

Recovery Strategy for the Five-lined Skink (*Plestiodon fasciatus*), Carolinian population, in Canada

Five-lined Skink



2019



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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.

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¹ www.canada.ca/en/environment-climate-change/services/species-risk-public-registry.html

RECOVERY STRATEGY FOR THE FIVE-LINED SKINK (*Plestiodon fasciatus*), CAROLINIAN POPULATION, IN CANADA

2019

Under the Accord for the Protection of Species at Risk (1996), the federal, provincial, and territorial governments agreed to work together on legislation, programs, and policies to protect wildlife species at risk throughout Canada.

In the spirit of cooperation of the Accord, the Government of Ontario has given permission to the Government of Canada to adopt the *Recovery Strategy for the Common Five-lined Skink (Plestiodon fasciatus) - Carolinian and Southern Shield populations in Ontario* (Part 2) and the *Five-lined Skink (Plestiodon fasciatus) - Carolinian and Southern Shield Populations – Ontario Government Response Statement*² (Part 3) under Section 44 of the *Species at Risk Act* (SARA). Environment and Climate Change Canada has included a federal addition (Part 1) which completes the SARA requirements for this recovery strategy.

The federal recovery strategy for the Five-lined Skink (*Plestiodon fasciatus*), Carolinian Population, in Canada consists of three parts:

Part 1 – Federal addition to the *Recovery Strategy for the Common Five-lined Skink (Plestiodon fasciatus) – Carolinian and Southern Shield populations in Ontario*, prepared by Environment and Climate Change Canada.

Part 2 – *Recovery Strategy for the Common Five-lined Skink (Plestiodon fasciatus) – Carolinian and Southern Shield populations in Ontario*, prepared by David C. Seburn (2010) for the Ontario Ministry of Natural Resources³.

Part 3 – *Five-lined Skink (Plestiodon fasciatus) - Carolinian and Southern Shield Populations – Ontario Government Response Statement*, (2011) prepared by the Ontario Ministry of Natural Resources.

² The Government Response Statement is the Ontario Government's policy response to the recovery strategy and summarizes the prioritized actions that the Ontario Government intends to take and support.

³ On June 26, 2014, the Ontario Ministry of Natural Resources became the Ontario Ministry of Natural Resources and Forestry.

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Part 2 – *Recovery Strategy for the Common Five-lined Skink (Plestiodon fasciatus) Carolinian and Southern Shield populations in Ontario*, prepared by David C. Seburn (2010) for the Ontario Ministry of Natural Resources

Part 3 – *Five-lined Skink (Plestiodon fasciatus) – Carolinian and Southern Shield Populations – Ontario Government Response Statement*, (2011) prepared by the Ontario Ministry of Natural Resources

Part 1 – Federal Addition to the *Recovery Strategy for the Common Five-lined Skink (Plestiodon fasciatus)* - *Carolinian and Southern Shield populations in Ontario*, prepared by Environment and Climate Change Canada

Preface

The federal, provincial, and territorial government signatories under the [Accord for the Protection of Species at Risk \(1996\)](#)⁴ 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 and Minister responsible for the Parks Canada Agency is the competent minister for the Five-lined Skink, Carolinian population and has prepared the federal component of this recovery strategy (Part 1), as per section 37 of SARA. To the extent possible, it has been prepared with the cooperation of the Province of Ontario, as per section 39(1) of SARA. SARA section 44 allows the Minister to adopt all or part of an existing plan for the species if it meets the requirements under SARA for content (sub-sections 41(1) or (2)). The Ontario Ministry of Natural Resources led the development of the attached recovery strategy for the Common Five-lined Skink, Carolinian and Southern Shield populations (Part 2) in cooperation with Environment and Climate Change Canada and the Parks Canada Agency. The Province of Ontario also led the development of the attached Government Response Statement (Part 3), which is the Ontario Government's policy response to its provincial recovery strategy and summarizes the prioritized actions that the Ontario government intends to take and support.

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, the Parks Canada Agency, or any other jurisdiction alone. All Canadians are invited to join in supporting and implementing this strategy for the benefit of the Five-lined Skink, Carolinian population, 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, the Parks Canada Agency 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 critical habitat is identified, either in a recovery strategy or an action plan, SARA requires that critical habitat then be protected.

⁴ www.canada.ca/en/environment-climate-change/services/species-risk-act-accord-funding.html#2

In the case of critical habitat identified for terrestrial species including migratory birds SARA requires that critical habitat identified in a federally protected area⁵ be described in the *Canada Gazette* within 90 days after the recovery strategy or action plan that identified the critical habitat is included in the public registry. A prohibition against destruction of critical habitat under ss. 58(1) will apply 90 days after the description of the critical habitat is published in the *Canada Gazette*.

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.

If the critical habitat for a migratory bird is not within a federal protected area and is not on federal land, within the exclusive economic zone or on the continental shelf of Canada, the prohibition against destruction can only apply to those portions of the critical habitat that are habitat to which the *Migratory Birds Convention Act, 1994* applies as per SARA ss. 58(5.1) and ss. 58(5.2).

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 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.

⁵ These federally protected areas are: a national park of Canada named and described in Schedule 1 to the *Canada National Parks Act*, The Rouge National 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* see ss. 58(2) of SARA.

Acknowledgments

Development of the federal component of this recovery strategy (Part 1) was facilitated by Angela Darwin, Paul Watton, Krista Holmes, Christina Rohe (Environment and Climate Change Canada, Canadian Wildlife Service – Ontario) Kari Van Allen and Diana Macecek (formerly Environment and Climate Change Canada, Canadian Wildlife Service – Ontario). Early drafts of the critical habitat section of the strategy were prepared by David C. Seburn (Seburn Ecological Services). Steve Hecnar, Briar Howes, and Carolyn Seburn provided their expertise during development of the federal component of this recovery strategy (Part 1). Contributions from Joe Crowley, Glenn Desy and Amelia Argue (Ontario Ministry of Natural Resources and Forestry); Gary Allen (Parks Canada Agency); Paul Johanson (Environment and Climate Change Canada, Canadian Wildlife Service – National Capital Region and Lesley Dunn, Elizabeth Rezek, Barbara Slezak, and Graham Bryan (Environment and Climate Change Canada, Canadian Wildlife Service – Ontario); Susan Humphrey, and Madeline Austen (formerly Environment and Climate Change Canada, Canadian Wildlife Service - Ontario) and Clint Jacobs (Walpole Island Heritage Centre) are also gratefully acknowledged.

Acknowledgement and thanks is given to all other parties that provided advice and input used to help inform the development of this recovery strategy including various Indigenous organizations and individuals, individual citizens, and stakeholders who provided input and/or participated in consultation meetings.

Additions and Modifications to the Adopted Document

The following sections have been included to address specific requirements of the federal *Species at Risk Act* (SARA) that are not addressed in the *Recovery Strategy for the Common Five-lined Skink*⁶ (*Plestiodon fasciatus*) – *Carolinian and Southern Shield populations in Ontario* (Part 2 of this document, referred to henceforth as “the provincial recovery strategy”) and/or to provide updated or additional information.

Environment and Climate Change Canada is adopting those portions of the provincial recovery strategy pertinent to the Five-lined Skink, Carolinian population, with the exception of section 2.3, Approaches to Recovery. In its place, Environment and Climate Change Canada is adopting those portions of the *Five-lined Skink (Plestiodon fasciatus) – Carolinian and Southern Shield Populations – Ontario Government Response Statement* (Part 3) as the broad strategies and general approaches to meet the population and distribution objective.

Under SARA, there are specific requirements and processes set out regarding the protection of critical habitat. Therefore, statements in the provincial recovery strategy and Government Response Statement referring to protection of the species’ habitat may not directly correspond to federal requirements. Recovery measures dealing with the protection of habitat are adopted; however, whether these measures will result in protection of critical habitat under SARA will be assessed following publication of the final federal recovery strategy.

1. Species Status Information

The global conservation rank for the Five-lined Skink (*Plestiodon fasciatus*) is secure⁷ (G5). In the United States, the national conservation status is secure (N5), though the subnational conservation status varies from critically imperiled⁸ (S1) to secure (S5) in the 34 states in which it is found (NatureServe 2017; 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 reassigned from a single unit to two disjunct populations (COSEWIC 2007); the first is referred to as the Five-lined Skink (*Plestiodon fasciatus*) – Carolinian population and the second as the Five-lined Skink (*Plestiodon fasciatus*) – Great Lakes / St. Lawrence population⁹.

This recovery strategy is specific to the Five-lined Skink – Carolinian population, which is listed as Endangered¹⁰ on Schedule 1 of the federal *Species at Risk Act* (SARA). In Ontario, the

⁶ The Five-lined Skink is called the Common Five-lined Skink when referring to provincial documents because it is officially known by this name in the Province of Ontario.

⁷ Globally common, widespread and abundant.

⁸ 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.

⁹ In the provincial recovery strategy (Seburn 2010), this population is referred to as the Southern Shield population.

¹⁰ A wildlife species facing imminent extirpation or extinction.

Five-lined Skink – Carolinian population is listed as Endangered¹¹ under the provincial *Endangered Species Act, 2007* (ESA). The national conservation status of the Five-lined Skink – Carolinian population is imperiled (N2) and the subnational conservation rank in Ontario is imperiled (S2) (NatureServe 2017).

The Carolinian population of the Five-lined Skink is near the northern limit of the species' range in Canada. It is estimated that less than 5% of the global range of the Five-lined Skink (including both the Carolinian and Great Lakes/St. Lawrence populations) occurs in Canada¹²; the remainder occurs in the United States.

2. Recovery Feasibility Summary

Based on the following four criteria that Environment and Climate Change Canada uses to establish recovery feasibility, there are unknowns regarding the feasibility of recovery of the Five-lined Skink – Carolinian population. In keeping with the precautionary principle, this recovery strategy has been prepared as per section 41(1) of SARA, as would be done when recovery is determined to be technically and biologically feasible. This recovery strategy addresses the unknowns surrounding the feasibility of recovery.

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.

Unknown. There are nine extant¹³ element occurrences¹⁴ in southern Ontario (NHIC 2011). It is uncertain whether there are adequate individuals to sustain the Canadian population or increase its abundance. Additionally, even though the Five-lined Skink has a large range in eastern North America and several American states report secure population ranks (Appendix 1), it is unknown whether extant populations in the United States would be available to support recovery in Canada, or if recovery efforts involving such populations would be feasible.

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

Unknown. Across its range, the Five-lined Skink is associated with a range of habitats, though the Carolinian population is primarily limited to stabilized dune habitat, open woods and savannahs with sandy substrates (COSEWIC 2007). Cover objects, such as

¹¹ A species that lives in the wild in Ontario but is facing imminent extinction or extirpation.

¹² This number is based on the approximate global range of the species and the estimated extent of occurrence in Canada provided in the COSEWIC status report.

¹³ Still in existence; not destroyed, lost or extinct.

¹⁴ An element occurrence 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, the element occurrence 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, element occurrences may cross jurisdictional boundaries.

logs, boards and sheets of wood can be a limiting factor in habitat selection as can nest sites (i.e. logs in a moderate state of decay) and hibernation habitat (Seburn 2010). Habitat suitable for the purposes of nesting and thermoregulation¹⁵ can be made available through the maintenance or addition of cover objects in areas with Five-lined Skinks. However, little is known about habitat selection for hibernation in the Carolinian population, and as such it is unknown whether additional habitat could be made available through restoration for this part of the Five-lined Skink's life-cycle (Seburn 2010).

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

Yes. Effective methods exist to mitigate against the primary threats to this species and/or its habitat. For example, habitat degradation and road mortality (COSEWIC 2007; Seburn 2010) can be mitigated by activities aimed at habitat management and education (e.g. maintaining canopy openings in areas considered to be suitable habitat, seasonal road closures).

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

Yes. A number of recovery techniques have been implemented at locations in southern Ontario. Habitat enhancement projects have occurred at both Point Pelee National Park and Oxley Poison Sumac Swamp. Targeted education and outreach programs have occurred at both Rondeau Provincial Park and Point Pelee National Park, and population monitoring and research into habitat trends, phylogeography¹⁶ and genetic diversity is occurring range-wide (Seburn 2010). Additional approaches to recovery include the development and implementation of management measures to protect sites, reduce identified threats and increase available habitat (Seburn 2010). Such approaches should allow for the maintenance of current element occurrences and the possible reversal of declining trends.

The Carolinian population of the Five-lined Skink is near the northern limit of the species' range in Canada. It has likely always been rare in Ontario, being largely limited to open areas with a sandy substrate such as stabilized dunes, old fields, tallgrass prairies, open woods and savannahs. Because of its naturally limited distribution in Canada, it will likely always be vulnerable to both natural and human-influenced stressors.

¹⁵ Thermoregulation refers to the process whereby an organism is able to maintain its body temperature within certain limits even when external temperatures are very different.

¹⁶ Phylogeography is defined as the study of historical processes that may have caused the current geographic distribution of a species.

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; Figure 1). 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 occurrence¹⁸ is 3 946 km² and the estimated area of occupancy¹⁹ is 88 km² (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 is 29 842 km² (COSEWIC 2007).

The *Recovery Strategy for the Common Five-lined Skink (Pleistodon fasciatus) - Carolinian and Southern Shield populations in Ontario* (Seburn 2010) indicates there are six extant²⁰ element occurrences in Ontario for the Carolinian population; however, additional information has been acquired since that document was posted. There are currently a total of 27 element occurrences for the Carolinian population as assessed by the Ontario Natural Heritage Information Centre (NHIC)²¹, of which nine (33%) are considered extant, eight (30%) are considered historical and ten (37%) are considered extirpated²² (Appendix 2, see footnote 28). The Walpole Island occurrence is considered historical by the NHIC (2011). Local knowledge, however, confirms the species is extant on the First Nation (C. Jacobs pers. comm. 2006 in COSEWIC 2007); therefore, this species is considered extant on the Walpole Island First Nation in this document (Figure 2, Appendix 2, footnote 28).

¹⁸ Extent of Occurrence: The area included in a polygon without concave angles that encompasses the geographic distribution of all known populations of a wildlife species.

¹⁹ Area of Occupancy: The area within 'extent of occurrence' that is occupied by a taxon, excluding cases of vagrancy. The measure reflects the fact that the extent of occurrence may contain unsuitable or unoccupied habitats.

²⁰ Occurrence recently has been verified as still existing, but sufficient information on the factors used to estimate viability of the occurrence has not yet been obtained (Hammerson et al. 2008).

²¹ New observations for some historical or extirpated element occurrences have been submitted to, but not verified yet by the NHIC. Therefore, not all the data needed to identify critical habitat for all the populations is currently available to Environment and Climate Change Canada. Current critical habitat identified (Table 1) is based on best available information at this time; additional critical habitat may be identified in updates to the recovery strategy or in an action plan.

²² An element occurrence for which there is documented destruction of its habitat or environment, or persuasive evidence of its eradication based on adequate surveys (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).

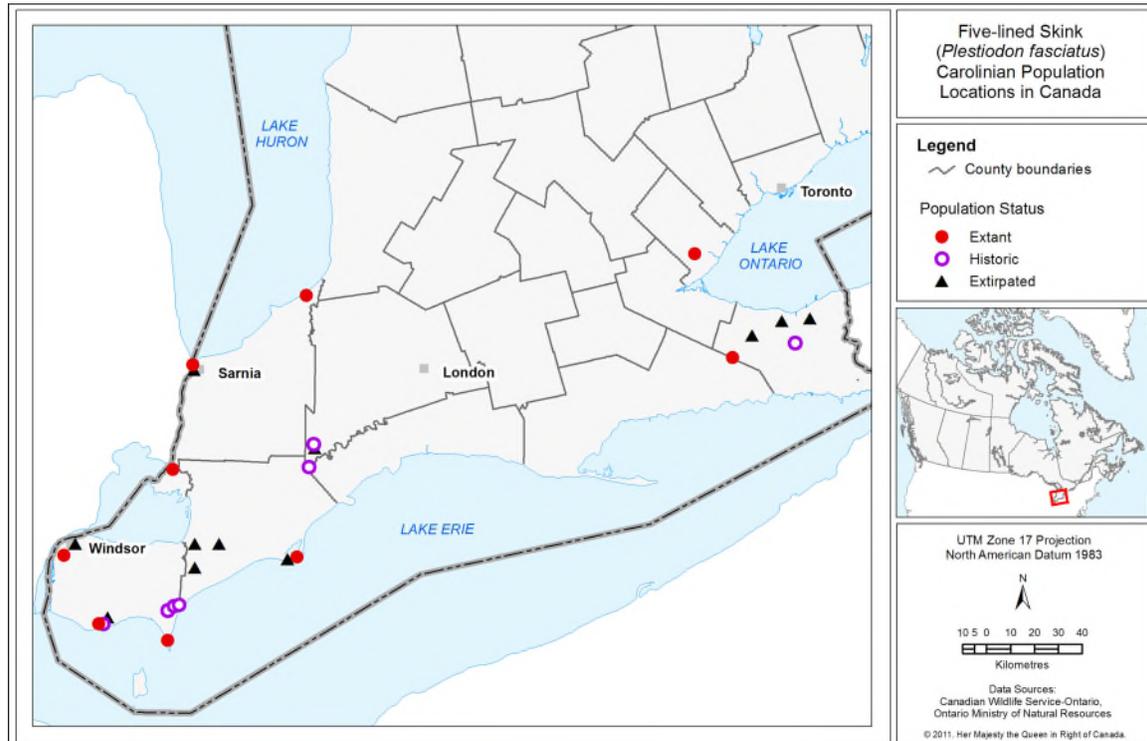


Figure 2. Distribution of the Five-lined Skink – Carolinian population in Canada. Occurrence information from COSEWIC (2007) and NHIC (2011). Note that some occurrences are in close proximity to each other, therefore some symbols may overlap.

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 their activity patterns change throughout the year (COSEWIC 2007). Abundance data for the Carolinian population is lacking at most locations. Effective population sizes²³ were calculated in COSEWIC (2007) for two element occurrences in the Carolinian population: 291 and 306 for Rondeau Provincial Park and Point Pelee National Park, respectively. However, estimates of effective population size cannot be directly compared to census population size estimates, because these population survey methods have not been simultaneously employed in a single population (COSEWIC 2007). While the ratio of effective population size varies among species, it is typically 11% of census estimates (Frankham 1995).

There is little information on population trends of the Five-lined Skink – Carolinian population. The element occurrences ranked as historical may indicate a reduction in the number of element occurrences, or 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). Abundance at Rondeau Provincial Park appears to be stable (COSEWIC 2007) though little quantitative data are available (Seburn 2010). At Point Pelee National Park, home to the largest estimated sub-population, estimates indicate a downward population trend from 1990 to 1996, followed by increases in

²³ 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.

abundance in the period of 1997 to 2001, with record high numbers documented in 2001-2002 (Hecnar and Hecnar 2011). Analysis of the abundance from 1990 to 2010 indicates a relatively stable but variable sub-population (Hecnar and Hecnar 2011). Population modeling suggests that the Point Pelee National Park subpopulation is at significant risk of extirpation given the inherent variability in abundance (Hecnar and Hecnar 2009 *in* Seburn 2010), and it is very likely that other Carolinian sub-populations are also at risk of extirpation (Seburn 2010).

4. Population and Distribution Objective

Under SARA, population and distribution objectives for the species must be established. The population and distribution objective established by Environment and Climate Change Canada is to:

- ensure the long-term viability and survival of the Five-lined Skink – Carolinian population.

The focus has been placed on persistence of the Carolinian population as a whole. This objective is consistent with the goal identified in the *Five-lined Skink (Plestiodon fasciatus) - Carolinian and Southern Shield Populations – Ontario Government Response Statement (Part 3)*, which contains the following goal:

- The government of Ontario’s goal for the recovery of the Common Five-lined Skink is to ensure the long-term viability and survival of both designated populations in Ontario.

It also aligns with *The Recovery Strategy for the Common Five-lined Skink (Plestiodon fasciatus) – Carolinian and Southern Shield populations in Ontario (Part 2)*, which contains the following recovery goal:

- The recovery goal for the Carolinian population of the Common Five-lined Skink is to ensure the long term survival of all remaining sub-populations²⁴.

5. Broad Strategies and General Approaches to Meet Objectives

The Government-Led and Government-Supported Actions tables from the *Five-lined Skink (Plestiodon fasciatus) - Carolinian and Southern Shield Populations – Ontario Government Response Statement (GRS) (Part 3)* are adopted as the broad strategies and general approaches to meet the population and distribution objectives for the Five-lined Skink – Carolinian population. In addition, this Recovery Strategy includes an extension of the GRS encouraging the transfer of Traditional Ecological Knowledge (TEK) and local knowledge amongst landowners, managers and others regarding past trends, land use and perceived threats. For further clarity, Environment and Climate Change Canada is not adopting the approaches identified in Section 2.3 of the *Recovery Strategy for the Common Five-lined Skink (Plestiodon fasciatus) – Carolinian and Southern Shield populations in Ontario (Part 2)*.

²⁴ Element occurrences often correspond to local populations or sub-populations. Sub-population as used in Seburn (2010) is equivalent to the use of element occurrence this document.

6. Critical Habitat

6.1 Identification of the Species' Critical Habitat

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. Under SARA, critical habitat is "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". In this document, the benchmark for survival and recovery is outlined in the population and distribution objective (Section 4).

Identification of critical habitat is not a component of the provincial recovery strategy prepared for the Ontario Ministry of Natural Resources under the *Endangered Species Act, 2007* (ESA). However, the province has created a habitat regulation for the Five-lined Skink- Carolinian population which describes the area being considered as habitat under the provincial ESA (See Appendix 3: Ontario Regulation 122/12 – Common Five-lined Skink (Carolinian population) Habitat for a description of the provincial habitat regulation that came into effect July 1, 2012).

The critical habitat under SARA will be consistent with the regulated habitat under Ontario's ESA for Five-lined Skink – Carolinian population occurrences where the occurrences are in naturally occurring [and certain cultural] habitats (i.e., habitats that meet the suitable habitat criteria (Section 6.1.1)). However, unlike the provincial habitat regulation for Common Five-lined Skink, critical habitat under SARA will not include certain non-natural habitat types at this time. Environment and Climate Change Canada has taken this approach because although additional non-natural habitat may sometimes be beneficial to individual Five-lined Skinks, natural (and some naturalized) areas comprise the vast majority of the known habitat for the Five-lined Skink – Carolinian population. Therefore these natural (and some naturalized) areas are considered critical to the long-term persistence of this population. Individual Five-lined Skink – Carolinian population occurrences, including those in non-natural habitats, are protected under the ESA for a prescribed period of time.

Critical habitat for the Five-lined Skink – Carolinian population is identified in this recovery strategy to the extent possible based on the best available information. Critical habitat is identified for seven out of nine known extant element occurrences in natural habitats. This is considered a partial identification of critical habitat, as an evaluation of the presence or absence of the species for some element occurrences is required (i.e. occurrences considered to be extant, but where data is currently incomplete or unavailable to Environment and Climate Change Canada OR occurrences are considered to be historical (i.e. where suitable habitat exists, but where no standardized surveys have occurred in the past 20 years)). In addition, insufficient information is available on the contribution human-influenced habitats have in long-term viability and survival of the overall population. Human-influenced habitats are not identified as critical habitat for Five-lined Skink – Carolinian population. The Schedule of Studies (Section 6.2) outlines the activities required for identification of any additional critical habitat necessary to support the population and distribution objective.

The identification of critical habitat for the Five-lined Skink is based on the following two criteria: suitable habitat and site occupancy.

6.1.1. Suitable Habitat

Suitable habitat is characterized as the areas where individuals of the species carry out essential aspects of their life cycle (e.g., foraging, nesting and hibernating) in Canada. The Carolinian population of the Five-lined Skink is largely limited to open areas with a sandy substrate within a few kilometres (often less than 1 km) of the shores of lakes Erie, St. Clair and Huron. Known habitats include stabilized dunes, sand barrens, old fields, tallgrass prairies, beaches, open woods and savannahs. Within these habitats, Five-lined Skinks are primarily associated with cover objects that are used for nest microsites, thermoregulation and concealment from predators. The amount and quality of cover objects (e.g., rocks, logs), are key features of suitable habitat for the Five-lined Skink. The most common cover object type used by the Five-lined Skink – Carolinian population tends to be woody debris (COSEWIC 2007); and skinks typically prefer large logs that are greater than 15 cm in diameter and in a moderate state of decay (Seburn 1993; Hecnar 1994). Large cover objects with more surface area may provide soil moisture conditions preferred by Five-lined Skinks to mitigate drying. Without appropriate cover objects, the species is prone to desiccation²⁵ stress and extreme temperatures (COSEWIC 2007). Artificial cover objects such as boards or building materials can also be an important habitat component (Seburn 1990). Five-lined Skinks appear to have some tolerance for human presence in the landscape and will use artificial cover objects although natural objects are preferred for nest microsites (Seburn 1990; Hecnar and M'Closkey 1998). There are numerous observations of Five-lined Skinks associated with man-made structures, such as paved surfaces including roads, buildings and decks, but the net benefit or detriment to the species from use of these structures is unknown. As such, man-made structures are not currently considered suitable habitat.

It is important to note that assessment of suitable habitat for the Carolinian population of the Five-lined Skink is primarily based on observations of individuals under cover objects at specific locations, particularly at Point Pelee National Park. There is limited information available on either movement patterns or hibernation habitat in Canada.

The extent of habitat occupied by the Five-lined Skink is highly variable. Five-lined Skinks generally limit their activities to small, familiar areas with seasonal movements occasionally exceeding 200m but typically less than 25 m (Fitch 1954). The size and shape of the habitat used by Five-lined Skinks can vary greatly between sites, depending upon habitat availability. Home ranges for individuals in a Kansas population were estimated to be between 270 m² and 578 m² (Fitch 1954) but the boundaries were not strictly defined. Five-lined Skinks are not territorial and can shift activity centres more than once during their active season. This can result in home ranges exceeding 2 000 m² (Fitch and von Achen 1977). Juveniles are more active and will shift to new areas more frequently within a season than adults (Fitch 1954). Individuals regularly use areas outside of their home range to breed and nest although females tend to return to their original home range after their eggs have hatched (Seburn 1993).

²⁵ Desiccation is the process of moisture removal (i.e., becoming dried up or dehydrated).

The amount of available Five-lined Skink habitat can change over time; it can decrease as a result of natural successional processes that alter its early successional habitat or increase through fires or other disturbances (COSEWIC 2007).

Suitable habitat for the Five-lined Skink is identified using the Ecological Land Classification (ELC) framework for Ontario (Lee et al. 1998). The ELC framework provides a standardized approach to the interpretation and delineation of ecosystem boundaries. As the microhabitat features within the larger site area appear to be more important to Five-lined Skinks than the specific vegetation species composition (e.g., ecosite), the ELC *community class* unit was chosen. Suitable habitat for the Five-lined Skink - Carolinian population includes the following ELC community classes:

- Beach/Bar (BB)
- Sand Barren (SB)
- Sand Dune (SD)
- Tallgrass Prairie, Savannah or Woodland (TP)
- Forest (FO)

Select cultural habitats are also considered suitable habitat for the Five-lined Skink. Cultural meadows include old fields typically containing open areas often having a large portion of introduced species with the presence of some trees and shrubs²⁶. These areas result from or are maintained by cultural disturbances. Suitable habitat for Five-lined Skink – Carolinian population also includes the following ELC community series unit:

- Cultural Meadow (CUM)

Although much of the forest habitat may not be suitable given the level of canopy closure, openings may provide suitable habitat for individuals of the Five-lined Skink – Carolinian population. In addition, areas of suitable habitat may shift with changes in moisture level or disturbance (e.g. tree harvesting). Many individuals have been observed along the edges of trails in forest habitat and individuals may move within the forest habitat in between canopy openings. As such, forest is included as a component of suitable habitat.

This list of ELC community classes used by individuals of the Five-lined Skink – Carolinian population may not be exhaustive as no thorough analysis of habitat use has been conducted. As more information becomes available, this list may be modified.

6.1.2. Site Occupancy

Site Occupancy Criterion: The site occupancy criterion is defined as a site (defined below) where one or more individuals of the Five-lined Skink - Carolinian population have been observed in any single year since 1992.

²⁶ Trees and shrubs may be present, but must be less than 25% coverage to be considered a meadow (Lee et al 1998).

A 20 year time period is appropriate given the cryptic nature of the Five-lined Skink and its ability to persist even in small pockets of suitable habitat. Skinks spend the greater part of their day under cover elements making them difficult to survey. Further, individuals may shift their home range throughout the active season which can result in underestimates of the population size (COSEWIC 2007). The selected time period balances available occurrence information with the duration of habitat suitability, as these ecosystems are dynamic. Available information used for identifying critical habitat is between 1992 and 2011.

A site is defined by a 30 m boundary around an occurrence of the Five-lined Skink - Carolinian population. Where any portion of a suitable habitat area intersects 30 m of each occurrence, the entire suitable habitat area (ELC community class or community series) is considered occupied and is included as critical habitat. In addition, all suitable contiguous adjacent habitat areas that create larger complexes of suitable habitat are also considered critical habitat (Figure 3a). The 30 m radial site is a precautionary estimate of the size of a Five-lined Skink's home range (Fitch 1954) and represents average tree height, or the area of a microhabitat important to an individual Skink within suitable habitat. Applying this area around an occurrence considers that the individual skink may be moving through habitats and therefore identifies all suitable habitat within that area as habitat occupied by the skink.

As skinks can move through wetlands (i.e., marshes, swamps) into adjacent suitable habitat, these areas are considered habitat corridors. All suitable habitat that is connected to the occupied and contiguous suitable habitat complex by adjacent wetland areas is also identified as critical habitat (Figure 3b). While wetlands are not considered suitable habitat and thus are not critical habitat for the Five-lined Skink, these corridors maintain functional and structural connectivity of suitable habitat complexes for Five-lined Skinks in the Carolinian population. This is an important consideration where this species occurs (i.e., in Southern Ontario) where the rates and extent of habitat loss and fragmentation are very high.

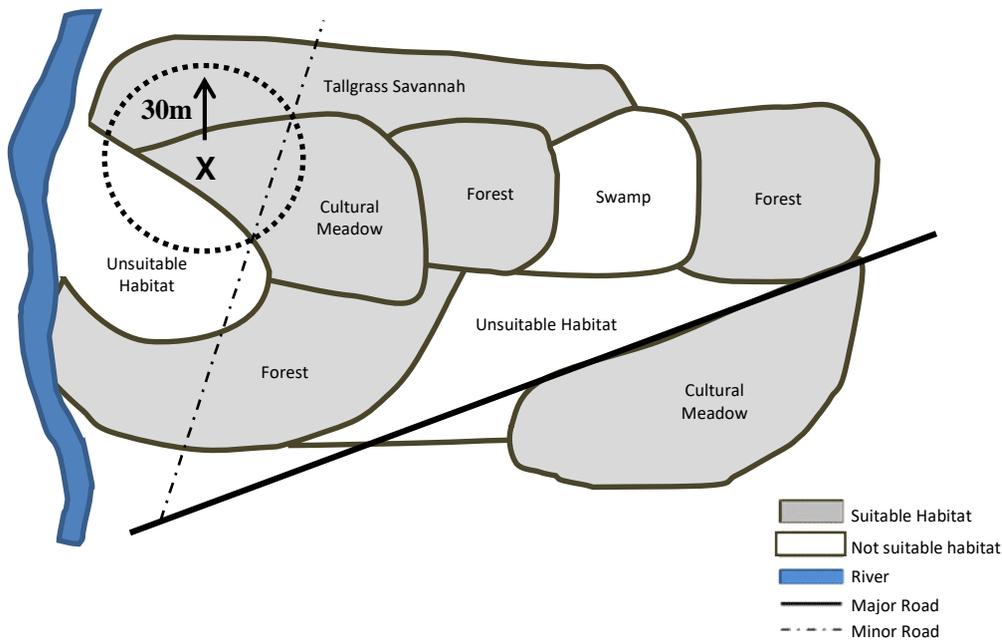


Figure 3a. Suitable habitat (represented by grey shading; See Section 6.1.1) identified for a single Five-lined Skink – Carolinian population occurrence (represented by “X”). Swamp – in this example, is illustrative of a habitat corridor (which is not considered suitable habitat) but does enable access into adjacent suitable habitat areas.

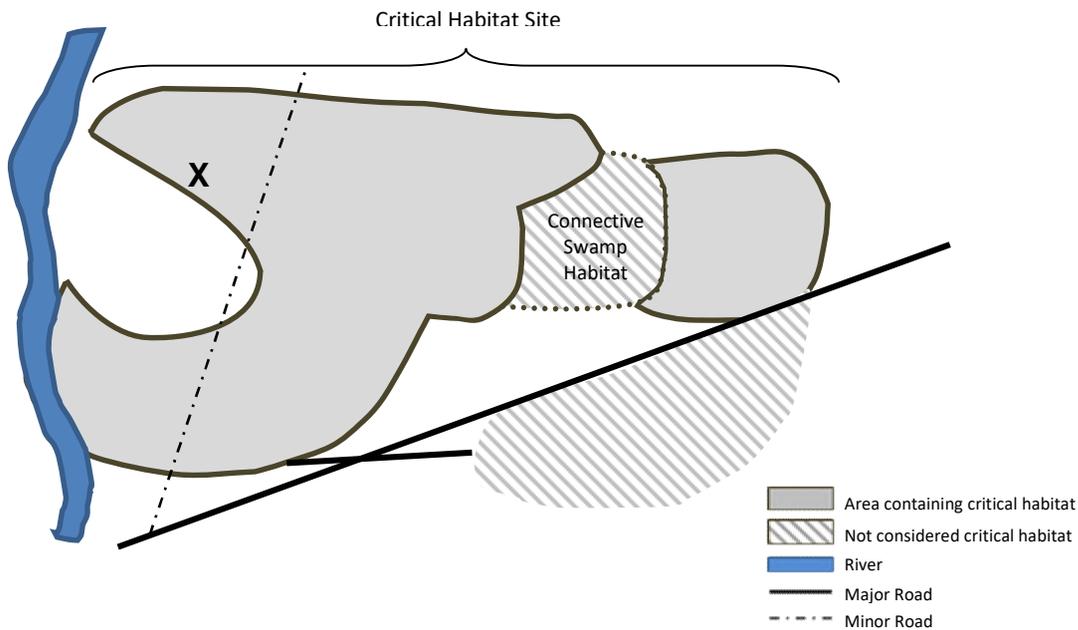


Figure 3b. The extent of a site containing critical habitat (shaded area) for a single Five-lined Skink – Carolinian population occurrence. Barriers to the Five-lined Skink are discontinuities to critical habitat and include large bodies of water and major roads (e.g. highways).

6.1.3. Application of the Five-lined Skink – Carolinian Population Critical Habitat Criteria

Critical habitat for the Five-lined Skink - Carolinian population is identified as the entire contiguous habitat complex composed of ELC community class or community series areas considered suitable habitat (as described in Section 6.1.1) in which the Five-lined Skink has been found according to the Site Occupancy Criterion (Section 6.1.2). Critical habitat for the Five-lined Skink - Carolinian population is consistent with the provincial habitat regulation for Common Five-lined Skink (Carolinian population) in naturally occurring [and certain cultural] areas for a prescribed period of time (see Appendix 3: Ontario Regulation: 122/12 – Common Five-lined Skink (Carolinian population) Habitat).

Barriers to the Five-lined Skink include large bodies of water (e.g. lakes, large rivers) and major roads (e.g. highways), however, suitable habitat or adjacent areas of suitable habitat that are bisected by non-major roads (e.g. secondary roads, gravel roads) or small streams are considered contiguous suitable habitat for the Five-lined Skink - Carolinian population. The collection of suitable habitat areas and complexes linked together by wetlands are together considered a site containing critical habitat.

Critical habitat is identified for naturally occurring areas of suitable habitat where the Five-lined Skink – Carolinian population is known to persist. Although the Five-lined Skink may at times occupy only a small portion of the suitable habitat area, the entire, adjacent suitable habitat complex defined by the ELC community class and community series areas is identified as critical habitat. Maintaining contiguous suitable habitat facilitates movement of the species between and among areas where individuals carry out essential aspects of their life cycle. The addition of suitable yet unoccupied habitat that joins together occupied habitat, allows movement between habitat areas, prevents habitat patches from becoming isolated from each other, recognizes the dynamic nature of these habitats, and will allow for the expansion of occurrences. Further, adjacent suitable unoccupied habitat may be a result of inconsistent survey efforts and/or underestimations of population size due to this species' cryptic nature, and it is possible that skink individuals occur in portions of adjacent suitable habitat types. Five-lined Skinks regularly use areas outside their home range to breed and nest (Seburn 1993).

Although individuals of the Carolinian population of the Five-lined Skink may be observed in locations outside of what has been described as suitable habitat, these locations are not included in the identification of critical habitat (e.g. paved surfaces, buildings, decks). Any portion of non-suitable habitat within the site is not considered critical habitat. There is currently insufficient information to identify human-influenced habitats as critical habitat for Five-lined Skink – Carolinian population (See Schedule of Studies to Identify Critical Habitat, Section 6.2). Human-influenced habitats may be critical for some local Five-lined Skink - Carolinian subpopulations but it is unclear the role these habitats play in overall population viability and survival, and there are currently large tracts of naturally occurring suitable habitat available for the Five-lined Skink at all but one known subpopulation. Thus, the inclusion of human-influenced habitat in critical habitat identification at this time would be an overly precautionary measure and is not considered necessary to meet population and distribution objectives for Five-lined Skink –

Carolinian population at this time. Therefore, critical habitat is only identified for Five-lined Skink – Carolinian population in naturally occurring [and certain cultural] habitats at this time, i.e., habitats that meet the suitable habitat criteria (Section 6.1.1). These are the optimal habitat areas likely contributing the largest net benefit to species' persistence, resilience and recovery of the population as a whole. As new information becomes available (e.g. habitat use), the suitability criteria may be modified. Where Five-lined Skink – Carolinian population individuals occur in Ontario, in areas not identified as suitable habitat in Section 6.1.1, the area within 50 m of the observation is protected under the ESA for a prescribed period of time (see Appendix 3: Ontario Regulation 122/12 – Common Five-lined Skink (Carolinian population) Habitat).

Application of the critical habitat criteria to the best available data as of October 2011 identifies eight sites containing critical habitat for the Five-lined Skink – Carolinian population (Table 1; Figure 4). These eight sites represent seven of nine known extant element occurrences in the Carolinian population. The extant element occurrence at Pinery Provincial Park is represented by two critical habitat sites. Critical habitat for the Five-lined Skink (Carolinian population) is presented using 10 x 10 km UTM grid squares (Table 1). The UTM grid squares presented in Figure 4 is part of a standardized grid system that indicates the general geographic areas containing critical habitat, which can be used for land use planning and/or environmental assessment purposes. In addition to providing these benefits, the 10 x 10 km UTM grid respects provincial data-sharing agreements in Ontario. As additional information becomes available, critical habitat may be refined or more sites meeting critical habitat criteria may be added. More detailed information on provincially regulated habitat may be requested on a need-to-know basis from the Ontario Ministry of Natural Resources and Forestry. More detailed information on 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 – Canadian Wildlife Service at ec.planificationduretablissement-recoveryplanning.ec@canada.ca.

Table 1. Grid squares that contain critical habitat for the Five-lined Skink - Carolinian population in Canada. Critical habitat for the Five-lined Skink - Carolinian Population occurs within these 10 x 10 km standardized UTM grid squares where the criteria described in Section 6.1 are met.

Element Occurrence	10 x 10 km Standardized UTM grid square ID ¹	UTM Grid Square Coordinates ²		Land Tenure ³
		Easting	Northing	
Point Pelee National Park	17TLG74	370000	4640000	Federal land
Pinery Provincial Park	17TMH28	420000	4780000	Non-federal land
	17TMH38	430000	4780000	
	17TMH39	430000	4790000	
Rondeau Provincial Park	17TMG27	420000	4670000	Non-federal land
	17TMG37	430000	4670000	
	17TMG28	420000	4680000	
	17TMG38	430000	4680000	
Oxley Poison Sumac Swamp	17TLG45	340000	4650000	Non-federal land
Sheldon Creek Headwaters	17TNJ90	590000	4800000	Non-federal land
Springarden Road Prairie	17TLG37	330000	4670000	Non-federal land
	17TLG38	330000	4680000	
Caistor-Canborough Slough Forest (Niagara)	17TPH06	600000	4760000	Non-federal land
	17TPH16	610000	4760000	

¹ Based on the standard UTM Military Grid Reference System (see <http://www.nrcan.gc.ca/earth-sciences/geography/topographic-information/maps/9789>), where the first 2 digits and letter represent the UTM Zone, the following 2 letters indicate the 100 x 100 km standardized UTM grid followed by 2 digits to represent the 10 x 10 km standardized UTM grid containing all or a portion of the critical habitat unit. This unique alphanumeric code is based on the methodology produced from the Breeding Bird Atlases of Canada (See <http://www.bsc-eoc.org/> for more information on breeding bird atlases).

² The listed coordinates are a cartographic representation of where critical habitat can be found, presented as the southwest corner of the 10 x 10 km standardized UTM grid square containing all or a portion of the critical habitat unit. The coordinates may not fall within critical habitat and are provided as a general location only.

³ Land tenure is provided as an approximation of the types of land ownership that exist at the critical habitat units and should be used for guidance purposes only. Accurate land tenure will require cross referencing critical habitat boundaries with surveyed land parcel information.

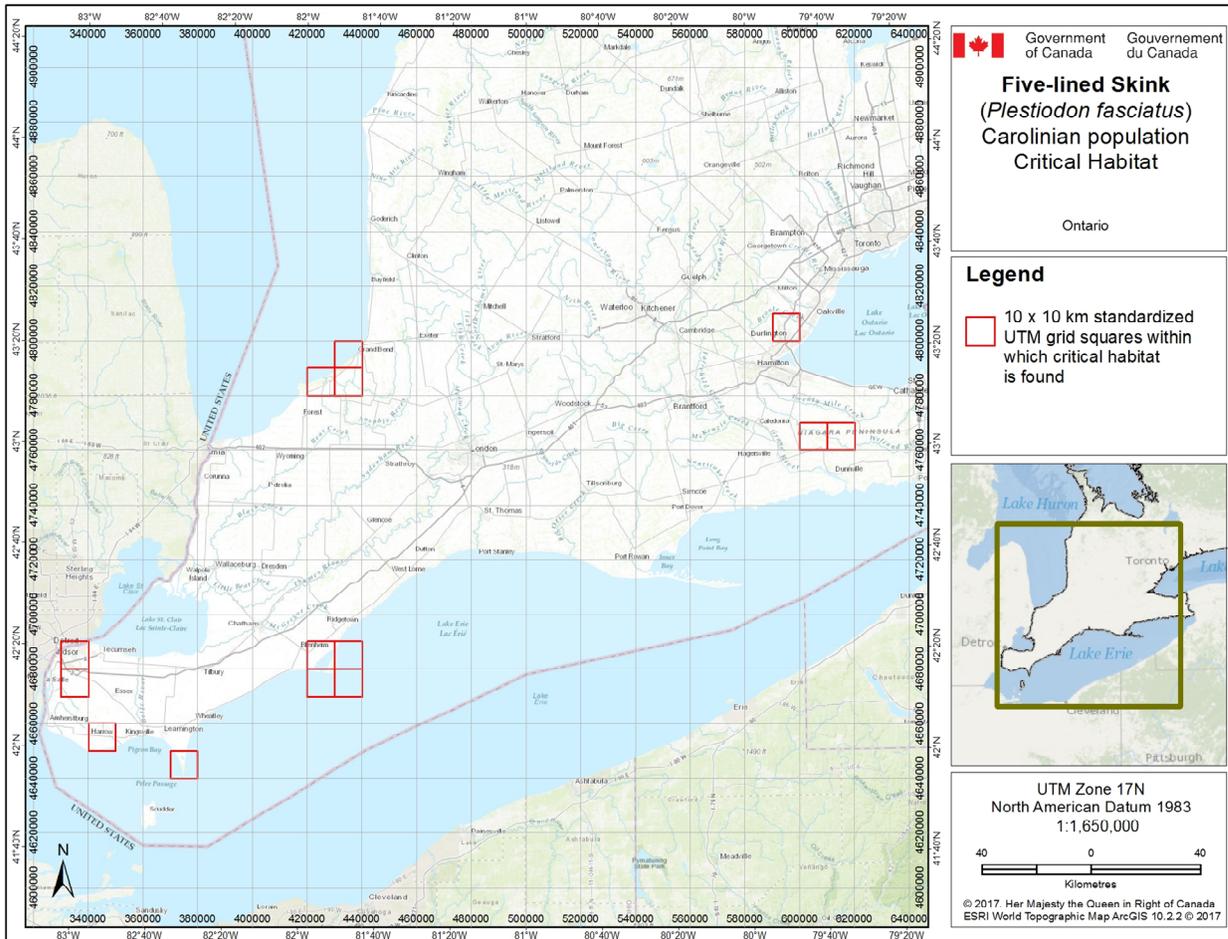


Figure 4. Grid squares that contain critical habitat for the Five-lined Skink – Carolinian population in Canada. Critical habitat for the Five-lined Skink – Carolinian population occurs within these 10 x 10 km UTM grid squares (red squares), where the criteria described in section 6.1 are met.

Although the presence of an extant element occurrence of Five-lined Skink has been confirmed at both Walpole Island (C. Jacobs pers. comm. 2006 *in* COSEWIC 2007) and Sarnia, the data required to satisfy the critical habitat criteria (i.e., location and verified observation, biophysical habitat attributes) are not yet available to Environment and Climate Change Canada. Confirming the biophysical habitat attributes (i.e., extent and amount of the ELC community classes and series of suitable habitat (as listed in Section 6.1.1)) at these two locations is required. A confirmation of the location and extent of the Five-lined Skink population on the Walpole Island First Nation is also required. Once adequate information is available for use, additional critical habitat may be identified.

Critical habitat is not identified for historical element occurrences (8 sites, see Appendix 2 including footnote 28). Additional surveys are required to confirm if element occurrences are extant or extirpated (Schedule of Studies to Identify Critical Habitat, Section 6.2). Once assessments are completed, additional critical habitat may be identified.

6.2 Schedule of Studies to Identify Critical Habitat

Table 2. Schedule of Studies to Identify Critical Habitat.

Description of Activity	Rationale	Timeline
<p>Conduct surveys and habitat assessments for those Five-lined Skink – Carolinian population element occurrences which:</p> <ul style="list-style-type: none"> • are considered to be extant, but where critical habitat has yet to be identified (i.e. where data is currently incomplete or unavailable to Environment and Climate Change Canada) • are considered to be historical (i.e. where suitable habitat exists, but where no standardized population surveys have occurred in the past 20 years). 	<p>Determine whether or not suitable habitat exists and is occupied and therefore can be identified as critical habitat. Identify additional critical habitat.</p>	<p>2019 – 2024</p>
<p>Assess the dependancy of Five-lined Skink – Carolinian population on human-influenced habitats for survival and the extent to which these habitats contribute to overall population viability, especially where there appears to be sufficient naturally occurring suitable habitat.</p>	<p>Determine whether or not human-influenced habitat use is critical to the viability and survival of the Canadian population. Identification of additional critical habitat, if new information supports the inclusion of areas beyond those currently identified.</p>	<p>2019 – 2024</p>

6.3 Activities Likely to Result in Destruction of Critical Habitat

Understanding what constitutes destruction of critical habitat is necessary for the protection and management of critical habitat. Destruction is determined on a case by case basis. Destruction would result if part of the critical habitat was degraded, either permanently or temporarily, such that it would not serve its function when needed by the species. Destruction may result from a single activity or multiple activities at one point in time or from the cumulative effects of one or more activities over time. Activities described below include those likely to cause destruction of critical habitat for the species; however, destructive activities are not limited to those listed.

Small scale or light disturbances within suitable habitat can be beneficial to the Five-lined Skink - Carolinian population. The local distribution of Five-lined Skink changes somewhat from year to year with habitat suitability (e.g., new openings within their forest habitat). As a result, some disturbance to Five-lined Skink habitat may be beneficial to the species, opening up suitable areas within a given site.

Activities described below are examples of those likely to cause destruction of critical habitat to the species; however destructive activities are not necessarily limited to those listed:

- Activities that result in the net removal, disturbance or destruction of cover objects (e.g., the collection of rocks, logs and boards for various purposes including building rock gardens or other structures; using wood as firewood, lumber or for ornamental purposes; facilitating trail riding by ATVs or dirt bikes; and/or clearing from beaches for aesthetic reasons). These activities reduce the habitat available for thermoregulation and/or nesting by Five-lined Skinks. Without appropriate cover objects, the species is prone to desiccation stress and extreme temperatures (COSEWIC 2007).
- Timber harvesting that reduces the forest canopy cover below 75% closure that leads to altered hydrology, soil moisture levels and/or understory temperature. These activities reduce soil moisture conditions preferred by Five-lined Skinks and make the species prone to desiccation, stress and extreme temperatures.
- Activities that create hardened surfaces within critical habitat (e.g., construction of buildings, paved driveways and roads). These activities reduce the amount of habitat available to the species for the purpose of foraging, nesting and hibernation.
- Activities that alter the hydrology or moisture levels within or adjacent to, critical habitat in such a manner as to cause soils to become too wet or too moist (e.g., inappropriate or poorly applied surface irrigation techniques). These activities reduce the species nesting, egg rearing and/or hibernation success.
- Activities that cause soil disturbance, including soil compression (e.g., the use of motorized vehicles), which result in the destruction of critical habitat by decreasing the amount of habitat available to the species for the purposes of hibernation (i.e. by destroying underground burrows).
- Activities that change natural processes and disturbances (e.g., wave-action, wind) within or adjacent to critical habitat, such as the construction of dykes, dams and other barriers. These activities can affect sand deposition and erosion rates and decrease the amount of habitat available to the species for the purposes of nesting, egg rearing and/or hibernation.
- Activities that make areas of critical habitat unavailable to the species (e.g., limiting movement through connecting habitat corridors such as wetlands). This reduces the amount of habitat available to the species for the purposes of foraging, nesting and hibernation.

7. Statement on Action Plans

One or more action plans will be completed for the Five-lined Skink – Carolinian population by December 31, 2025. At least one of these action plans is expected to include an area-based, multi-species approach and be prepared in collaboration with the Walpole Island First Nation.

8. 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](#)²⁷. 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](#)'s²⁸ (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.

Recovery activities that protect the habitat of the Five-lined Skink – Carolinian population will likely also benefit a number of other species that make use of similar habitats; in particular, other species that inhabit stabilized dune habitats, old fields, tallgrass prairies, open woods and savannahs with sandy substrates near the shorelines of lakes Erie, St. Clair and Huron (Table 3).

Table 3. Some of the species that may benefit from conservation and management of Five-lined Skink habitat in those areas where the Five-lined Skink - Carolinian population occurs.

Common Name	Scientific Name	COSEWIC Status
Spring Blue-eyed Mary	<i>Collinsia verna</i>	Extirpated
Butler's Gartersnake	<i>Thamnophis butleri</i>	Endangered
Cerulean Warbler	<i>Dendroica cerulea</i>	Endangered
Eastern Foxsnake (Carolinian population)	<i>Pantherophis gloydi</i>	Endangered
Fowler's Toad	<i>Anaxyrus fowleri</i>	Endangered
Henslow's Sparrow	<i>Ammodramus henslowii</i>	Endangered
Jefferson Salamander	<i>Ambystoma jeffersonianum</i>	Endangered
Eastern Hog-nosed snake	<i>Heterodon platirhinos</i>	Threatened
Eastern Musk Turtle	<i>Sternotherus odoratus</i>	Special Concern
Eastern Ribbonsnake (Great Lakes population)	<i>Thamnophis sauritus</i>	Special Concern
Eastern Milksnake	<i>Lampropeltis triangulum</i>	Special Concern
DeKay's Brownsnake	<i>Storeria dekayi</i>	Not at Risk
Northern Watersnake	<i>Nerodia sipedon sipedon</i>	Not at Risk

²⁷ www.canada.ca/en/environmental-assessment-agency/programs/strategic-environmental-assessment/cabinet-directive-environmental-assessment-policy-plan-program-proposals.html

²⁸ www.ec.gc.ca/dd-sd/default.asp?lang=En&n=CD30F295-1

While some of the proposed recovery activities 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 – Carolinian population. For example, maintaining an approximate 75% canopy cover preferred by the Five-lined Skink would need to be balanced with the needs of other rare species in the same area that require a more closed woodland, for example, the Acadian Flycatcher (*Empidonax vireescens*) and American Ginseng (*Panax quinquefolius*).

Consequently, it is important that recovery 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 – Carolinian population will be guided by existing ecosystem-based recovery plans that have already taken into account the needs of other species at risk (e.g., Pinery Provincial Park Management Plan, Point Pelee National Park Management Plan, draft Walpole Island Ecosystem Recovery Strategy).

This recovery strategy directly contributes to the goals and targets of the Federal Sustainability Development Strategy for Canada (FSDS). Specifically, it will help to restore populations of wildlife to healthy levels and maintain productive and resilient ecosystems with the capacity to recover and adapt (Goals 5 and 6 of the FSDS).

References

- Conant, R., and J.T. Collins. 1998. Field Guide to Reptiles and Amphibians: Eastern and Central North America. Fourth Addition. Boston, Houghton Mifflin.
- COSEWIC 2007. COSEWIC assessment and update status report on the Five-lined Skink *Eumeces fasciatus* (Carolinian population and Great Lakes/St. Lawrence population) in Canada. Committee on the Status of Endangered Wildlife in Canada. Ottawa. vii + 50 pp. (www.sararegistry.gc.ca/status/status_e.cfm).
- Fitch, H. S. 1954. Life history and ecology of the five-lined skink, *Eumeces fasciatus*. University of Kansas Publications of the Museum of Natural History 8:1-156.
- Fitch, H.S. and P.L. von Achen. 1977. Spatial relationships and seasonality in the skinks *Eumeces fasciatus* and *Scincella laterale* in northeastern Kansas. *Herpetologica* 33:303-313
- Frankham, R. 1995. Effective population size/ adult population size ratios in wildlife: a review. *Genetical Research* 66: 95-107.
- Government of Canada. 2009. *Species at Risk Act Policies*. Overarching Policy Framework [Draft]. *Species at Risk Act Policy and Guidelines Series*. Environment Canada. Ottawa. 38 pp.
- Hammerson, G.A., D. Schweitzer, L. Master and J. Cordeiro. January 11 2008. Generic Guidelines for the Application of Occurrence Ranks. Available: <http://www.natureserve.org/explorer/eorankguide.htm#Generic>
- Hecnar, S. J. 1994. Nest distribution, site selection, and brooding in the five-lined skink (*Eumeces fasciatus*). *Canadian Journal of Zoology* 72:1510-1516.
- Hecnar, S. J., and D. R. Hecnar. 2009. Five-lined skink research at Point Pelee National Park 2009. Report of contract 45237116.
- Hecnar, S. J., and D. R. Hecnar. 2011. Five-lined Skink research at Point Pelee National Park 2010. Report of Contract 45285641.
- Hecnar, S. J. and R. T. M'Closkey. 1998. Effects of human disturbance on five-lined skink (*Eumeces fasciatus*) abundance and distribution. *Biological Conservation* 85: 213-222.
- Jacobs, C., pers. comm. 2006. *Telephone conversation with Briar J. Howes*. Natural Heritage Coordinator, Walpole Island Heritage Centre, Wallaceburg, Ontario.

- Lee, H. T., Bakowsky, W. D., Riley, J., Bowles, J., Puddister, M., Uhlig, P., and S. McMurray. 1998. Ecological Land Classification for Southern Ontario: First Approximation and Its Application. Ontario Ministry of Natural Resources, Southcentral Science Section, Science Development and Transfer Branch. SCSS Field Guide FG-02.
- Natural Heritage Information Centre (NHIC). 2011. Species Element Occurrence Report: *Eumeces fasciatus*. Website of the Natural Heritage Information Centre of the Ontario Ministry of Natural Resources. <http://www.biodiversityexplorer.mnr.gov.on.ca/nhicWEB/main.jsp>. Accessed 6 June, 2011.
- NatureServe. 2017. NatureServe Explorer: An online encyclopedia of life [web application]. Version 7.1. NatureServe, Arlington, Virginia. Available <http://www.natureserve.org/explorer>. (Accessed: July 10, 2017).
- Ontario Ministry of Natural Resources. 2011. Five-lined Skink (*Plestiodon fasciatus*) - Carolinian and Southern Shield Populations – Ontario Government Response Statement
- Royal Ontario Museum (ROM). 2011. Distribution: Common Five-lined Skink. http://www.rom.on.ca/ontario/risk.php?doc_type=map&id=152 Accessed 13 October 2011.
- Seburn, C. N. L. 1990. Population ecology of the five-lined skink, *Eumeces fasciatus*, at Point Pelee National Park, Canada. Unpublished Master's thesis, Department of Biological Sciences, University of Windsor, Windsor, Ontario, Canada. 165 pp.
- Seburn, C. N. L. 1993. Spatial distribution and microhabitat use in the five-lined skink (*Eumeces fasciatus*). Canadian Journal of Zoology 71:445-450.
- Seburn, D. C. 2010. Recovery strategy for the Common Five-lined Skink (*Plestiodon fasciatus*) – Carolinian and Southern Shield populations in Ontario. Ontario Recovery Strategy Series. Prepared for the Ontario Ministry of Natural Resources, Peterborough, Ontario. vi + 22 pp.

Appendix 1: NatureServe Ranks and Definitions

Table 4. Subnational conservation ranks (S-ranks) for the Five-lined Skink in North America (NatureServe 2017).

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 (S3S4)

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

Appendix 2: Five-lined Skink - Carolinian Population Element Occurrences In Canada*

Element Occurrence Name	Seburn 2010 (Figure 1)	COSEWIC 2007	NHIC 2011	Year Last Observed
Point Pelee National Park	2000-2009	1995-present	Extant	2008
Rondeau Provincial Park	2000-2009	1995-present	Extant	2010
Pinery Provincial Park	2000-2009	1995-present	Extant	2010 ²⁹
Sarnia Area	2000-2009		Extant	2009
Oxley Poison Sumac Swamp	2000-2009	1995-present	Extant	2007
Caistor Canborough Slough Forest			Extant	2007 ³⁰
Walpole Island	2000-2009	1995-present	Historical	1987 ³¹
Sheldon Creek Headwaters	Pre-2000		Extant	1992
Springarden Road Prairie		Observed 1984-1994	Extant	1992
Dolson Creek Area	2000-2009	Observed 1984-1994	Historical	1989
Wheatley	Pre-2000	Observed 1984-1994	Historical	1987
Kopegaron Woods Conservation Area	Pre-2000	Observed 1984-1994	Historical	1986
Short Hills Wilderness Area			Historical	1982
Hillman Sandhills Environmentally Sensitive Area	Pre-2000		Historical	1981
Thames River, Bothwell			Historical	1970
Newbury			Historical	1963
Windsor	Extirpated		Historical	1970
Arner	Extirpated		Extirpated	1934
Tilbury Vicinity	Extirpated		Extirpated	1881
Tilbury Northside Conservation Area	Extirpated	Observed 1984-1994	Extirpated	1986
Fletcher Vicinity	Extirpated		Extirpated	1961
Erieau, near Rondeau Provincial Park	Extirpated		Extirpated	1968
Sarnia Vicinity	Extirpated		Extirpated	1934
Skunks Misery	Extirpated		Extirpated	1970
Smithville	Extirpated		Extirpated	1950
Vineland	Extirpated		Extirpated	1935
St. Catharines	Extirpated		Extirpated	1938

*The data contained in this appendix was extracted from COSEWIC 2007, Seburn 2010 and NHIC 2011. Please consult these sources for additional information.

²⁹ Note that this element occurrence produces 2 Critical Habitat sites.

³⁰ 2007 record from Guelph District (Ontario Ministry of Natural Resources) Species at Risk Database, submitted to NHIC in 2009.

³¹ Although there are no post-1995 records for the Walpole Island First Nation in the Ontario Herpetofauna Summary (Oldham and Weller 2000), skinks have been incidentally observed there during the period of 2002-2004 (C. Jacobs pers. comm. 2006 *in* COSEWIC 2007) and the element occurrence is reflected as extant in Section 3.1 and Figure 2.

Appendix 3: Ontario Regulation 122/12 - Common Five-lined Skink (Carolinian Population) Habitat

ONTARIO REGULATION 122/12

made under the

ENDANGERED SPECIES ACT, 2007

Made: May 30, 2012

Filed: June 1, 2012

Published on e-Laws: June 1, 2012

Printed in *The Ontario Gazette*: June 16, 2012

Amending O. Reg. 242/08

(GENERAL)

Note: Ontario Regulation 242/08 has previously been amended. For the legislative history of the Regulation, see the Table of Consolidated Regulations – Detailed Legislative History at www.e-Laws.gov.on.ca.

1. Section 1 of Ontario Regulation 242/08 is amended by adding the following subsection:

(2) A reference in this Regulation to a geographic area is a reference to a geographic area named and described in Schedule 1 or 2 to Ontario Regulation 180/03 (Division of Ontario into Geographic Areas) made under the *Territorial Division Act, 2002*.

4. The Regulation is amended by adding the following sections:

Common five-lined skink (Carolinian population) habitat

24.1.2 (1) For the purpose of clause (a) of the definition of “habitat” in subsection 2 (1) of the Act, the areas described in subsection (2) that are located in the geographic areas of Chatham-Kent, Elgin, Essex, Haldimand, Halton, Lambton, Middlesex and Niagara are prescribed as the habitat of the common five-lined skink (Carolinian population).

(2) Subsection (1) applies to the following areas:

1. A naturally occurring area that is being used, or was used at any time in the past three years, by a common five-lined skink (Carolinian population) as a nesting or hibernation site.
2. The area within 30 metres of the area described in paragraph 1.
3. An area other than a naturally occurring area being used by a common five-lined skink (Carolinian population) as a nesting site from the time it is used until the following August 31.

4. An area other than a naturally occurring area being used by a common five-lined skink (Carolinian population) as a hibernation site from the time it is used until the following May 31.
 5. An area that is being used, or has been used at any time in the previous three years, by a common five-lined skink (Carolinian population) to carry on life processes other than nesting or hibernation.
 6. If an area described in paragraph 1, 2, 3, 4 or 5 is located in an area belonging to a land classification described in subsection (3), the entire area so classified and any other contiguous areas, or areas connected by swamp or marsh, that also belong to a land classification described in subsection (3).
 7. An area within 50 metres of an area described in paragraph 3, 4 or 5 if that area provides suitable conditions for a common five-lined skink (Carolinian population) to carry on its life processes.
- (3) The following are the land classifications referred to in paragraph 6 of subsection (2):
1. Any of the following community classes identified under the land classification system for southern Ontario:
 - i. A beach/bar.
 - ii. A sand dune.
 - iii. A sand barren.
 - iv. A tallgrass prairie, savannah or woodland.
 - v. A forest.
 2. A community series identified as cultural meadow under the land classification system for southern Ontario.

(4) In subsection (3),

“land classification system for southern Ontario” means the land classification system set out in the document entitled *Ecological Land Classification for Southern Ontario: First Approximation and its Application*, dated September, 1998 and published by the Ontario Ministry of Natural Resources, as that document may be amended from time to time.

Commencement

5. This Regulation comes into force on the later of July 1, 2012 and the day it is filed.

**Part 2 – *Recovery Strategy for the Common Five-lined Skink (Plestiodon fasciatus) Carolinian and Southern Shield populations in Ontario*, prepared by David C. Seburn (2010)
for the Ontario Ministry of Natural Resources**



Common Five-lined Skink

(Plestiodon fasciatus) Carolinian and Southern Shield populations in Ontario

Ontario Recovery Strategy Series

Recovery strategy prepared under the *Endangered Species Act, 2007*

September 2010

Natural. Valued. Protected.

About the Ontario Recovery Strategy Series

This series presents the collection of recovery strategies that are prepared or adopted as advice to the Province of Ontario on the recommended approach to recover species at risk. The Province ensures the preparation of recovery strategies to meet its commitments to recover species at risk under the Endangered Species Act, 2007 (ESA, 2007) and the Accord for the Protection of Species at Risk in Canada.

What is recovery?

Recovery of species at risk is the process by which the decline of an endangered, threatened, or extirpated species is arrested or reversed, and threats are removed or reduced to improve the likelihood of a species' persistence in the wild.

What is a recovery strategy?

Under the ESA, 2007, a recovery strategy provides the best available scientific knowledge on what is required to achieve recovery of a species. A recovery strategy outlines the habitat needs and the threats to the survival and recovery of the species. It also makes recommendations on the objectives for protection and recovery, the approaches to achieve those objectives, and the area that should be considered in the development of a habitat regulation. Sections 11 to 15 of the ESA, 2007 outline the required content and timelines for developing recovery strategies published in this series.

Recovery strategies are required to be prepared for endangered and threatened species within one or two years respectively of the species being added to the Species at Risk in Ontario list. There is a transition period of five years (until June 30, 2013) to develop recovery strategies for those species listed as endangered or threatened in the schedules of the ESA, 2007. Recovery strategies are required to be prepared for extirpated species only if reintroduction is considered feasible.

What's next?

Nine months after the completion of a recovery strategy a government response statement will be published which summarizes the actions that the Government of Ontario intends to take in response to the strategy. The implementation of recovery strategies depends on the continued cooperation and actions of government agencies, individuals, communities, land users, and conservationists.

For more information

To learn more about species at risk recovery in Ontario, please visit the Ministry of Natural Resources Species at Risk webpage at: www.ontario.ca/speciesatrisk

RECOMMENDED CITATION

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Cette publication hautement spécialisée Recovery strategies prepared under the Endangered Species Act, 2007, n'est disponible qu'en Anglais en vertu du Règlement 411/97 qui en exempte l'application de la Loi sur les services en français. Pour obtenir de l'aide en français, veuillez communiquer avec Pamela Wesley au ministère des Richesses naturelles au 705-755-1661.

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DECLARATION

The Ontario Ministry of Natural Resources has led the development of this recovery strategy for the Common Five-lined Skink in accordance with the requirements of the *Endangered Species Act, 2007* (ESA 2007). This recovery strategy has been prepared as advice to the Government of Ontario, other responsible jurisdictions and the many different constituencies that may be involved in recovering the species.

The recovery strategy does not necessarily represent the views of all of the individuals who provided advice or contributed to its preparation, or the official positions of the organizations with which the individuals are associated.

The goals, objectives and recovery approaches identified in the strategy are based on the best available knowledge and are subject to revision as new information becomes available. Implementation of this strategy is subject to appropriations, priorities and budgetary constraints of the participating jurisdictions and organizations.

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.

RESPONSIBLE JURISDICTIONS

Ontario Ministry of Natural Resources
Environment Canada, Canadian Wildlife Service – Ontario
Parks Canada Agency

EXECUTIVE SUMMARY

The Common Five-lined Skink (*Plestiodon fasciatus*) is the only lizard native to Ontario. Juveniles and some adults have five stripes that run down the back. Juveniles have bright blue tails, but the colour fades with age. Females typically lay a clutch of 9-10 eggs under cover, such as logs or rocks. The young mature in just under two years and typically live less than five years.

The Common Five-lined Skink is widespread in eastern North America, being found from Florida and Texas in the south to Minnesota and Ontario in the north. Canadian populations are limited to Ontario, where they occur in two disjunct areas: a small area in southwestern Ontario along the shorelines of Lakes Erie, St Clair, and Huron (Carolinian population) and along the southern edge of the Canadian Shield (Southern Shield population). Under the *Endangered Species Act, 2007* (ESA 2007) the Southern Shield population is listed as special concern, while the Carolinian population, reduced to only a few sites, is now listed as endangered. There is little information on abundance or trends across Ontario. The only intensive study of the Common Five-lined Skink is at Point Pelee National Park, where abundance declined as a result of disturbance to cover objects. Approximately 36 percent and 76 percent of element occurrences for the Southern Shield population and the Carolinian population, respectively, are considered either historic or extirpated. The Carolinian population has been reduced to six element occurrences.

The Common Five-lined Skink is associated with openings in, or edges of, deciduous forests. Within this broad category there is a wide range of habitats used including rocky outcrops, stabilized sand dunes, riparian forests, open deciduous forests and forest clearings. The Common Five-lined Skink is generally found in sandy areas in the Carolinian population and rocky areas in the Southern Shield population.

The major threat to the species is habitat loss and degradation from development. Disturbance is also a significant threat in the form of destruction or removal of cover objects used by Common Five-lined Skinks. Illegal collecting, traffic mortality and increased predation are also important threats.

A significant knowledge gap is that the complete distribution of the Common Five-lined Skink is not fully known. Other knowledge gaps include a lack of information on movements (habitat use, home range and dispersal), accurate population estimates for most sites in Ontario, and an assessment of the threat that succession poses to sites in Ontario.

A recovery goal has been prepared for each population. The goal for the Carolinian population is to ensure the long term survival of all remaining sub-populations. This recovery goal recognizes that some extant sites may not currently have enough suitable habitat to support the species in the long term. Increasing the amount of suitable habitat and microhabitat should be a high priority to ensure recovery of the species.

Recovery Strategy for the Common Five-lined Skink (Carolinian and Southern Shield populations) in Ontario

The goal for the Southern Shield population is to ensure the long term survival of representative sub-populations across the range.

The recovery objectives for both populations are to:

- 1) Determine the complete distribution of the Common Five-lined Skink in Ontario;
- 2) Improve understanding of population estimates, spatial ecology and clarify uncertain threats;
- 3) Develop and implement management measures to protect sites, reduce identified threats and increase available habitat.

It is recommended that any Ecological Land Classification unit containing a verified Common Five-lined Skink occurrence in the Carolinian population be prescribed as habitat in a habitat regulation. An exception to this approach is any observation outside of suitable habitat. Such an approach is recommended because it ensures all habitat elements required by the Common Five-lined Skinks (nesting, foraging, and hibernating sites) are regulated. Only sites with occurrences documented in the past 20 years should be prescribed as habitat in a habitat regulation for the population. This time period recognizes the cryptic nature of the Common Five-lined Skink and its ability to persist in even small pockets of suitable habitat. No area is recommended for habitat regulation for the Southern Shield population because as a special concern species the habitat protection provisions of the ESA 2007 do not apply.

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1.0 BACKGROUND INFORMATION

1.1 Species Assessment and Classification

COMMON NAME: Common Five-lined Skink

SCIENTIFIC NAME: *Plestiodon fasciatus*

SARO List Classification:

Common Five-lined Skink (Carolinian population) - Endangered (2009)

Common Five-lined Skink (Southern Shield population) - Special Concern (2009)

SARO List History:

Common Five-lined Skink (Carolinian population) - Endangered (2009)

Common Five-lined Skink (Southern Shield population) - Special Concern (2009)

Five-lined Skink - Special Concern (2004)

COSEWIC Assessment History:

Five-lined Skink (Carolinian population) - Endangered (2007)

Five-lined Skink (Great Lakes/St Lawrence population) - Special Concern (2007)

Five-lined Skink - Special Concern (1998)

SARA Schedule 1:

Five-lined Skink (Carolinian population) - Endangered (March 18, 2009)

Five-lined Skink (Great Lakes/St Lawrence population) - Special Concern (March 18, 2009)

CONSERVATION STATUS RANKINGS:

GRANK: G5

NRANK: N3

SRANK: S3

The glossary provides definitions for the abbreviations above.

1.2 Species Description and Biology

Species Description

The Common Five-lined Skink is a small lizard that grows to approximately 86 mm in body (snout-vent) length (COSEWIC 2007). The tail can be longer than the body. Juveniles and some adults have five cream-coloured stripes running down the length of the back. Body colour becomes more bronze with age, although females tend to retain more of the juvenile pattern (COSEWIC 2007). Juveniles have bright blue tails, but the colour fades with age. Adult males have wide heads, compared with females, and develop orange colouration around the jaws and chin during the spring breeding season. The Common Five-lined Skink can shed all or part of the tail when attacked by a predator. The tail will re-grow but will usually look different. The Common Five-lined Skink is the only lizard native to the province of Ontario.

Until recently, the Common Five-lined Skink was placed in the genus *Eumeces*. The genus *Eumeces* included skinks from North America, Africa and Asia. Recent genetic work has indicated that the genus *Eumeces* consists of a number of genera and all North American skinks are now separated into the genus *Plestiodon* (Schmitz et al. 2004, Smith 2005).

A phylogeographic analysis across the range of the Common Five-lined Skink revealed six major mitochondrial lineages (Howes and Lougheed 2008). Both Ontario populations fall within the eastern lineage, the most geographically widespread unit. Ontario populations have less genetic diversity than other more central populations (Howes and Lougheed 2008). The Carolinian and Southern Shield populations demonstrate significant genetic isolation from each other (COSEWIC 2007).

Species Biology

Like all lizards, the Common Five-lined Skink is an ectotherm – it does not maintain a constant body temperature, but controls its body temperature through basking. As such, it is forced to hibernate for approximately half of the year in Ontario. Skinks emerge from hibernation from early April in the Carolinian population (Hecnar and M'Closkey 1998) to early May in the Southern Shield population (Wick 2004). Skinks can be active until late September or early October in Ontario (Hecnar and M'Closkey 1998, Wick 2004).

The Common Five-lined Skink feeds on a variety of invertebrates, primarily arachnids, insects, insect larvae and earthworms (Judd 1962, Hecnar et al. 2002, COSEWIC 2007). Crickets were the most common prey at Rondeau Provincial Park (Judd 1962) while arachnids were the most common prey at Point Pelee National Park (Hecnar et al. 2002) suggesting that the Common Five-lined Skink is not a dietary specialist. It is an active forager, locating prey by sight or chemical perception through tongue-flicking.

Breeding occurs in the spring. Females will mate with more than one male and multiple paternity for a clutch of eggs has been confirmed for Ontario (Wick 2004). Females typically lay 9-10 eggs and remain to brood and guard the eggs for four to six weeks until they hatch in late summer (Vitt and Cooper 1989, Hecnar 1994, COSEWIC 2007). More than one female commonly nests under the same cover object (Cagle 1940, Vitt and Cooper 1986a, Seburn 1990, Hecnar 1994). The offspring typically reach maturity by their second spring. Adults may live up to 10 years of age (Fitch 1956), although most individuals do not live past age five (COSEWIC 2007).

1.3 Distribution, Abundance and Population Trends

The range of the Common Five-lined Skink corresponds to the deciduous hardwood forests of eastern North America (Fitch 1954). It ranges from Florida and Texas in the south to Minnesota and Ontario in the north. Within Canada, it is limited to the province

Recovery Strategy for the Five-lined Skink (Carolinian and Southern Shield populations) in Ontario

of Ontario. The Common Five-lined Skink is found in two widely separated areas of Ontario (COSEWIC 2007, Figure 1):

- 1) The Carolinian population is limited to a small area of southwestern Ontario, close to the shorelines of Lakes Erie, St Clair, and Huron.
- 2) The Southern Shield population occurs along the southern edge of the Canadian Shield, from Georgian Bay in the west, to Leeds and Grenville County in the east.

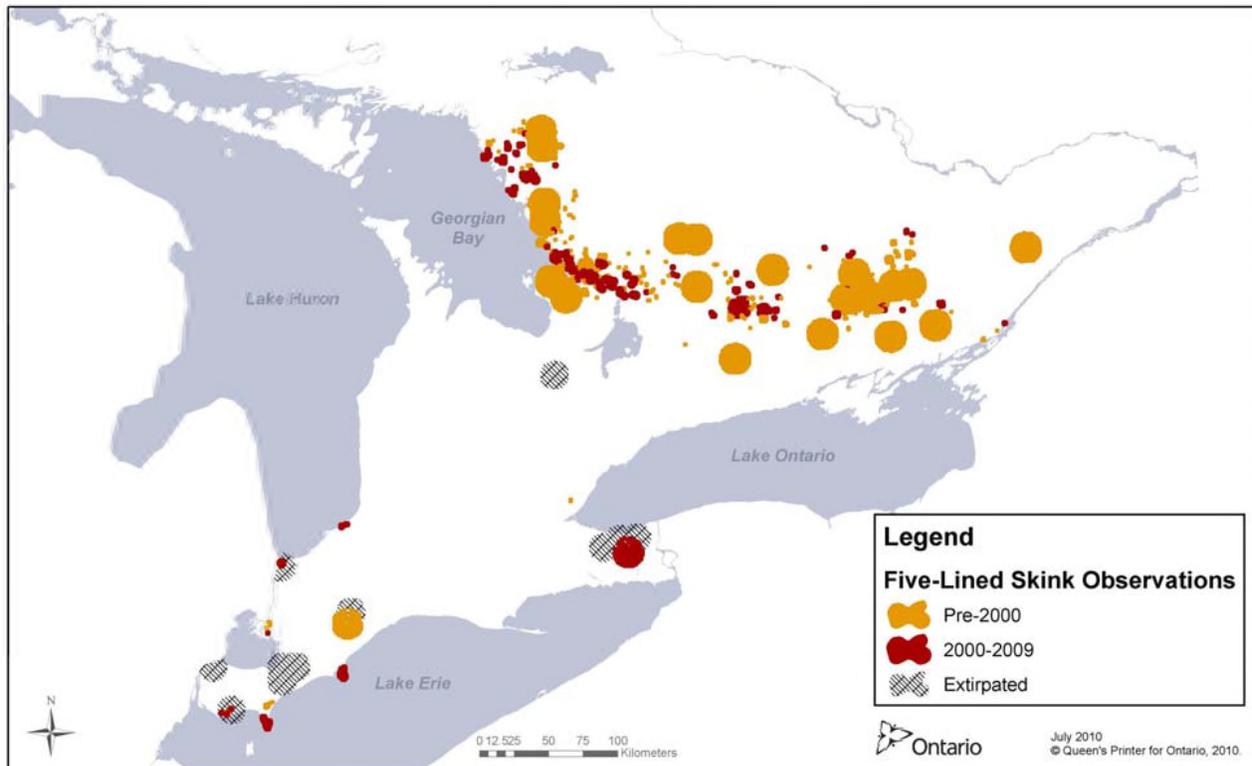


Figure 1. Extirpated and current distribution of the Common Five-lined Skink in Ontario

The Natural Heritage Information Centre of the Ontario Ministry of Natural Resources identifies 200 element occurrences (or sub-populations) of the Common Five-lined Skink in Ontario (NHIC 2010). There are 175 element occurrences for the Southern Shield population, of which 63 are ranked historic (not verified in the last 20 years) and one is ranked extirpated (NHIC 2010). There are 25 element occurrences for the Carolinian population, of which eight are ranked historic and 11 are ranked extirpated (NHIC 2010). Therefore 36 percent and 76 percent of element occurrences for the Southern Shield population and the Carolinian population, respectively, are considered either historic or extirpated. The Carolinian population has been reduced to six element occurrences (NHIC 2010).

There is little information on abundance of Common Five-lined Skinks at most Ontario locations. Skinks are semi-fossorial and spend much of their time concealed under or inside cover objects and are therefore difficult to survey. A total of 428 individuals were marked at Point Pelee National Park during one year (Seburn 1990). Adults made up

approximately 50 percent of the captures. No estimate for the entire park exists, but given that the whole park was not surveyed, the number of Common Five-lined Skinks would most likely have exceeded 1000 individuals in 1989 (personal observation). Surveys for activity density (number of individuals encountered within a defined area on a single survey), which is correlated with population size, have been conducted annually at Point Pelee National Park since 1990 (Hecnar and Hecnar 2009). Peak activity density was over 80 Common Five-lined Skinks at one site within the park (Hecnar and Hecnar 2009). Up to 98 nests have been found in a single year in the park (Hecnar and Hecnar 2009). The Common Five-lined Skink also appears to be relatively numerous at Rondeau Provincial Park, although no quantitative data exist (COSEWIC 2007). Effective population size has been estimated at 306 (95% confidence interval: 273-346) at Point Pelee National Park and 291 (95% confidence interval: 259-329) at Rondeau Provincial Park (COSEWIC 2007). Effective population size is typically significantly lower than population census size. The Common Five-lined Skink appears to be less abundant at other Carolinian sub-populations (Hecnar and Hecnar 2000). There are no population census estimates for any of the Southern Shield sub-populations, although effective population sizes have been calculated for seven sub-populations, varying from 177 to 328 Common Five-lined Skinks (COSEWIC 2007).

Similarly, there is little information on population trends. Populations can vary naturally as a result of the degree of reproductive success from one year to the next (Fitch 1954). Common Five-lined Skink abundance at Rondeau Provincial Park appears stable (COSEWIC 2007) although little quantitative data are available. The Common Five-lined Skink appears to have declined at Pinery Provincial Park, but again, no quantitative data are available (COSEWIC 2007). Research at Point Pelee National Park indicates that the Common Five-lined Skink declined significantly from 1990 to 1995 based on changes in activity density (Hecnar and M'Closkey 1998). The number of skinks increased until hitting a record peak in 2000 and then declined again (Hecnar and Hecnar 2009). When the data from 1990 to 2008 were examined, there was no significant trend over time (Hecnar and Hecnar 2009). Population modeling suggests that the Point Pelee National Park sub-population is at significant risk of extirpation given the inherent variability in population size (Hecnar and Hecnar 2009). It is likely that other Carolinian sub-populations are also at risk of localized extirpations. There are no population trend estimates for any of the Southern Shield sub-populations.

1.4 Habitat Needs

The Common Five-lined Skink is primarily associated with openings in, or edges of, deciduous forests. Within this broad category there is a range of habitats including rocky outcrops, stabilized sand dunes, riparian forests, open deciduous forests and forest clearings (COSEWIC 2007). The Common Five-lined Skink makes use of very different habitats in the two Ontario populations.

Habitat summary

Carolinian population

In southwestern Ontario, the Common Five-lined Skink is primarily limited to stabilized dune habitat and open woods or savanna with sandy substrate near the shorelines of Lakes Erie, St Clair and Huron (COSEWIC 2007). Within these habitats, the Common Five-lined Skink is usually found under cover. Cover objects are usually logs, boards or sheets of wood (Seburn 1990). In general, Common Five-lined Skinks appear to prefer cover objects which are larger than average (Seburn 1990). Larger objects tend to have increased soil moisture as a result of decreased evaporation.

Southern Shield population

The Common Five-lined Skink is largely limited to the southern edge of the Canadian Shield. Within this area, Common Five-lined Skinks are generally restricted to rocky outcrops in an area of mixed coniferous or deciduous forest (Howes and Loughheed 2004). The presence of loose cover rocks on the exposed bedrock was the most important variable in predicting the presence of Common Five-lined Skinks (Howes and Loughheed 2004). In general, Common Five-lined Skinks selected rocks that were longer than average (55.2 ± 2.1 cm) and in more open areas than randomly selected areas (Quirt et al. 2006). Additionally, rocks on a bedrock substrate were commonly used, likely because they provided more ideal thermal conditions. Common Five-lined Skink sites in Minnesota, where the habitat is similar to the Canadian Shield, tend to be associated with permanent or temporary sources of water, including ponds, streams or even temporary pools in rock outcrops (Lang 1982).

Nesting Habitat

Carolinian population

Nesting habitat was found to be a subset of cover objects used throughout the active season (Seburn 1990). Cover objects used for nesting had a significantly larger surface area than other cover objects (Seburn 1993). Nest locations were more commonly found under logs than boards (Hecnar 1994). Larger logs (>15 cm diameter and more than 44770 cm^3) in a moderate state of decay were more commonly used (Hecnar 1994).

Southern Shield population

Nest sites are typically under rocks on top of a thin layer of soil or moss and lichen (Seburn and Seburn 1989, Wick 2004). Nests were found under rocks that averaged 39.3 ± 3.1 cm long and 15.6 ± 1.0 cm thick at one site in Ontario (Wick 2004). Skink eggs have also been found in an abandoned fire pit constructed of rock slabs (Seburn and Seburn 1989). There was no soil in the fire pit, but a large amount of old ash was present.

Hibernation

Carolinian population

Habitat selection for hibernation has not been quantified within this population. Observations of holes in the substrate and the presence of skinks under woody debris on the first days of recorded seasonal activity suggest that skinks at Point Pelee

National Park hibernate within their summer home ranges (S. Hecnar pers. comm. 2010). Common Five-lined Skinks have also been observed overwintering within their summer home range in Kansas (Fitch and von Achen 1977), although it is unclear if this is common. A negative correlation between skink abundance at Point Pelee National Park and annual water levels in Lake Erie suggests that selection of hibernacula below the frost line and above the high water level is important for overwinter survivorship (Hecnar and Hecnar 2009).

Southern Shield population

Little is known about habitat selection for hibernation, although individuals have been found to hibernate in crevices in rock formations or building foundations outside of Ontario (Harding 1997). In a rocky landscape similar to the Canadian Shield, Common Five-lined Skinks have been found two to three metres below the surface in rock fissures during mid-winter at an active quarry in Minnesota (Lang 1982). Common Five-lined Skinks were observed hibernating within their summer home range in Kansas (Fitch and von Achen 1977), although it is unclear if this is common. Therefore it is likely, although unproven, that Common Five-lined Skinks hibernate near or within their summer home ranges.

1.5 Limiting Factors

The Common Five-lined Skink reaches its northern limit in Ontario. Although individuals in the Carolinian population are unlikely to be at their thermal limit, it is possible that the distribution of skinks in the Southern Shield population is limited to the warmest and sunniest areas. Over-wintering locations may also be a limiting factor. Common Five-lined Skinks must hibernate in areas above the water line and also below the frost line (Hecnar and Hecnar 2009).

Although the Common Five-lined Skink is found in diverse habitats in the core of its range in the US, within Ontario it could be considered a habitat specialist. Skinks in the Carolinian population appear to be largely limited to areas with a sandy substrate and individuals in the Southern Shield population are mainly restricted to rock outcrops with loose rock present. The eastern limit of the Common Five-lined Skink in Ontario appears to be set by the presence of moist lowlands (Ussher and Cook 1979).

1.6 Threats to Survival and Recovery

The Common Five-lined Skink faces a number of threats. The following list includes known or perceived threats in decreasing order of importance.

Habitat Loss

The loss, degradation and fragmentation of habitat has been a significant threat to the Common Five-lined Skink, particularly in the Carolinian population where habitat has been lost to urban development, agriculture and recreation (COSEWIC 2007). Loss of

habitat in the Southern Shield population does not appear to be as widespread, although there is less historic knowledge of the distribution of the species in this area. Habitat degradation and loss is likely a growing threat in the Southern Shield population as the human population grows.

It is unclear how significant or widespread succession is as a threat to the Common Five-lined Skink in Ontario. In Minnesota, where the Common Five-lined Skink also makes use of rock outcrops, open habitat declined by roughly two-thirds at known sites from approximately 1940 to 1980 possibly as a result of fire suppression (Lang 1982). Forest succession has almost eliminated the Common Five-lined Skink from the Fitch Natural History Reservation (formerly the University of Kansas Natural History Reservation; Fitch 2006a, b) and it is also believed to have reduced the number of Common Five-lined Skink sites in Connecticut (H. Gruner pers. comm. 2009). A survey of historic Common Five-lined Skink locations in southwestern Ontario commented on the lack of suitable habitat as a result of succession (Hecnar and Hecnar 2000).

Threat level: Widespread
Degree of certainty: High
Level of concern: High

Disturbance

There are a number of kinds of anthropogenic disturbance that threaten the Common Five-lined Skink. The removal of cover objects has been observed in the Southern Shield population (B.J. Howes pers. comm. 2009) and is a significant threat at Point Pelee National Park (Hecnar and M'Closkey 1998). In areas of high use by people, fewer skinks were found and there was less woody debris. Park visitors have used woody cover objects for firewood, removed driftwood for ornamental use, and salvaged boards for lumber. The removal of woody debris may force skinks to re-locate, but may also reduce nesting success if nesting cover objects are removed while females are brooding their eggs. The removal of woody debris is likely also a threat at other sites.

During surveys at Point Pelee National Park, mapped cover objects were commonly found moved (Hecnar and M'Closkey 1998). While much of the disturbance is likely by humans, some disturbance may be the result of predators seeking food. Logs were rolled out of place or broken apart. Up to 82 percent of cover boards set out for Common Five-lined Skink use were disturbed. In June of 1994 and August of 1995 nearly every mapped cover object had been disturbed. Frequent disturbance results in cover objects breaking down into smaller cover objects which are of lesser use to Common Five-lined Skinks (Hecnar and M'Closkey 1998). Disturbance may also cause brooding females to abandon their nests (Fitch 1954). Human activity can also lead to accidental mortality as Common Five-lined Skinks have been found crushed under cover objects that have been stepped on (Hecnar and M'Closkey 1998). There is also the risk of Common Five-lined Skinks being crushed by off road vehicles in the Southern Shield population.

Threat level: Widespread

Degree of certainty: High
Level of concern: High

Illegal Collecting

Several large scale disturbances of cover objects were observed at Point Pelee National Park from 1990 to 1995 (Hecnar and M'Closkey 1998). In June of 1994 and August 1995 virtually every cover object was disturbed (Hecnar and M'Closkey 1998). After these disturbances fewer gravid females and nests were found in the summer and few hatchlings were observed in the late summer and early fall, when they should have been abundant. The authors concluded that this widespread disturbance was likely the result of illegal collecting of Common Five-lined Skinks for the pet trade (Hecnar and M'Closkey 1998).

Threat level: Widespread
Degree of certainty: High
Level of concern: High

Traffic Mortality

A total of 16 Common Five-lined Skinks were found dead on roads in Point Pelee National Park during intensive surveys for vertebrate roadkill in 2005 (Farmer 2007). Similarly, 18 individuals were found dead on roads in Rondeau Provincial Park during surveys in 2005 (Farmer 2007). The threat of roads has also been identified for the Common Five-lined Skink in Florida (Aresco 2005) and Illinois (COSEWIC 2007).

Threat level: Widespread
Degree of certainty: High
Level of concern: Moderate

Increased Predation

Although predation is natural, elevated populations of predators can have a significant effect on prey populations. For example, Raccoon (*Procyon lotor*) population density at Point Pelee National Park is four times the average density for rural Ontario (Phillips and Murray 2005). Raccoons are confirmed predators of Common Five-lined Skinks (COSEWIC 2007) and research suggests that Raccoon predation is considerable at Point Pelee National Park (Hecnar and Hecnar 2005). It has also been observed that domestic cats will kill Common Five-lined Skinks (Lang 1982). The rapidly growing population of Wild Turkeys (*Meleagris gallopavo*) in areas such as Point Pelee National Park may also affect Common Five-lined Skinks (T. Dobbie pers. comm. 2009). In addition to direct predation, predation attempts can result in tail loss in Common Five-lined Skinks (e.g. Cooper and Vitt 1985, Vitt and Cooper 1986b), which in turn leads to reduced sprint speed for a few weeks (Goodman 2006), possibly increasing predation risk.

Threat level: Widespread
Degree of certainty: Moderate
Level of concern: Moderate

1.7 Knowledge Gaps

Although there have been several studies on the Common Five-lined Skink in Ontario there is limited information about various aspects of the species. Significant knowledge gaps include:

Distribution

The complete distribution of the Common Five-lined Skink may not be fully known even in the Carolinian population. A new location with Common Five-lined Skinks in the Carolinian zone was discovered in 2009 (J. Choquette pers. comm. 2009). Common Five-lined Skinks may still be present at some sites classified as historic or at previously unknown locations.

Movement

Habitat use, home range and dispersal of Common Five-lined Skinks have not been studied in any meaningful way. It is important to determine how far individuals typically move or can disperse to adequately inform a habitat regulation for the species.

Population sizes

Population estimates are lacking for all Ontario sites, with the exception of Point Pelee National Park. Some Carolinian sites are only known by the observation of a few Common Five-lined Skinks.

Succession

Although succession is known to cause loss of suitable habitat for Common Five-lined Skinks, it is unclear how significant or widespread succession is as a threat in Ontario.

Predator control

The threat of increased predator populations is an issue that affects many species at risk. While attempts to limit predator access to garbage have been largely successful, predator populations still have abundant food sources. While developing effective strategies to control predator populations is beyond the scope of this recovery strategy, it should be a priority in areas where predators pose a significant threat to many species at risk.

1.8 Recovery Actions Completed or Underway

The following recovery actions have been undertaken for the Common Five-lined Skink or its habitat in Ontario:

Recovery

- Enhancing habitat at the Oxley Poison Sumac Swamp by setting out artificial cover objects (COSEWIC 2007).
- Enhancing habitat at Point Pelee National Park by setting out artificial cover objects (Hecnar and M'Closkey 1998). Since 1996, Parks Canada staff have led Ontario Stewardship Rangers and volunteers in annual restoration of microhabitat for

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Common Five-lined Skink as well as in tagging and monitoring woody debris as part of ongoing restoration efforts (T. Dobbie pers. comm. 2009).

- Control of invasive species affecting Common Five-lined Skink habitat began in 2010 at Rondeau Provincial Park (S. Dobbyn pers. comm. 2010). Additional cover objects are also being provided to increase availability of suitable microhabitat.
- Ontario provincial parks are making changes to reduce predator access to garbage in attempts to help control predator populations (e.g. raccoons).

Education

- Education efforts at Point Pelee National Park have been on-going since at least the early 1990's. Permanent displays about Common Five-lined Skink biology and protection are found at the Visitor Centre and at the children's youth camp in the park. The Common Five-lined Skink is also included in the park's introductory video. In 2009, Common Five-lined Skinks and their habitat were incorporated into the Grade four in-park school program. Live Common Five-lined Skinks are also used in park education programs (T. Dobbie pers. comm. 2009).
- The Common Five-lined Skink has been included in natural heritage programs at Rondeau Provincial Park for many years (S. Dobbyn pers. comm. 2010). Outreach activities also include cottage leaseholders.

Research

- Range-wide phylogeographic study to delineate evolutionary lineages of the species (Howes et al. 2006).
- Range-wide study on intra-population genetic diversity to determine how northern peripheral populations differ from other populations in the range (Howes and Loughheed 2008).
- Ongoing research and monitoring of the Common Five-lined Skink at Point Pelee National Park by Professor Hecnar and his lab (e.g. Baptista 2007, Hecnar and Hecnar 2009) with support of Parks Canada Agency.
- Monitoring of Common Five-lined Skinks within the inland portions of its habitat in Rondeau Provincial Park has been ongoing since 2003 (S. Dobbyn pers. com. 2010)
- Microhabitat study (Howes and Loughheed 2004) and thermoregulation study (Quirt et al. 2006) in the Southern Shield population
- Fine-scale genetic analysis of population structure in the Southern Shield population (Wick 2004).
- Quantitative assessments of Lake Erie Sand Spit Savanna habitat trends have been conducted on two occasions at Point Pelee National Park (Smith and Bishop 2002, Dougan & Associates 2007).

2.0 RECOVERY

2.1 Recovery Goal

The recovery goal for the Carolinian population of the Common Five-lined Skink is to ensure the long term survival of all remaining sub-populations. This recovery goal recognizes that some extant sites may not currently have enough suitable habitat to support the species in the long term. Increasing the amount of suitable habitat and microhabitat should be a high priority to ensure recovery of the species.

The recovery goal for the Southern Shield population of the Common Five-lined Skink is to ensure the long term survival of representative sub-populations across the range. The goal recognizes the widespread nature of the Common Five-lined Skink on the Canadian Shield.

2.2 Protection and Recovery Objectives

Table 1. Protection and recovery objectives

No.	Protection or Recovery Objective
1	Determine the complete distribution of the Common Five-lined Skink in Ontario
2	Improve understanding of population estimates, spatial ecology and clarify uncertain threats
3	Develop and implement management measures to protect sites, reduce identified threats and increase available habitat

2.3 Approaches to Recovery

Table 2. Approaches to recovery of the Common Five-lined Skink in Ontario

Relative Priority (Carolinian population)	Relative Priority (Southern Shield population)	Relative Timeframe	Recovery Theme	Approach to Recovery	Threats or Knowledge Gaps Addressed
1. Determine the complete distribution of the Common Five-lined Skink in Ontario					
Critical	Beneficial	Short-term	Inventory	1.1 Survey historic locations to determine if Common Five-lined Skinks are still present	<ul style="list-style-type: none"> • Distribution of the species is likely not fully known
Critical	Beneficial	Short-term	Inventory	1.2 Develop a prioritized list of sites where the species potentially occurs and survey for presence of Common Five-lined Skinks	<ul style="list-style-type: none"> • Distribution of the species is likely not fully known
Beneficial	Beneficial	Short-term	Inventory	1.3 Determine spatial limits of existing occupied sites	<ul style="list-style-type: none"> • Distribution of the species is likely not fully known
2. Improve understanding of population estimates, spatial ecology and clarify uncertain threats					
Critical	Beneficial	Short-term	Monitoring	2.1 Implement standardized survey protocol (e.g. method used at Point Pelee National Park) for estimating abundance of Common Five-lined Skinks at each Carolinian population site and representative Southern Shield population sites	<ul style="list-style-type: none"> • Population estimates lacking for most sites
Beneficial	Beneficial	Short-term	Research	2.2 Determine habitat use, typical movement and dispersal abilities	<ul style="list-style-type: none"> • Extent of habitat use and dispersal ability largely unknown
Beneficial	Beneficial	Short-term	Research	2.3 Determine if succession is a significant threat to occupied sites and which techniques are beneficial to maintaining or enhancing Common Five-lined Skink habitat	<ul style="list-style-type: none"> • Habitat loss

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Relative Priority (Carolinian population)	Relative Priority (Southern Shield population)	Relative Timeframe	Recovery Theme	Approach to Recovery	Threats or Knowledge Gaps Addressed
3. Develop and implement management measures to protect sites, reduce identified threats and increase available habitat					
Critical	Beneficial	Long-term	Protection	3.1 Develop and implement habitat protection guidelines	• Habitat loss
Critical	Beneficial	Ongoing	Management	3.2 Increase or maintain amount of habitat and microhabitat available for Common Five-lined Skinks	• Habitat loss, Disturbance
Necessary	Beneficial	Ongoing	Protection	3.3 Promote compliance with existing legislation and increase surveillance of habitat during nesting season to discourage collecting of Common Five-lined Skinks	• Illegal collecting
Necessary	Beneficial	Ongoing	Education and Outreach	3.4 Educate target groups (e.g. land owners, pet trade, park visitors) regarding Common Five-lined Skinks and their habitat	• Disturbance, Illegal collecting
Beneficial	Beneficial	Long-term	Management	3.5 Identify and implement approaches to reduce traffic mortality (e.g. seasonal road closures within protected areas)	• Traffic mortality
Beneficial	Beneficial	Ongoing	Research	3.6 Develop and implement additional approaches to manage predator populations	• Increased predation; predator control

Narrative to Support Approaches to Recovery

The abundance of Common Five-lined Skinks appears to rebound quickly after declines if there is abundant habitat and microhabitat available (Hecnar and M’Closkey 1998, Hecnar and Hecnar 2009). Therefore the major requirements for maintaining the current distribution of the Common Five-lined Skink should focus on protecting existing habitat and maintaining, or increasing where possible, the amount of habitat and microhabitat (or cover objects) available. Providing cover objects for Common Five-lined Skinks is an ongoing requirement as cover objects degrade over time. At sites where Common Five-lined Skinks are limited to small areas, concerted efforts should be undertaken to increase the amount of suitable habitat available.

2.4 Performance Measures

Successful recovery, especially for the Carolinian population, will require an increase in the amount of suitable habitat and an increase in the abundance of Common Five-lined Skinks in areas with low abundance. Therefore major performance measures for the Carolinian population are:

- Suitable habitat will increase by at least 25 percent within 10 years. An increase can be the result of increased open areas or through the increase in microhabitat (i.e. cover objects) which improve the suitability of the habitat.
- Abundance estimates for Common Five-lined Skinks will remain stable or increase at all extant sites.

Table 3. Performance measures

Approach	Performance Measure
Objective 1: Determine the complete distribution of the Common Five-lined Skink in Ontario	
1.1 Survey historic locations to determine if skinks are still present	• Majority of historic locations surveyed for Common Five-lined Skinks
1.2 Develop a prioritized list of potential sites and survey for presence of skinks	• Majority of prioritized sites surveyed for Common Five-lined Skinks
1.3 Determine spatial limits of existing occupied sites	• Majority of sites in Carolinian population have habitat mapping completed
Objective 2: Improve understanding of population estimates, spatial ecology and clarify uncertain threats	
2.1 Implement standardized survey protocol (e.g. method used at Point Pelee National Park) for estimating abundance of Common Five-lined Skinks at each Carolinian population site and representative Southern Shield population sites	• Majority of sites in Carolinian population and at least 5 sites in Southern Shield population have abundance estimates using standardized protocol

Recovery Strategy for the Five-lined Skink (Carolinian and Southern Shield populations) in Ontario

Approach	Performance Measure
2.2 Determine habitat use, typical movement and dispersal abilities	<ul style="list-style-type: none"> Completion of habitat use and movement study at one or more sites in Ontario
2.3 Determine if succession is a significant threat to occupied sites and which techniques are beneficial to maintaining or enhancing Common Five-lined Skink habitat	<ul style="list-style-type: none"> At least 10 sites analyzed for loss of habitat as a result of succession
Objective 3: Develop and implement management measures to protect sites, to reduce identified threats and increase available habitat	
3.1 Increase amount of habitat protected	<ul style="list-style-type: none"> Percentage of sites implementing habitat protection guidelines
3.2 Increase or maintain amount of habitat and microhabitat available for Common Five-lined Skinks	<ul style="list-style-type: none"> Majority of Carolinian sites and at least 5 additional Southern Shield sites have increased or maintained habitat and microhabitat for Common Five-lined Skinks
3.3 Promote compliance with existing legislation and increase surveillance of habitat during nesting season to discourage collecting of Common Five-lined Skinks	<ul style="list-style-type: none"> Target groups (e.g. pet stores, reptile keepers, park visitors) demonstrate improved awareness of legislation Patrols of known nesting areas are carried out where appropriate
3.4 Educate target groups (e.g. land owners, pet trade, park visitors) regarding Common Five-lined Skinks and their habitat	<ul style="list-style-type: none"> Target groups (e.g. pet stores, reptile keepers, park visitors) demonstrate improved awareness of threats and stewardship issues
3.5 Identify and implement approaches to reduce traffic mortality (e.g. seasonal road closures within protected areas)	<ul style="list-style-type: none"> Traffic mortality reduction techniques have been implemented and tested at known areas of concern
3.6 Develop and implement additional approaches to control predator populations	<ul style="list-style-type: none"> Predator control techniques have been tested in at least one area and successful techniques are adopted by protected areas with Common Five-lined Skinks

2.5 Area for Consideration in Developing a Habitat Regulation

Under the ESA 2007, a recovery strategy must include a recommendation to the Minister of Natural Resources on the area that should be considered in developing a habitat regulation. A habitat regulation is a legal instrument that prescribes an area that will be protected as the habitat of the species. The recommendation provided below by the author will be one of many sources considered by the Minister when developing the habitat regulation for this species.

A recommended area to be considered in developing a habitat regulation is only required for the Carolinian population of the Common Five-lined Skink. No area is recommended for the Southern Shield population because as a special concern species the habitat protection provisions of the ESA 2007 do not apply.

The extent of habitat occupied by Common Five-lined Skinks at each of the remaining Carolinian sites is highly variable. Sites range from just a few hundred meters to several kilometres in length. Most Common Five-lined Skink locations in the Carolinian population are within one kilometre of the lakeshore, however, Common Five-lined Skink are not restricted to areas close to lakes and can be found in open areas more than one kilometre from water. Common Five-lined Skink habitat also changes over time. It can be reduced as a result of succession resulting in closed canopied areas, or it can be increased as a result of openings. For example, Common Five-lined Skinks appear to be expanding their range into new areas of Point Pelee National Park (Hecnar and Hecnar 2009).

Nesting locations

Common Five-lined Skinks commonly nest under logs or artificial objects such as boards (Fitch 1954, Seburn 1990, Hecnar 1994). Such cover objects are critical to the long term persistence of Common Five-lined Skinks (Hecnar and M'Closkey 1998) and the amount and quality of cover objects needs to be maintained in areas with Common Five-lined Skinks.

Foraging locations

In general, individual skinks make use of only a small area, with movements typically less than 25 meters over the course of a year (Fitch 1954). However, individuals have been observed to move more than 100 meters in Ontario (Seburn 1993) and more than 200 meters in Kansas (Fitch 1954). Common Five-lined Skinks can shift their activity centre more than once during the active season, resulting in home ranges of more than 2000 square meters (Fitch and von Achen 1977). The size and shape of the habitat used by the Common Five-lined Skink will vary greatly from site to site, depending upon the available habitat.

Hibernation locations

Little is known about where Common Five-lined Skinks hibernate in the Carolinian region of Ontario. They may overwinter within their summer home range (Fitch and von Achen 1977), but this may not always be the case. Movements appear to be generally less than 200 meters (Fitch 1954) suggesting that most hibernation locations will be within or adjacent to summer habitat.

Recommendation

It is recommended that the entire Ecological Land Classification (Lee et al. 1998) unit containing each verified Common Five-lined Skink observation in the Carolinian population be prescribed as habitat in a habitat regulation. An exception to this approach is any observation outside of suitable habitat. Such an approach is recommended for a number of reasons including the following.

- Most observations of Common Five-lined Skinks are under cover objects, yet intervening habitat is also used.
- This approach increases the likelihood that all habitat elements required by the Common Five-lined Skinks are included.

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- Information on the spatial limits of habitat used by Common Five-lined Skinks is lacking for most sites.
- Common Five-lined Skink use of habitat may shift with time as a result of changes to habitat.

It is recommended that the development of a habitat regulation be considered at all Carolinian sites with observations of Common Five-lined Skinks in the past 20 years, where suitable habitat still persists. This time period recognizes the cryptic nature of the Common Five-lined Skink and its ability to persist in even small pockets of suitable habitat. The habitat regulation should be written such that it also immediately includes historic sites if the Common Five-lined Skink is reconfirmed and as well as any newly discovered occurrences.

GLOSSARY

Committee on the Status of Endangered Wildlife in Canada (COSEWIC): The committee responsible for assessing and classifying species at risk in Canada.

Committee on the Status of Species at Risk in Ontario (COSSARO): The committee established under section 3 of the *Endangered Species Act, 2007* that is responsible for assessing and classifying species at risk in Ontario.

Conservation status rank: A rank assigned to a species or ecological community that primarily conveys the degree of rarity of the species or community at the global (G), national (N) or subnational (S) level. These ranks, termed G-rank, N-rank and S-rank, are not legal designations. The conservation status of a species or ecosystem is designated by a number from 1 to 5, preceded by the letter G, N or S reflecting the appropriate geographic scale of the assessment. The numbers mean the following:

- 1 = critically imperilled
- 2 = imperilled
- 3 = vulnerable
- 4 = apparently secure
- 5 = secure

Endangered Species Act, 2007 (ESA 2007): The provincial legislation that provides protection to species at risk in Ontario.

Species at Risk Act (SARA): The federal legislation that provides protection to species at risk in Canada. This act establishes Schedule 1 as the legal list of wildlife species at risk to which the SARA provisions apply. Schedules 2 and 3 contain lists of species that at the time the act came into force needed to be reassessed. After species on Schedule 2 and 3 are reassessed and found to be at risk, they undergo the SARA listing process to be included in Schedule 1.

Species at Risk in Ontario (SARO) List: The regulation made under section 7 of the *Endangered Species Act, 2007* that provides the official status classification of species at risk in Ontario. This list was first published in 2004 as a policy and became a regulation in 2008.

REFERENCES

- Aresco, M.J. 2005. Mitigation measures to reduce highway mortality of turtles and other herpetofauna at a north Florida lake. *Journal of Wildlife Management* 69:549-560.
- Baptista, C. 2007. The effects of environmental variables on Five-lined Skink (*Eumeces fasciatus*) abundance in Point Pelee National Park. Unpublished Honours thesis, Department of Biology, Lakehead University, Thunder Bay, Ontario, Canada. 32 pp.
- Cagle, F.R. 1940. Eggs and natural nests of *Eumeces fasciatus*. *American Midland Naturalist* 23:227-233.
- Choquette, J. 2009. Graduate student, University of Guelph. Personal communication with D. Seburn, 4 December, 2009.
- Cooper, W.E. and L.J. Vitt. 1985. Blue tails and autotomy: enhancement of predation avoidance in juvenile skinks. *Zeitschrift Für Tierpsychologie* 70:265–276.
- COSEWIC. 2007. COSEWIC assessment and update status report on the Five-lined Skink *Eumeces fasciatus* (Carolinian population and Great Lakes/St Lawrence population) in Canada. Committee on the Status of Endangered Wildlife in Canada. Ottawa. vii + 50 pp.
- Dobbie, T. 2009. Ecosystem scientist, Point Pelee National Park. Personal communication with D. Seburn, 29 December, 2009.
- Dobbyn, S. 2010. Zone ecologist, Ontario Parks. Personal communication with D. Seburn, 16 February, 2010.
- Dougan & Associates. 2007. Point Pelee National Park Ecological Land Classification and Plant Species at Risk Mapping and Status. Prepared for Parks Canada Agency, Point Pelee National Park of Canada. 128 pp. + Appendices A – I.
- Farmer, R.G. 2007. Factors associated with vertebrate roadkill in southern Ontario parks. Unpublished Master's thesis, Department of Integrative Biology, University of Guelph, Guelph, Ontario, Canada.
- Fitch, H.S. 1954. Life history and ecology of the five-lined skink, *Eumeces fasciatus*. *University of Kansas Publications of the Museum of Natural History* 8:1-156.
- Fitch, H.S. 1956. A ten-year-old skink? *Herpetologica* 12:328.
- Fitch, H.S. 2006a. Collapse of a fauna: Reptiles and turtles of the University of Kansas Natural History Reservation. *Journal of Kansas Herpetology* 17:10-13.

Recovery Strategy for the Five-lined Skink (Carolinian and Southern Shield populations) in Ontario

- Fitch, H.S. 2006b. Ecological succession on a natural area in northeastern Kansas from 1948 to 2006. *Herpetological Conservation and Biology* 1:1-5.
- Fitch, H.S. and P.L. von Achen. 1977. Spatial relationships and seasonality in the skinks *Eumeces fasciatus* and *Scincella laterale* in northeastern Kansas. *Herpetologica* 33:303-313.
- Goodman, R.M. 2006. Effects of Tail Loss on Growth and Sprint Speed of Juvenile *Eumeces fasciatus* (Scincidae). *Journal of Herpetology* 40:99-102.
- Gruner, H. 2009. Vice-president, programs, Connecticut Science Center. Personal communication with D. Seburn, 2 December, 2009.
- Harding, J.H. 1997. Amphibians and Reptiles of the Great Lakes Region. University of Michigan Press, Ann Arbor. xvi + 378 pp.
- Hecnar, S.J. 1994. Nest distribution, site selection, and brooding in the five-lined skink (*Eumeces fasciatus*). *Canadian Journal of Zoology* 72:1510-1516.
- Hecnar, S.J. 2009. Professor, Dept of Biology, Lakehead University, Thunder Bay. Personal communication with D. Seburn, 3 January, 2010.
- Hecnar, S.J. and D.R. Hecnar. 2000. Five-lined skink research at Point Pelee National Park 2000. Report of contract PP00-03 to Parks Canada. 72 pp.
- Hecnar, S.J. and D.R. Hecnar. 2005. Five-lined skink research at Point Pelee National Park 2005. Report of contract PP2005-03.
- Hecnar, S.J. and D.R. Hecnar. 2009. Five-lined skink research at Point Pelee National Park 2008. Report of contract 45237116.
- Hecnar, S.J., R. Freitag, and D.R. Hecnar. 2002. Diet. *Herpetological Review* 33:307-308.
- Hecnar, S.J. and R.T. M'Closkey. 1998. Effects of human disturbance on five-lined skink (*Eumeces fasciatus*) abundance and distribution. *Biological Conservation* 85:213-222.
- Howes, B.J. 2009. Critical habitat biologist, Parks Canada. Personal communication with D. Seburn, 29 December, 2009.
- Howes, B.J., B. Lindsay, and S.C. Loughheed. 2006. Range-wide phylogeography of a temperate lizard, the five-lined skink (*Eumeces fasciatus*). *Molecular Phylogenetics and Evolution* 40:183-194.

Recovery Strategy for the Five-lined Skink (Carolinian and Southern Shield populations) in Ontario

- Howes, B.J and S.C Lougheed. 2004. The importance of cover rock in northern populations of the five-lined skink (*Eumeces fasciatus*). *Herpetologica* 60:287-294.
- Howes, B.J and S.C Lougheed. 2008. Genetic diversity across the range of a temperate lizard. *Journal of Biogeography* 35:1269-1278.
- Judd, W.W. 1962. Observations on the food of the blue-tailed skink in Rondeau Park, Ontario. *The Canadian Field-Naturalist* 76:88-89.
- Lang, J.W. 1982. Distribution and abundance of the five-lined skink (*Eumeces fasciatus*) in Minnesota. Unpublished report to the Minnesota Department of Natural Resources, iv + 41 pp.
- Lee, H.T., W.D. Bakowsky, J. Riley, J. Bowles, M. Puddister, P. Uhlig, and S. McMurray. 1998. Ecological Land Classification for Southern Ontario: First Approximation and Its Application. Ontario Ministry of Natural Resources, Southcentral Science Section, Science Development and Transfer Branch. SCSS Field Guide FG-02.
- Natural Heritage Information Centre (NHIC). 2010. Species Element Occurrence Report: *Eumeces fasciatus*. Website of the Natural Heritage Information Centre of the Ontario Ministry of Natural Resources. <http://www.biodiversityexplorer.mnr.gov.on.ca/nhicWEB/main.jsp>. Accessed 1 March, 2010.
- Phillips, J. and D. Murray. 2005. Raccoon (*Procyon lotor*) population demographics in Point Pelee National Park and implications for the management of turtle species at risk. Contract report for Parks Canada.
- Quirt, K.C., G. Blouin-Demers, B.J. Howes, and S.C. Lougheed. 2006. Microhabitat selection of Five-lined Skinks in northern peripheral populations. *Journal of Herpetology* 40:335-342.
- Schmitz, A., P. Mausfield, and D. Embert. 2004. Molecular studies on the genus *Eumeces* Wiegmann, 1834: phylogenetic relationships and taxonomic implications. *Hamadryad* 28:73-89.
- Seburn, C.N.L. 1990. Population ecology of the five-lined skink, *Eumeces fasciatus*, at Point Pelee National Park, Canada. Unpublished Master's thesis, Department of Biological Sciences, University of Windsor, Windsor, Ontario, Canada. 165 pp.
- Seburn, C.N.L. 1993. Spatial distribution and microhabitat use in the five-lined skink (*Eumeces fasciatus*). *Canadian Journal of Zoology* 71:445-450.

Recovery Strategy for the Five-lined Skink (Carolinian and Southern Shield populations) in Ontario

- Seburn, C.N.L. and D.C. Seburn. 1989. The geographical ecology of the five-lined skink in Ontario. Unpublished report to the Royal Canadian Geographic Society. 26 pp.
- Smith, H.M. 2005. Plestiodon: A replacement name for most members of the genus *Eumeces* in North America. *Journal of Kansas Herpetology* 14:15-16.
- Smith, M. and H. Bishop. 2002. Mapping Critical Red Cedar Savanna Habitat in Point Pelee National Park over the past 69 years (1931-2000). Unpublished Parks Canada report.
- Ussher, R.D. and F.R. Cook. 1979. Eastern limit of the Five-Lined Skink, *Eumeces fasciatus*, in Ontario. *Canadian Field-Naturalist* 93:321–323.
- Vitt, L.J. and W.E. Cooper. 1986a. Skink reproduction and sexual dimorphism: *Eumeces fasciatus* in the Southeastern United States, with notes on *Eumeces inexpectatus*. *Journal of Herpetology* 20:65-76.
- Vitt, L.J. and W.E. Cooper. 1986b. Tail loss, tail color, and predator escape in *Eumeces* (Lacertilia: Scincidae): age-specific differences in costs and benefits. *Canadian Journal of Zoology* 64:583–592.
- Vitt, L.J. and W.E. Cooper. 1989. Maternal care in skinks (*Eumeces*). *Journal of Herpetology* 23:29–34.
- Wick, S.E. 2004. Microsatellite analysis of fine-scale population structure in a northern population of the five-lined skink (*Eumeces fasciatus*). Unpublished Master's thesis, University of Guelph, Guelph, Ontario, Canada. 75 pp.

Part 3 – *Five-lined Skink (Plestiodon fasciatus)* – *Carolinian and Southern Shield Populations* – Ontario Government Response Statement, (2011) prepared by the Ontario Ministry of Natural Resources

Natural. Valued. Protected.

Common Five-lined Skink – Carolinian and Southern Shield Populations

Ontario Government Response Statement



Photo: Bob Bervo

PROTECTING AND RECOVERING SPECIES AT RISK IN ONTARIO

Species at risk recovery is a key part of protecting Ontario's biodiversity. Biodiversity – the variety of life on Earth – provides us with clean air and water, food, fibre, medicine and other resources that we need to survive.

The *Endangered Species Act, 2007* (ESA) is the Government of Ontario's legislative commitment to protecting and recovering species at risk and their habitats. As soon as a species is listed as extirpated, endangered or threatened under the ESA, it is automatically protected from harm or harassment. Also, immediately upon listing, the habitats of endangered and threatened species are protected from damage or destruction.

Under the ESA, the Ministry of Natural Resources (the Ministry) must ensure that a recovery strategy is prepared for each species that is listed as endangered or threatened. A recovery strategy provides science-based advice to the government on what is required to achieve recovery of a species.

GOVERNMENT RESPONSE STATEMENTS

Within nine months after a recovery strategy is prepared, the ESA requires the Ministry to publish a statement summarizing the government's intended actions and priorities in response to the recovery strategy. The recovery strategy for the Common Five-lined Skink was completed on September 10, 2010 (http://www.mnr.gov.on.ca/en/Business/Species/2ColumnSubPage/STDPROD_066837.html).

The response statement is the government's policy response to the scientific advice provided in the recovery strategy. In addition to the strategy, the response statement is based on input from stakeholders, other jurisdictions, Aboriginal communities and members of the public. It reflects the best available traditional, local and scientific knowledge at this time and may be adapted if new information becomes available. In implementing the actions in the response statement, the ESA allows the Ministry to determine what is feasible, taking into account social and economic factors.

The Common Five-lined Skink is the only lizard native to Ontario. It is black or grey with five cream-coloured stripes along its back and a blue tail in juveniles. Females typically lay their eggs under cover objects, such as logs or rocks.

MOVING FORWARD TO PROTECT AND RECOVER COMMON FIVE-LINED SKINK

The Common Five-lined Skink is included on the Species at Risk in Ontario List as two geographically distinct populations – the Carolinian population, which is found in southwestern Ontario, and the Southern Shield population, which is found in central Ontario.

The Common Five-lined Skink (Carolinian population) is listed as an endangered species under the ESA, which protects both the animal and its habitat. The ESA prohibits harm to or harassment of the species and damage to or destruction of its habitat without authorization. Such authorization would require that conditions established by the Ministry be met.

The Common Five-lined Skink (Southern Shield population) is listed as a special concern species under the ESA. A special concern species is one with characteristics that make it sensitive to human activities or natural events.

The main threats to the Common Five-lined Skink include habitat loss and degradation as well as disturbance from the removal of cover objects used by the species, such as logs or rocks.

The government's goal for the recovery of the Common Five-lined Skink is to ensure the long-term viability and survival of both designated populations in Ontario.

Protecting and recovering species at risk is a shared responsibility. No single agency or organization has the knowledge, authority or financial resources to protect and recover all of Ontario's species at risk. Successful recovery requires intergovernmental co-operation and the involvement of many individuals, organizations and communities.

In developing the government response statement, the Ministry considered what actions are feasible for the government to lead directly and what actions are feasible for the government's conservation partners to undertake with government support.

GOVERNMENT-LED ACTIONS

To help protect and recover the Common Five-lined Skink, the government will directly undertake the following actions:

- Develop a survey protocol to be used by proponents and partners to detect the presence or absence of Common Five-lined Skink.
- Educate other agencies and authorities involved in planning and environmental assessment processes on the protection requirements under the ESA.
- Encourage the submission of Common Five-lined Skink data to the Ministry's central repository at the Natural Heritage Information Centre or to the Ontario Reptile and Amphibian Atlas Project.
- Undertake communications and outreach to increase public awareness of species at risk in Ontario.

- Protect the Common Five-lined Skink (Carolinian population) and its habitat through the ESA. Develop and enforce a regulation prescribing the habitat of the species.
- Support conservation, agency, municipal and industry partners in undertaking activities to protect and recover the Common Five-lined Skink. Support will be provided through funding, agreements, permits (including conditions) and advisory services.
- Establish and communicate annual priority actions for government support in order to encourage collaboration and reduce duplication of efforts.

GOVERNMENT-SUPPORTED ACTIONS

The government endorses the following actions for the protection and recovery of the Common Five-lined Skink. Actions identified as “high” will be given priority consideration for funding or for authorizations under the ESA. The government will focus its support on these high-priority actions over the next five years.

Carolinian population:

Focus Area: Protection and Management

Objective: Develop and implement measures to protect sites, reduce identified threats and increase available habitat.

Actions:

1. **(HIGH)** Maintain and, where necessary, increase the amount and quality of habitat and microhabitat (i.e., cover objects) that is available for Common Five-lined Skinks.
2. Identify and implement approaches to reduce threats such as road mortality, highly subsidized predator* populations and disturbance of cover objects.
3. Develop and deliver communications to targeted groups (e.g., landowners, members of the pet trade and park visitors) to promote public awareness of protection provisions, stewardship opportunities and habitat requirements of the Common Five-lined Skink.
4. As opportunities arise, support the securement of lands that contain Common Five-lined Skink sub-populations through existing land securement and stewardship programs.

Focus Area: Research

Objective: Improve understanding of the spatial ecology of the Common Five-lined Skink and clarify uncertain threats.

Actions:

5. **(HIGH)** Conduct studies into the habitat use, typical movements and dispersal abilities of the Common Five-lined Skink.
6. Determine if natural succession to less open habitats is a significant threat to occupied sites and which techniques are beneficial to maintaining or enhancing the suitability of Common Five-lined Skink habitat.

◆ These are predators that exist at unnaturally high levels because of “subsidies” (e.g., food waste or crops) that humans provide.

Focus Area: Inventory and Monitoring
Objective: Determine the distribution, abundance and associated trends of the Common Five-lined Skink in Ontario.

Actions:

7. **(HIGH)** Implement a standardized survey protocol for estimating the abundance over time of Common Five-lined Skinks in the Carolinian population.
8. Develop a prioritized list of historic locations and sites where the species potentially occurs, and survey for the presence of Common Five-lined Skinks.

Southern Shield population:

Actions:

1. **(HIGH)** Implement a standardized survey protocol for estimating the distribution and abundance of Common Five-lined Skinks in the Southern Shield population.
2. Maintain the amount and quality of habitat and microhabitat that is available for Common Five-lined Skinks.
3. Develop and deliver communications to targeted groups (e.g., landowners, members of the pet trade and park visitors) to promote public awareness of stewardship opportunities and habitat requirements of the Common Five-lined Skink.

IMPLEMENTING ACTIONS

Financial support for the implementation of actions may be available through the Species at Risk Stewardship Fund, Species at Risk Farm Incentive Program or Community Fisheries and Wildlife Involvement Program. Conservation partners are encouraged to discuss project proposals related to the actions in this response statement with the Ministry. The Ministry can also advise if any authorizations under the ESA may be required to undertake the project.

Implementation of the actions may be subject to changes in priorities across the multitude of species at risk, availability of resources and the capacity of partners to undertake recovery activities. Where appropriate, the implementation of actions for multiple species will be co-ordinated across government response statements.

REVIEWING PROGRESS

The ESA requires the Ministry to conduct a review of progress toward protecting and recovering a species not later than five years from the publication of this response statement. The review will help determine whether adjustments are needed to achieve the protection and recovery of the Common Five-lined Skink.

ACKNOWLEDGEMENT

We would like to thank all those who participated in the development of the "Recovery Strategy for Common Five-lined Skink – Carolinian and Southern Shield Populations in Ontario" for their dedication to protecting and recovering species at risk.

For additional information:

Visit the species at risk website at
ontario.ca/speciesatrisk

Contact your MNR district office

Contact the Natural Resources Information Centre

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