SARA Status
Eastern Foxsnake	*Pantherophis gloydi*	Endangered
Gray Ratsnake	*Pantherophis spiloides*	Threatened
Massasauga	*Sistrurus catenatus*	Threatened
Eastern Ribbonsnake	*Thamnophis sauritus*	Special Concern
Milksnake	*Lampropeltis triangulum*	Special Concern
Brownsnake	*Storeria dekayi*	Not at Risk
Eastern Gartersnake	*Thamnophis sirtalis*	Not at Risk
Northern Watersnake	*Nerodia sipedon*	Not at Risk
Northern Redbelly Snake	*Storeria occipitomaculata*	Not at Risk
Smooth Greensnake	*Liochlorophis vernalis*	Not at Risk
Northern Ringneck Snake	*Diadophis punctatus*	Not at Risk

While some of the proposed conservation measures will benefit the environment in general and are expected to positively affect other sympatric native species, there could be consequences to those species whose requirements differ from those of the Five-lined Skink – Great Lakes/St. Lawrence population. Consequently, it is important that habitat management activities for the Five-lined Skink be considered from an ecosystem perspective through the development, with input from responsible jurisdictions, of multi-species plans, ecosystem-based recovery programs or area management plans that take into account the needs of multiple species, including other species at risk. Many of the stewardship and habitat improvement

activities to benefit the Five-lined Skink - Great Lakes/St. Lawrence population will be implemented through existing ecosystem-based recovery programs that have already taken into account the needs of other species at risk.