

**Ontario Species at Risk Evaluation Report for
Eastern Massasauga**

Massasauga de l'Est

**Wahbunoongn zhenuhwa (Massasauga:
Anishinaabe/Ojibway), zhenuhwa (rattlesnake:
Anishinaabe/Ojibway), kenabig (snake:
Anishinaabe/Ojibway), Zhiishiigweg (Massasauga:
Anishinaabek)**

(Sistrurus catenatus)

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

Assessed by COSSARO as Threatened

January 2026

Final

Executive summary

Eastern Massasauga (*Sistrurus catenatus*) is a relatively small grey to light brown snake with dark saddle-shaped patches along its back and a segmented rattle at the end of its tail. It is one of three species in the *Sistrurus* genus, and the only extant rattlesnake in Ontario. Eastern Massasauga is known to occupy a variety of landcover types, including wet prairie, old fields, peatlands, shrub thickets, bogs, fens, bedrock barrens, and deciduous and coniferous forests. During the winter this species hibernates in animal burrows and rock fissures below the frost line.

While previously more widespread, the species is currently found on the Bruce Peninsula and along the eastern shore of Lake Huron in the Great Lakes / St. Lawrence region, with isolated sub populations in the Carolinian region. Populations in these regions were previously assessed independently as separate designatable units; however, new genetic evidence shows greater connectedness and the populations no longer meet the definition for separate designatable units. Eastern Massasauga was previously classified as Threatened in the Great Lakes / St. Lawrence region, and Endangered in the Carolinian region by COSSARO, and is listed as such on the Species at Risk in Ontario List.

In 2025 COSEWIC determined that the Ontario population should be considered a single unit, and COSSARO reached the same conclusion. The Ontario population of Eastern Massasauga is primarily threatened by habitat loss and modification, along with road mortality and persecution due to negative public perception. The global population of Eastern Massasauga extends into multiple U.S. states, but the Broader Biologically Relevant Geographic Range for the Ontario population does not extend beyond Michigan where it is considered critically imperiled. The species is globally vulnerable and declining in all jurisdictions.

Eastern Massasauga is assessed by COSSARO as Threatened in Ontario based on criteria A2acd+3cd+4acd, due to past and projected declines over any three generations exceeding 30%. These projected declines are based upon observed, projected, and inferred analysis of occupied habitats, along with roadkill and persecution. A similar decline is expected to occur in future based on continuing threats and population viability analyses of some sub-populations. This status matches the most recent COSEWIC assessment.

1. Eligibility for Ontario status assessment

1.1. Eligibility conditions

1.1.1. Taxonomic distinctness

Eastern Massasauga is one of several massasaugas and closely linked to the Western Massasauga, but is a separate species (Crother *et al.* 2011; Crother *et al.* 2017).

1.1.2. Designatable units

Eastern Massasauga was previously assessed by COSEWIC and COSSARO as two separate designatable units, one in the Great Lakes / St. Lawrence region and one in the Carolinian region. This classification was based on genetic distinctiveness, eco-geographic regions, range disjunction, and ecological settings (COSEWIC 2012).

COSEWIC recently revised its guidelines for designatable units, and subsequent review of the units for Eastern Massasauga led to committee to adopt a single designatable unit approach for the Canadian population. Genetic studies for Eastern Massasauga indicate substantial genetic isolation between Ontario sub-populations (Chiucchi and Gibbs 2010; DiLeo and Loughheed 2011; DiLeo et al. 2013; Sovic et al. 2019), but are not cluster sorted to the extent necessary to meet the definition for separate designatable units. The current distribution of sub-populations likely represents the remains of a once connected population, isolated by land-use change (COSEWIC 2025). Accordingly, the previous designatable units did not meet the definition for Heritable Discreteness.

The previous pair of designatable units also fails to meet the criterion for Geographic Discreteness, which requires there to be severely limited transmission of heritable information (e.g., gene flow) for an extended time, and unlikely to occur in the future, and cannot be caused by human activities. The genetic data imply relatively recent connectivity, and the current disconnection is likely caused by human activities.

COSSARO follows the COSEWIC definitions of designatable units, and it therefore follows to adopt the approach of a single, combined, population for the Ontario assessment.

1.1.3. Native status

Eastern Massasauga is native to Ontario.

1.1.4. Occurrence

Eastern Massasauga occurs in Ontario.

1.2. Eligibility results

Eastern Massasauga (*Sistrurus catenatus*) is eligible for status assessment in Ontario.

2. Background information

2.1. Current designations

- GRANK: G3 (NatureServe 2026)
- IUCN: Least Concern (March 2007)
- NRANK Canada: N3 (NatureServe 2026)
- COSEWIC: Threatened (May 2025)
- SARA: Endangered (Carolinian population) / Threatened (Great Lakes / St. Lawrence population (Schedule 1)
- MBCA protection: No
- Aquatic species under SARA: No
- COSSARO: Endangered (Carolinian population) / Threatened (Great Lakes / St. Lawrence population) (January 2013)
- ESA 2007 (Species at Risk in Ontario List): Endangered (Carolinian population) / Threatened (Great Lakes / St. Lawrence population) (Originally added in 2008, split in 2014)
- SRANK: S1 (Carolinian population) / S3 (Great Lakes / St. Lawrence population) (ranked in 2015)

2.2. Distribution in Ontario

Eastern Massasauga in Ontario are split across two different biogeographic zones, formerly considered to be separate designatable units (see 1.1.2). The Carolinian region supports two isolated subpopulations, Ojibway Prairie Complex and Wainfleet Bog near Port Colborne. The Great Lakes / St. Lawrence region likely supports multiple subpopulations, defined by geographic and genetic evidence.

Using contemporary (2000–2022) observations, the extent of occupancy for the combined Ontario population is 115,380 km², while index area of occupancy is 2,736 km². The Great Lakes / St. Lawrence bioregion supports much of the current population, illustrated by an AIO of 2,696 km² vs. an AIO of 40 km² for the Carolinian region. Historically the Carolinian region had an additional 19 sub-populations beyond the two that remain. The number of locations for the combined Ontario population is estimated at 41–44 based on elemental occurrences and hibernaculum.

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

Eastern Massasauga is found in the Great Lakes lowland region, in both Canada and the USA. The global range is estimated at 200,000–2,500,000 km² (NatureServe 2023). This is similar to historic estimates, but there has been increasing fragmentation within the overall range (USFWS 1998; Szymanski et al. 2016). Across the species' historic range, 9 out of 11 jurisdictions have lost 30–50% of their populations (COSEWIC 2025) and ~40% of counties with historic populations no longer support the species (USFWS 2010). The contemporary global range, beyond Ontario, includes Illinois, Indiana, Iowa, Michigan, Minnesota, Missouri, New York, Ohio, Pennsylvania, and Wisconsin (USFWS

2010).

The Ontario population is historically collected to the broader population in the USA. The species has low dispersal ability, making regular movement unlikely, meaning that defining the broader biologically relevant geographic range for Eastern Massasauga depends on the timeline and extent of genetic isolation. Most of the Ontario population shows extended genetic isolation from other populations (COSEWIC 2025). However, the Ojibway sub-population in the Carolinian region is more closely linked to populations in Michigan, Indiana, and Ohio (Ray et al. 2013) based upon an mtDNA haplotype that is not present in other Ontario populations, although microsatellites show gene flow throughout the Ontario population including the Ojibway sub-population. While overall connectedness with other populations seems very low, a BBRGR that includes Michigan is the most conservative approach. The status of Eastern Massasauga in Michigan is S1, while all other USA states have the species ranked at greater risk than Ontario.

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	No	n/a	n/a
Manitoba	No	n/a	n/a
Michigan	Yes	S1	n/a
Minnesota	No	n/a	n/a
Nunavut	No	n/a	n/a
New York	No	n/a	n/a
Ohio	No	n/a	n/a
Pennsylvania	No	n/a	n/a
Wisconsin	No	n/a	n/a

2.4. Ontario conservation responsibility

Ontario is home to approximately 10% of the global population of Eastern Massasauga.

2.5. Direct threats

Eastern Massasauga in Ontario are primarily threatened by reductions in the quantity and quality of habitat available to them, along with fragmentation of their ranges by increased road development, along with intentional killing, climate change, and other cumulative effects (Parks Canada 2015).

Historic declines of Eastern Massasauga are largely attributed to human led landscape modification. This includes wetland drainage for agricultural production, natural resource extraction, fragmentation, road mortality, and human habitation (Parks Canada 2015). Extant sub-populations continue to face these threats.

Eastern Massasauga, as a venomous snake, also experience widespread negative

public perception due to fears for public safety.

The overall threat assessment for Eastern Massasauga is high, with a projected continuing decline. Threat categories include transportation and service corridors; climate change & severe weather; residential & commercial development; biological resource use; human intrusions & disturbance; invasive & other problematic species & genes; energy production and mining; natural system modifications; agriculture; and pollution (COSEWIC 2025).

2.6. Specialized life history or habitat use characteristics

Eastern Massasauga have relatively low dispersal abilities, and the increased fragmentation of their ranges by road development significantly limits their ability to re-colonize otherwise available habitat (Rouse et al. 2011; Colley et al. 2017).

Eastern Massasauga is the only venomous snake currently found in Ontario. Despite posing a minimal public safety concern, this factor has led to widespread persecution and misunderstanding (COSEWIC 2025).

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

Meets Threatened criteria A2acd+3cd+4acd. Past and projected declines over any three generations exceed 30%, based upon observed, projected, and inferred analysis of occupied habitats, along with roadkill and persecution. A similar decline is expected to occur in the future based on continuing threats and Population Viability Analyses of some sub-populations.

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

Does not apply. EOO exceeds 20,000 km². IAO is below threshold, but sub-criteria are not met.

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

Does not apply. Estimated population range extends above 10,000 and C2 sub-criteria not met.

3.1.4. Criterion D – Very small or restricted total population

Does not apply. Estimated population exceeds 1,000, IAO exceeds 20 km² and number of locations exceeds five.

3.1.5. Criterion E – Quantitative analysis

Does not apply. No suitable analysis has been conducted.

3.2. Application of Special Concern in Ontario

Does not apply.

3.3. Status category modifiers

3.3.1. Ontario's conservation responsibility

Does not apply. Less than 25% of the species' global range / population is found within Ontario (approximately 10%; COSEWIC 2025).

3.3.2. Status modification based on level of risk in broader biologically

relevant geographic range

Does not apply. The species is at risk throughout its global range, including the BBRGR, with 30–50% declines in 9 out of 11 jurisdictions throughout its historic range, and is assessed as critically imperilled in Michigan.

3.3.3. Rescue Effect

Does not apply. Rescue from outside Ontario is unlikely; populations in USA states are severely fragmented, declining, and beyond the natural dispersal abilities of the species.

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

Eastern Massasauga (*Sistrurus catenatus*) is classified as Threatened in Ontario based on meeting criterion A2acd+3cd+4acd. This status matches the most recent COSEWIC assessment.

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

The change in status of the Carolinian population from the 2014 assessment is considered a non-genuine¹ change based on reevaluation of designatable units with new genetic information.

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.

5. Information sources

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Appendix 1: Technical summary for Ontario

Species: Eastern Massasauga (*Sistrurus catenatus*)

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.	6–8 years
Is there an observed, inferred, or projected continuing decline in number of mature individuals?	Yes based on observed, inferred, and projected declines in spatial occurrence
Estimated percent of continuing decline in total number of mature individuals within 5 years or 2 generations.	24–44% decline, observed and inferred from spatial analyses
Observed, estimated, inferred, or suspected percent reduction or increase in total number of mature individuals over the last 10 years or 3 generations.	21–45% reduction, observed and inferred from spatial analyses
Projected or suspected percent reduction or increase in total number of mature individuals over the next 10 years or 3 generations.	27–46% reduction, observed and inferred from spatial analyses
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.	46.7–100% reduction, projected and inferred from spatial analyses
Are the causes of the decline (a) clearly reversible, and (b) understood, and (c) ceased?	a. Partially b. Yes c. No
Are there extreme fluctuations in number of mature individuals?	No

Extent and occupancy information in Ontario

Extent and occupancy attributes	Value
Estimated extent of occurrence (EOO).	115,380 km ²
Index of area of occupancy (IAO).	2,736 km ²
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	a. No b. Yes

Extent and occupancy attributes	Value
(b) separated from other habitat patches by a distance larger than the species can be expected to disperse?	
Number of locations.	>10
Number of NHIC Element Occurrences	81
Is there an observed, inferred, or projected continuing decline in extent of occurrence?	Yes
Is there an observed, inferred, or projected continuing decline in index of area of occupancy?	No
Is there an observed, inferred, or projected continuing decline in number of sub-populations or EOs?	Yes (Carolinian); No (Great Lakes / St. Lawrence)
Is there an observed, inferred, or projected continuing decline in number of locations?	Yes
Is there an observed, inferred, or projected continuing decline in [area, extent and/or quality] of habitat?	Yes
Are there extreme fluctuations in number of populations?	No
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
- Great Lakes / St. Lawrence	
- Eastern Georgian Bay	1,774–8,727
- Bruce Peninsula	661–3,300
- Carolinian Region	
- Ojibway	0–12
- Wainfleet	2–31
- Total	2,435–12,027

Quantitative analysis (population viability analysis conducted)

Probability of extinction in the wild is unknown.

Threats

A threats calculator was completed by COSEWIC. Key threats were:

- Transportation & service corridors: Roads & railroads (High)
- Climate change: Temperature extremes and storms & flooding (Medium-Low)
- Residential and Commercial development: Housing & urban areas (Low)

- Natural system modifications: Fire & fire suppression and Other ecosystem modifications (Low)

Rescue effect

Rescue effect attribute	Value
Does the broader biologically relevant geographic range for this species extend beyond Ontario?	Possibly
Status of outside population(s) most likely to provide immigrants to Ontario	S1 (Michigan)
Is immigration of individuals and/or propagules between Ontario and outside populations known or possible?	Unknown, but unlikely
Would immigrants be adapted to survive in Ontario?	Yes
Is there sufficient suitable habitat for immigrants in Ontario?	No (Carolinian); Yes (Great Lakes / St. Lawrence)
Are conditions deteriorating in Ontario?	Yes/No/Unknown/Probably/Possibly
Is the species of conservation concern in bordering jurisdictions?	Yes
Is the Ontario population considered to be a sink?	Yes (Carolinian); No (Great Lakes / St. Lawrence)
Is rescue from outside populations likely?	No

Sensitive species

The species is not restricted by NHIC, but the locations of hibernation sites are protected.

Acronyms

BBRGR: Broader Biological Relevant Geographic Range
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
MBCA: Migratory Birds Convention Act
MNR: Ministry of Natural Resources
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