

**Ontario Species at Risk Evaluation Report for
Common Five-lined Skink
Scinque pentaligne commun
(*Plestiodon fasciatus*)**

Carolinian Population

Committee on the Status of Species at Risk in Ontario
(COSSARO)

(Carolinian Population)
Assessed by COSSARO as Endangered

September 2021

Scinque pentaligne commun (population carolinienne)

Le scinque pentaligne commun (population carolinienne) est classé dans la catégorie des espèces en voie de disparition en Ontario par le CDSEPO.

L'unité désignable carolinienne est l'une des deux unités présentes en Ontario et au Canada; elles sont distinctes l'une de l'autre sur le plan physique, génétique et écologique. Le scinque pentaligne commun n'est pas en péril dans l'ensemble, sauf aux extrémités nord de son aire de répartition, mais aucune aire de répartition plus vaste pertinente sur le plan biologique n'existe pour l'unité désignable carolinienne au-delà de son étendue. La population a connu un déclin de 30 % de son nombre d'individus matures au cours des 10 dernières années et comporte maintenant moins de 5 000 individus, selon les estimations. Son indice de zone d'occupation est petit, en baisse et fragmenté. La fragmentation de l'habitat et la mortalité due à la circulation routière sont les principaux facteurs de ce déclin observé.

La population de scinques pentalignes communs est classée dans la catégorie des espèces en voie de disparition par le CDSEPO, en raison de sa petite aire géographique fragmentée qui connaît un déclin continu, et des déclinés observés et projetés dans la superficie et dans la qualité de l'habitat, ainsi que dans le nombre des sous-populations et des individus matures. Bien que son statut d'espèce en voie de disparition l'emporte, cette espèce respecte également les critères applicables aux espèces menacées, en raison des déclinés observés dans la taille de la population et de son petit nombre total d'individus. Ce statut est conforme au statut actuellement attribué à l'espèce par le COSEPAC.

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Executive summary

Common Five-lined Skink is the most widely distributed lizard in eastern North America. The Carolinian Designatable Unit is one of two units in Ontario and Canada; the two units are isolated physically, genetically, and ecologically. The Common Five-lined Skink is globally secure, but vulnerable in the northern extents of its range, and the Carolinian Designatable Unit does not have a broader biologically relevant geographic range beyond the extend of the Designatable Unit. The population has experienced a 30% decline in the number of mature individuals in the last 10 years and is now estimated to contain fewer than 5,000 individuals. The population has a small, declining, and fragmented Index of Area of Occupancy. Habitat fragmentation and road mortality are the key factors in this observed decline.

The Carolinian population of Five-lined Skink is classified as Endangered by COSSARO, due to its small and fragmented geographic that is experiencing a continuing decline, and observed and projected declines in the area and quality of habitat and the number of sub-populations and mature individuals. Although superseded by endangered status, species also qualifies as threatened due to observed declines in the population size, and the small total number of individuals. This status is consistent with the current COSEWIC status.

1. Eligibility for Ontario status assessment

1.1. Eligibility conditions

1.1.1. Taxonomic distinctness

Formerly included in the genus *Eumeces*, the Common Five-lined Skink (*Plestiodon fasciatus*) is one of three *Plestiodon* species in North America. Despite an extensive global range, no subspecies are recognized, although there is substantial phylogenetic structure and suspected cryptic species in the eastern USA portion of the range (Crother *et al.* 2017).

1.1.2. Designatable units

COSEWIC recognizes two designatable units in Ontario: the Carolinian population, and Great Lakes/St. Lawrence population. This is based on genetic deafferentation between populations, the physical separation between them and biogeographic distinction: the populations are discrete, and differences are evolutionarily significant (COSEWIC 2021).

1.1.3. Native status

Common Five-lined Skink is native to Ontario (COSEWIC 2021).

1.1.4. Occurrence

Common Five-lined Skink occurs in Ontario, and populations spend their entire life cycles within the province (COSEWIC 2021).

1.2. Eligibility results

Common Five-line Skink (*Plestiodon fasciatus*), Carolinian population, is eligible for status assessment in Ontario.

2. Background information

2.1. Current designations

- GRANK: G5T2 (NatureServe 2021)
- IUCN: Least Concern (2007)
- NRANK Canada: N2
- COSEWIC: Endangered (April 2021)
- SARA: Endangered (Schedule 1)
- ESA 2007: Endangered (month and year of last assessment)
- SRANK: S2 (ranked in 2015)

2.2. Distribution in Ontario

The Carolinian population of Common Five-lined Skink is comprised of several distinct subpopulations in southwestern Ontario. Subpopulations are distributed near the shores of lakes Erie, St. Clair, and Huron (COSEWIC 2021). Nine out of a total of 14 EOs are considered extant following considerable search effort (COSEWIC 2021). While skinks were not identified at several historic locations in recent searches, one new EO was discovered in 2015 (Hecnar and Brazeau 2016, 2017). The EOO for this population, based on extant records, is 8,389 km²: a 66.8% reduction compared to the EOO for all historic records, an average decline of 4.8% per decade (COSEWIC 2021). The IAO for extant records is 336 km²: an 81.6% reduction compared to the IAO for all historic records, an average decline of 5.9% per decade (COSEWIC 2021).

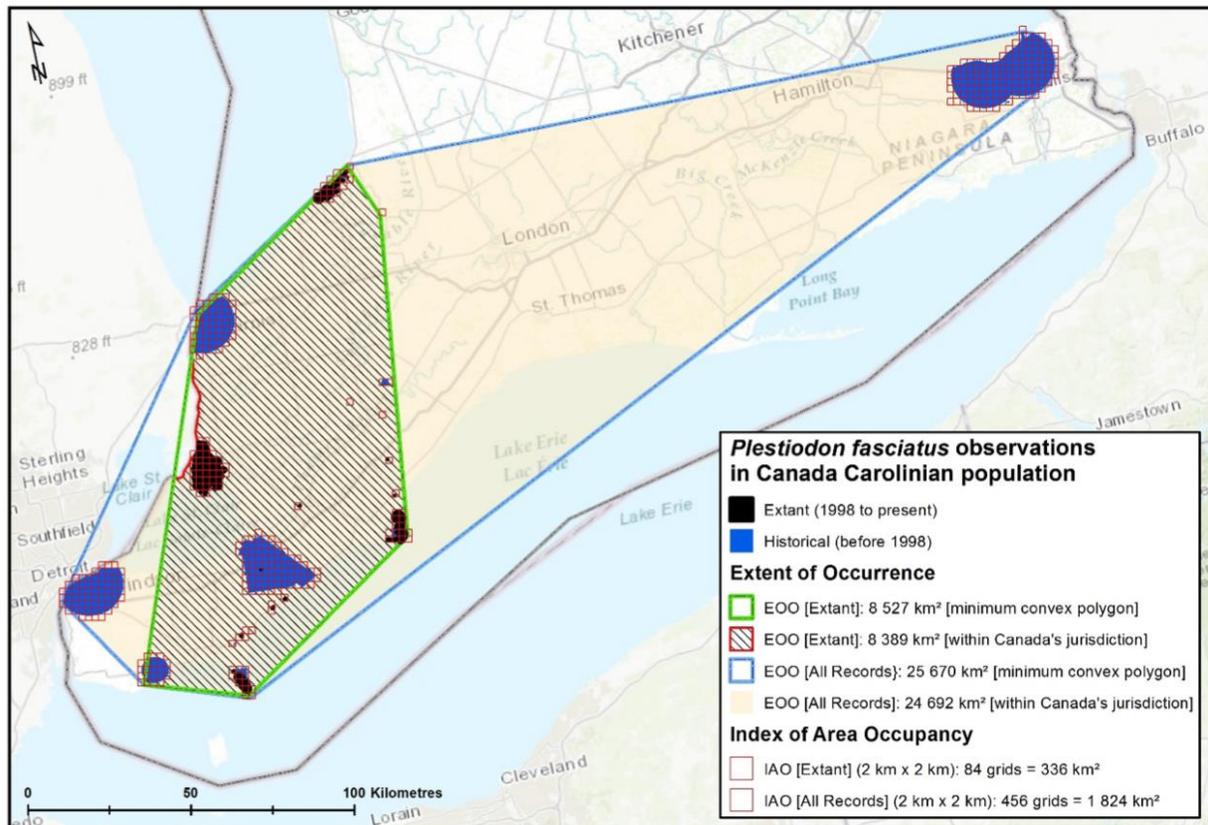


Figure 1. Historic and current distribution, EOO, and IAO for the Carolinian population of Common Five-lined Skink (COSEWIC 2021).

2.3. Distribution, status and the broader biologically relevant geographic range outside Ontario

Common Five-lined Skink is the most widely distributed lizard in eastern North America (Powell *et al.* 2016). Their range extends approximately 1,900 km from the Atlantic seaboard to Texas and Minnesota and 1,800 km from southern Ontario to the Gulf of Mexico (Fitch 1954; Powell *et al.* 2016). The geographic range roughly follows the Temperate Deciduous Forest biome of eastern North America (Fitch 1954; Lomolino *et al.* 2017).

The Carolinian population of Common Five-lined Skink does not have a broader biologically relevant geographic range beyond the Designatable Unit. This population became isolated from populations in the northern USA approximately 4,000 years ago by a water barrier (Strahler 1971). This isolation has led to considerable genetic differentiation both between the two Canadian populations, and between them and other populations of the species (Howes *et al.* 2006; Howes and Lougheed 2008). These two populations may have entered Canada via different post-glacial dispersal routes, and their isolation from one another has been enhanced by habitat fragmentation over the past 4,000 years, and the two populations are now separated by approximately 225 km (COSEWIC 2021). In addition to the genetic and geographic distinctness of the

Carolinian population, it occurs in a different COSWIC terrestrial Amphibians and Reptiles Faunal Province. The differing climate and physiography have likely resulted in local adaptations in the population (COSEWIC 2021).

Although the Carolinian population is isolated from neighbouring populations MI, USA, two subpopulations have genetic affinity with skinks in Eastern Michigan, with much greater genetic differentiation to other USA populations (Howes *et al.* 2006). Three of the four neighbouring populations in the USA are designated as vulnerable and movement between populations is not possibly due to physical barriers (COSWEIC 2021).

Table 1. Condition of the Species in Adjacent Jurisdictions and Broader Biologically Relevant Geographic Range

Adjacent Jurisdictions	Biologically Relevant to Ontario (n/a, yes, no)	Condition	Notes & Sources
Quebec	n/a		
Manitoba	n/a		
Michigan	S3	Three of four neighbouring populations are vulnerable (COSEWIC 2021)	(Natureserve 2021)
Minnesota	S3		(Natureserve 2021)
Nunavut	n/a		
New York	S3		(Natureserve 2021)
Ohio	SNR		(Natureserve 2021)
Pennsylvania	S4		(Natureserve 2021)
Wisconsin	S3		(Natureserve 2021)
<i>Other Relevant Jurisdiction</i>	n/a		

2.4. Ontario conservation responsibility

Approximately 2% of the global distribution of Common Five-lined Skink occurs in Ontario.

2.5. Direct threats

Common Five-lined Skink in Canada are primarily limited by habitat fragmentation (COSEWIC 2021). Historically the result of physical barriers and habitat loss from long-term climate change, habitat fragmentation is now increasing due to human actions. The species' poor dispersal abilities limit the recovery of subpopulations after disturbances. Following application of the IUCN Threats Calculator for the Carolinian

population, an overall threat impact of “high” was determined (COSEWIC 2021), with the following specific threats:

Transportation and service corridors (medium): the high density of roads and traffic in Southern Ontario has resulted in increased mortality of skinks crossing or basking on roads in the Carolinian region (Farmer and Brooks 2012; Baxter-Gilbert *et al* 2013). Roads also act as a barrier, reducing skink movements (Brazeau 2016; Brazeau and Hecnar 2018).

Climate change and severe weather (medium–low): while increased temperatures may be advantageous for the ectothermic skink, other impacts of climate change are likely negative. Increasing frequency of drought, higher temperatures, storm erosion, flooding, and increased lake water levels pose a risk, especially to shoreline subpopulations (COSEWIC 2021). The range of uncertainty for this threat reflects the uncertain impacts.

Invasive and other problematic species (medium–low): predation risks to skinks have increased due to human actions altering predator-prey dynamics in the region. For example, increased racoon populations in the locality of some subpopulations (Phillips and Murray 2005) are troubling because racoons account for a large proportion of skink predation (Hecnar and Hecnar 2005, 2013). Frequencies of tail loss has been shown to positively correlate with the abundance of Striped Skunks in one sub-populations (Myschowoda 2015).

Residential and commercial development (low): many extirpated localities in the Carolinian population are in areas with intense urban development, and other subpopulations are bordered by expanding housing and commercial development (COSEWIC 2021).

Natural system modifications (low): skinks in the Carolinian region are threatened by increasing forest encroachment on their prairie and savannah habitat, linked to reduced forest fire activity and conversion to intense agriculture (COSWEIC 2021).

Human intrusions and disturbances (low): many of the extant skink subpopulations in the Carolinian region occur in provincial or federal parks. Increased visitation in recent years can lead to increased trampling, disturbance, and loss of microhabitat (COSEWIC 2021). It may be possible to reduce this threat through active management, such as habitat restoration (COSWEIC 2021).

Another potential threat with an unknown impact is environmental contamination by pesticides, herbicides, and fertilizers. While there is no specific information on the effects of these produces on skinks, they are known to negatively impact many other lizards and skinks. Such chemicals are widely used across southeastern Ontario, and environmental levels regularly exceed guidelines (MECP 2019).

2.6. Specialized life history or habitat use characteristics

Home ranges of skinks in the Carolinian population averaged $233 \pm 56.6 \text{ m}^2$ during late

summer (Hecnar and Brazeau 2016; Brazeau and Hecnar 2018). Site fidelity appears low, but dispersal is limited (Fitch 1954).

Typical predators of Common Five-lined Skink include Racoons, crows, hawks, foxes, minks, weasels, skunks, opossums, armadillos, snakes, moles, shrews, fish, spiders, and alligators (COSEWIC 2021). Skinks can automize (shed) their tails as a defence mechanism, at the cost of impaired locomotion, reduced social status and reduced growth or reproduction (Goodman 2006).

3. Ontario status assessment

3.1. Application of endangered/threatened status in Ontario

3.1.1. Criterion A – Decline in total number of mature individuals

Threatened A2b A4b.

A 30% decline has been observed in the number of mature individuals in the past 10 years, based on the index of abundance of the two largest subpopulations, caused by threats that have not ceased and may not be reversible.

A 30% decline is suspected in the number of the mature individuals over 10 years past and future, based on the index of abundance of the two largest subpopulations and present and ongoing threats.

3.1.2. Criterion B – Small distribution range and decline or fluctuation

Endangered B2ab(i,ii,iii,iv,v).

The IAO for the Carolinian population is 336 km², the population is severely fragmented (a) and known to exist at a minimum of four locations, and (b) is experiencing a continuing observed decline in EOO (i), IAO (ii), observed and projected declines in extent and quality of habitat (iii), observed decline in the number of locations or subpopulations (iv) and an observed, inferred and projected decline in the number of mature individuals (v).

3.1.3. Criterion C – Small and declining number of mature individuals

Threatened C2a(i).

The number of mature individuals in the Carolinian population is below the threshold for threatened with no subpopulation estimated to contain more than 1,000 individuals.

3.1.4. Criterion D – Very small or restricted total population

Does not apply.

The estimated population exceeds thresholds.

3.1.5. Criterion E – Quantitative analysis

Does not apply.

No analysis has been conducted for the entire population.

3.2. Application of Special Concern in Ontario

Does not apply.

3.3. Status category modifiers

3.3.1. Ontario's conservation responsibility

Modification not applied: the species is not globally at risk, and Ontario's conservation responsibility is clearly below 25%.

3.3.2. Status modification based on rescue effect or level of risk in broader biologically relevant geographic range

Rescue effect modification not applied: immigration is not known or possible due to physical isolation, nearby populations are also vulnerable, and conditions are deteriorating in Ontario and nearby populations.

BBRGR modification not applied: the genetic, geographic, and evolutionary isolation of the Carolinian population does not warrant an BBRGR beyond the range of the population itself. Four subpopulations in MI, USA, are close to the border and are genetically similar to some Carolinian populations. However, the MI population are physically isolated and three of four are also vulnerable, so offer no avenue for this modification.

3.4. Other status categories

3.4.1. Data deficient

Does not apply.

3.4.2. Extinct or extirpated

Does not apply.

3.4.3. Not at risk

Does not apply.

4. Summary of Ontario status

Common Five-lined Skink (*Plestiodon fasciatus*), Carolinian DU, is classified as Endangered in Ontario based on meeting criterion B2ab(i,ii,iii,iv,v).

This status of this species is consistent with the definition of Endangered under the Endangered Species Act, 2007.

5. Information sources

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¹ A change in the classification of a species during reassessment by COSSARO may be for genuine or non-genuine reasons. Genuine reasons may include a reduction in threats to a species such that status of the species has improved, or the continuation of threats to the species such that the status of the species has further deteriorated. Non-genuine reasons may include new information on population size or threats that was not available during a previous assessment, the use of previous COSSARO criteria that may have yielded a different result or, taxonomic revisions that result in changes in range, population sizes or designatable units.

Appendix 1: Technical summary for Ontario

Species: Common Five-lined Skink (*Plestiodon fasciatus*), Carolinian DU

Demographic information

Demographic attribute	Value
Generation time. Based on average age of breeding adult: age at first breeding = X year; average life span = Y years.	3 years
Is there an observed, inferred, or projected continuing decline in number of mature individuals?	Yes based on observed, inferred and projected decline.
Estimated percent of continuing decline in total number of mature individuals within 5 years or 2 generations.	Unknown
Observed, estimated, inferred, or suspected percent reduction or increase in total number of mature individuals over the last 10 years or 3 generations.	Likely >30% reduction based on observed decline in the largest monitored sub population and ongoing threats
Projected or suspected percent reduction or increase in total number of mature individuals over the next 10 years or 3 generations.	10–70% reduction based on threats calculator results of overall: high
Observed, estimated, inferred, or suspected percent reduction or increase in total number of mature individuals over any 10 years, or 3 generations, over a time period including both the past and the future.	Suspect >30% reduction based on observed decline in the largest monitored sub population and ongoing threats
Are the causes of the decline (a) clearly reversible, and (b) understood, and (c) ceased?	a. Yes, but unlikely b. Yes c. No
Are there extreme fluctuations in number of mature individuals?	No, not extreme but some fluctuations exist in sub-populations

Extent and occupancy information in Ontario

Extent and occupancy attributes	Value
Estimated extent of occurrence (EOO). <i>If value in COSEWIC status report is not applicable, then use geocat.kew.org. State source of estimate.</i>	8389 km ² (extant sites 1998–2018, COSEWIC 2021)
Index of area of occupancy (IAO). <i>If value in COSEWIC status report is not applicable, then use geocat.kew.org. State source of estimate.</i>	336 km ² (extant sites 1998–2018, COSEWIC 2021)

Extent and occupancy attributes	Value
<p>Is the total population severely fragmented? i.e., is >50% of its total area of occupancy in habitat patches that are: (a) smaller than would be required to support a viable population, and (b) separated from other habitat patches by a distance larger than the species can be expected to disperse?</p>	<p>Yes a. All extant subpopulations have low long-term viability, including the largest b. Mean distance between subpopulations is 31 km of inhospitable habitat, beyond the species dispersal abilities</p>
<p>Number of locations. <i>See Definitions and Abbreviations on COSEWIC and IUCN websites for more information on the term "location". Use plausible range to reflect uncertainty if appropriate.</i></p>	<p>4–9 (9 extant subpopulations, however 6 populations are on a shoreline with potential to be affected by a single storm event, potentially reducing locations to 4)</p>
<p>Number of NHIC Element Occurrences <i>Request data from MNRF.</i></p>	<p>n/a</p>
<p>Is there an observed, inferred, or projected continuing decline in extent of occurrence?</p>	<p>Yes, observed (-66.8% long-term decline, averaging ~4.8% per decade)</p>
<p>Is there an observed, inferred, or projected continuing decline in index of area of occupancy?</p>	<p>Yes, observed (-81.6% long-term decline averaging ~5.9% decline per decade)</p>
<p>Is there an observed, inferred, or projected continuing decline in number of sub-populations or EOs?</p>	<p>Yes, observed (5 of 14 subpopulations lost according to recent records)</p>
<p>Is there an observed, inferred, or projected continuing decline in number of locations?</p>	<p>Yes, observed (locations defined by subpopulations, see above)</p>
<p>Is there an observed, inferred, or projected continuing decline in [area, extent and/or quality] of habitat?</p>	<p>Yes, observed and projected decline from coastal erosion and human activities. 65.9% of historic locations had lost habitat quality through urbanization or forest encroachment.</p>
<p>Are there extreme fluctuations in number of populations?</p>	<p>No</p>

Extent and occupancy attributes	Value
Are there extreme fluctuations in number of locations?	No
Are there extreme fluctuations in extent of occurrence?	No
Are there extreme fluctuations in index of area of occupancy?	No

Number of mature individuals in each sub-population or total population (if known)

Sub-population (or total population)	Number of mature individuals
Method 1, based on extrapolation from densities recorded at 3 sites to delineated area of EOs: 3,967 mature individuals (range 2,897–5,057). Method 2, based on multiplying average density recorded at 3 sites by number of EOs: 1,404 mature individuals (range 562–2,246).	<1000 per subpopulation
Total (rounded)	500–5000

Quantitative analysis (population viability analysis conducted)

Probability of extinction in the wild is unknown. PVAs for two of the largest subpopulations indicated 12% and 38.9% probability of extinction within 20 years and 30% and 97% in the next 50 years.

Threats

A threats calculator (completed 20 June 2019) found an overall threat impact of “high”, with threats in the following categories:

- Transportation and service corridors (medium)
- Climate change and severe weather (medium to low)
- Invasive or other problematic species and genes (medium to low)
- Residential and commercial development (low)
- Natural system modifications (low)
- Human intrusions or disturbance (low)
- Pollution (unknown)

Rescue effect

Rescue effect attribute	Value
Does the broader biologically relevant geographic range for this species extend beyond Ontario?	No
Status of outside population(s) most likely to provide immigrants to Ontario	Vulnerable (S3) in MN, MI, NY, Not Ranked (NR) in OH, Apparently Secure (S4) in PA
Is immigration of individuals and/or propagules between Ontario and outside populations known or possible?	No
Would immigrants be adapted to survive in Ontario?	Possibly
Is there sufficient suitable habitat for immigrants in Ontario?	No
Are conditions deteriorating in Ontario?	Yes
Is the species of conservation concern in bordering jurisdictions?	Yes (Vulnerable, S3, in MI and NY)
Is the Ontario population considered to be a sink?	No
Is rescue from outside populations likely?	No

Sensitive species

This is not a data sensitive species in Ontario.

Acronyms

COSEWIC: Committee on the Status of Endangered Wildlife in Canada
COSSARO: Committee on the Status of Species at Risk in Ontario
ESA: Endangered Species Act
EO: Element occurrence (as defined by NHIC)
EOO: extent of occurrence
GRANK: global conservation status assessments
IAO: index of area of occupancy
IUCN: International Union for Conservation of Nature and Natural Resources
MNRF: Ministry of Natural Resources and Forestry
NHIC: Natural Heritage Information Centre
NNR: Unranked
NRANK: National conservation status assessment
SARA: Species at Risk Act
SNR: unranked
SRANK: subnational conservation status assessment
S1: Critically Imperiled
S2: Imperiled
S3: Vulnerable
S4: Apparently Secure
S5: Secure
IUCN: International Union for Conservation of Nature and Natural Resources
CDSEPO: Le Comité de détermination du statut des espèces en péril en Ontario