

Ontario Species at Risk Evaluation Report for

Gray Ratsnake

Couleuvre Ratière Grise

(*Pantherophis spiloides*)

Great Lakes / St. Lawrence Population

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

(Great Lakes / St. Lawrence Population)
Assessed by COSSARO as Threatened

November 2020

Couleuvre Ratière Grise (*Pantherophis spiloides*)

La couleuvre obscure est le plus grand serpent de l'Ontario. Cette espèce, caractérisée par une maturité tardive et un taux de reproduction faible, occupe une région de plus en plus fragmentée de l'Ontario. La couleuvre obscure est menacée par le développement continu et l'expansion du réseau routier, qui entraînent une perte d'habitat et de la mortalité. Cette espèce est particulièrement sensible à la perte d'habitat dans les zones d'hibernacles communaux. La zone d'occurrence de cette espèce semble avoir nettement rétréci dans la province. Les données sur de multiples sous-populations de la population de l'axe de Frontenac indiquent une décroissance des populations à certains endroits; toutefois, aucune donnée n'est disponible sur des estimations généralisées de l'abondance et les tendances de la population. L'immigration en provenance d'autres populations est peu probable car la population est séparée de celle du nord-ouest de l'État de New York par le fleuve Saint-Laurent et se trouve à au moins 100 km de la principale aire de répartition de l'espèce dans cet État.

Le CDSEPO estime que la population de l'axe de Frontenac de la couleuvre obscure est une espèce menacée, en raison d'une baisse supposée supérieure à 30 % du nombre d'individus matures dans les trois dernières générations. Cette espèce, menacée par la perte et la fragmentation de son habitat, la mortalité sur les routes et par son élimination délibérée, de même que par la perturbation de ses hibernacles, a peu de moyens pour retourner la situation face à ces menaces. Cette évaluation concorde avec la classification fédérale de cette espèce par le COSEPAC (2018).

Cette publication hautement spécialisée «COSSARO Candidate Species at Risk Evaluation for Gray Ratsnake» n'est disponible qu'en anglais conformément au Règlement 671/92, selon lequel il n'est pas obligatoire de la traduire en vertu de la Loi sur les services en français. Pour obtenir des renseignements en français, veuillez communiquer avec le ministère l'Environnement, de la Protection de la nature et des Parcs au cossarosecretariat@ontario.ca.

Executive summary

Gray Ratsnakes are the largest snakes in Ontario. This species has a late age of sexual maturity and low reproductive rates and occupies a region of Ontario that is increasingly fragmented. Gray Ratsnakes are threatened by ongoing development and by expansion of road networks which result in both habitat loss and mortality. This species is especially sensitive to habitat loss in areas of communal hibernacula. The extent of this species occurrence appears to have declined significantly within the province. Data from multiple subpopulations within the Great Lakes / St. Lawrence population indicate decreasing populations at some locations; however, widespread estimates of abundance and population trends are unavailable. Rescue from other populations is unlikely since this population is already separated from upstate New York by the St. Lawrence River and by at least 100 km from the main species range in New York State.

The Great Lakes / St. Lawrence designatable unit of Grey Ratsnake is classified by COSSARO as Threatened, due to an inferred decline greater than 30% in the number of mature individuals in the past three generations. The species' threatened by habitat loss and fragmentation, deliberate killing and road mortality, and hibernacula disturbances, and has a poor ability to rebound from threats. This classification is consistent with the federal classification of this species by COSEWIC (2018).

1. Eligibility for Ontario status assessment

1.1. Eligibility conditions

1.1.1. Taxonomic distinctness

The species was originally recognized in western science by Say (1823), and since that time it has been divided into five subspecies: *Elaphe obsoleta obsoleta* (Say 1823), *Elaphe obsoleta lindheimeri* (Baird and Girard 1853), *Elaphe obsoleta quadrivittata* (Holbrook 1836), *Elaphe obsoleta rossalleni* (Neill 1949), and *Elaphe obsoleta spiloides* (Duméril et al. 1854). All Ontario populations were classified as Black Ratsnakes (*Elaphe obsoleta obsoleta*). In 2012, Crother (2012) proposed the genus name *Pantherophis* for most North American *Elaphe* following the division of *Elaphe* into multiple genera. Given these taxonomic uncertainties, the current name for the central clade, *Pantherophis spiloides*, was retained for all Ontario Ratsnakes; however, it is recognized that there are significant genetic differences between the ratsnakes in southwestern versus southeastern Ontario. Gray Ratsnake was the common name given to *Pantherophis spiloides* by Crother (2012).

1.1.2. Designatable units

Gray Ratsnakes are found in two (2) geographically distinct areas in Ontario and as such have been divided into two (2) designatable units (DU) – Great Lakes / St. Lawrence population and the Carolinian population.

1.1.3. Native status

Gray Ratsnakes are native to Ontario (Natureserve 2020)

1.1.4. Occurrence

Gray Ratsnake is known to occur in Ontario (COSEWIC 2018).

1.2. Eligibility results

Gray Ratsnake (*Pantherophis spiloides*) is eligible for status assessment in Ontario.

2. Background information

2.1. Current designations

- GRANK: G4 (NatureServe 2020)
- IUCN: Least Concern (April 18, 2016)
- NRANK Canada: N3
- COSEWIC: Threatened – Great Lakes / St. Lawrence population (2018)
- SARA: Threatened (Schedule 1)
- ESA 2007: Threatened (month and year of last assessment)
- SRANK: S3 (ranked in year)

2.2. Distribution in Ontario

Gray Ratsnake is found in two geographically disjunct areas of southeastern and southwestern Ontario; these regions are separated by approximately 300 km. Ratsnakes inhabiting the two regions show significant genetic differentiation (Lougheed et al. 1999; Gibbs et al. 2006). The Carolinian population is present in small areas of southwestern Ontario along the north shore of Lake Erie. The Great Lakes / St. Lawrence DU is primarily associated with the Fontenac Arch with the majority of the DU falling into Frontenac, and Leeds and Grenville Counties.

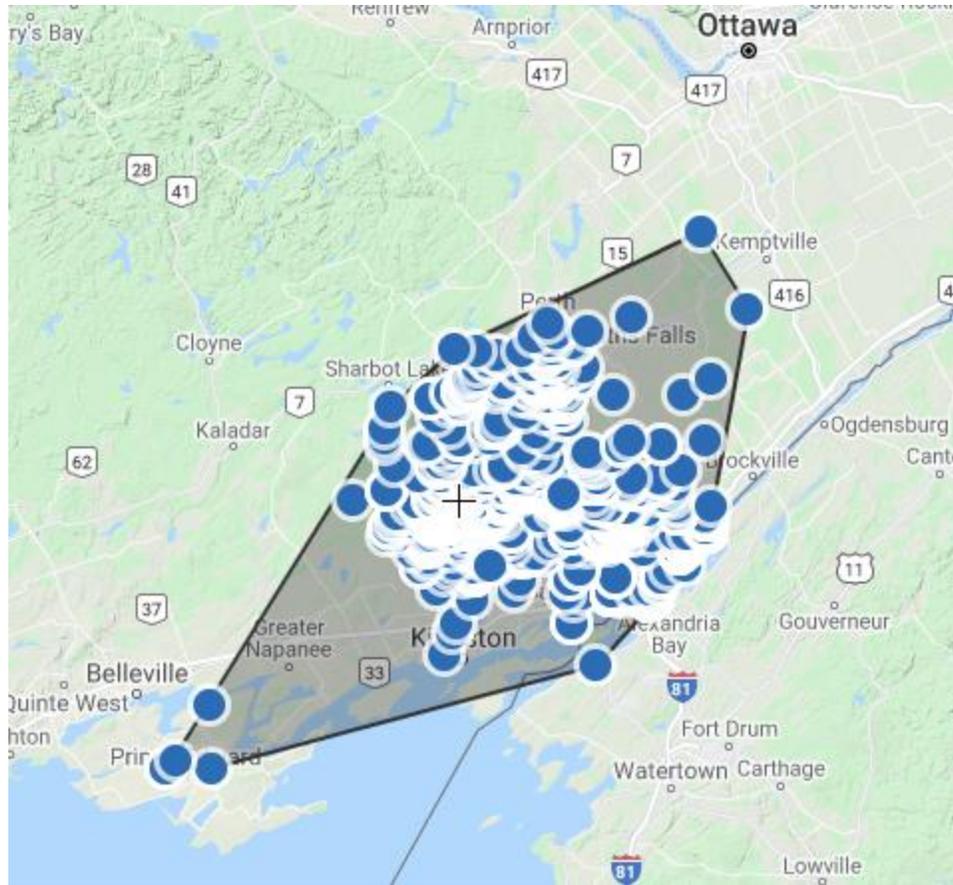


Figure 1. All Ontario Gray Ratsnake records for the Great Lakes / St. Lawrence population from the NHIC database (October 2020). Created for this report using [GeoCAT](#) [website accessed October 21, 2020].

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

Gray Ratsnake is widespread and common throughout the eastern and central United States of America. A small portion of the Great Lakes / St. Lawrence DU crosses the St. Lawrence River into Jefferson and St. Lawrence counties in upper New York State. The DU, including the small portion that exists in New York State, is geographically disjunct from continuous portions of the species' range in the USA. The DU Gray Ratsnake subpopulation is isolated and separated from the larger New York State population by at least 120 km from the nearest known population, in Syracuse (Personal Communication: G. Blouin-Demers, 2020). Snakes in this DU are also genetically separated from populations further south in New York state, representing a distinct hybrid between central and eastern populations in the U.S.A. (Gibbs *et al.* 2006), although the distinctions identified to date do not appear to be functional. Further, portion of the New York State populations that exist further south, are different level III or II ecoregions (Commission for Environmental Cooperation 2016).

On this basis the broader biologically relevant geographic range for this species is

limited to the connecting population in northern New York State. Little specific information is available about this population. However, because it is smaller, continuous part of the Great Lakes / St. Lawrence DU its condition is assumed to match that of the large DU.

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	No	S2S3	Natureserve (2020)
Minnesota	n/a		
Nunavut	n/a		
New York	Partially	State level: S4. BBRGR: declining.	Natureserve (2020). A northern New York state population immediately adjacent to the Great Lakes / St. Lawrence DU is considered relevant BBRGR. The larger state population is not considered BBRGR
Ohio	No	SNR	Natureserve (2020)
Pennsylvania	n/a		
Wisconsin	No	S3	Natureserve (2020)
<i>Other Relevant Jurisdiction</i>			

2.4. Ontario conservation responsibility

The Ontario populations of Gray Ratsnake represent less than 1% of the species global range (COSWEIC 2018). However, Ontario has > 50% responsibility for the Great Lakes / St. Lawrence DU, U.S.A, a small proportion of which occurs in the upper New York State (COSEWIC 2018) (see section 2.3 for more details).

2.5. Direct threats

Gray Ratsnakes have several life history features such as late age of maturity, long life span, biennial reproduction and intermittent juvenile recruitment that predispose this species to be sensitive to disturbances and do not allow for a natural capacity to rapidly rebound from population reductions. Threats to the Gray Ratsnake include habitat degradation, fragmentation and loss, direct mortality, road mortality and disturbance or destruction of hibernacula.

Habitat loss as a result of development and resource extraction activities (e.g., energy production, mining, agriculture, residential development, forest harvesting) is considered a primary threat to Gray Ratsnake in Ontario. The estimated extent of occurrence for this DU has declined from 3,287 km² to an estimated 2,565 km² (~22% decline, COSEWIC 2018). The extent of suitable habitat in the Frontenac Arch indicates that there are still large tracts of continuous suitable habitat; however, the presence of roads and other inhospitable habitats suggest that the total amount of available habitat is considerably less than the estimated 2,565 km² (Row 2006).

2.6. Specialized life history or habitat use characteristics

Gray Ratsnakes are known to aggregate for hibernation (Blouin-Demers et al. 2000) and individuals show strong fidelity to their hibernation sites (Blouin-Demers and Weatherhead 2002a). This species is known to travel up to 4 km (Blouin-Demers and Weatherhead 2002a) from hibernation sites to their active season range. This long-distance movement increases the potential for mortality where individuals are required to cross roadways.

Gray Ratsnakes in the Great Lakes / St. Lawrence DU have a maximum life expectancy of between 25 and 30 years, but do not reach sexual maturity until approximately 10 years of age Blouin-Demers et al. (2002) which is later than most Ontario snakes. Once sexually mature, females will only produce a clutch of eggs every 2–3 years (COSEWIC 2018). Finally, Ratsnakes commonly make use of communal nests that are used for multiple years by multiple females (Blouin-Demers et al. 2004). These life history characteristics make Gray Ratsnakes particularly vulnerable to any increases in adult mortality.

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

Gray Ratsnake meets the criteria for Threatened, A2acd, as there is an inferred decline of >30% in the number of mature individuals extrapolated from a 22% decline in EOO over the last 2 generations (20 years); sub criterion (a) applies as declines have been observed at several monitoring sites; (c) applies because there is a decline in EOO and habitat quality; (d) applies because of deliberate killing and accidental mortality on roads. Meets Threatened, A3cd, as there is a projected decline of >30% in the number of mature individuals based on continuing decline in quality of habitat, and deliberate and accidental killing (including road mortality); these factors are expected to continue and increase in the future. Meets Threatened, A4cd, as there is an inferred decline from reduction of EOO, and projected and suspected decline, based on past and continuing decline in quality of habitat and deliberate and accidental killing. This includes road mortality, which is expected to continue and is likely to increase in the future.

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

Not applicable. Although EOO meets the threshold for Endangered (B1), and IAO meets threshold for Threatened (B2), the requirements of only one (i.e., b) of subcriteria a-c are met.

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

Not applicable. The total number of mature individuals exceeds 10,000.

3.1.4. Criterion D – Very small or restricted total population

Not applicable. The population exceeds 1,000 individuals, and the IAO is >20 km².

3.1.5. Criterion E – Quantitative analysis

Insufficient information is available to perform analysis.

3.2. Application of Special Concern in Ontario

Not applicable.

3.3. Status category modifiers

3.3.1. Ontario's conservation responsibility

Not applied. The Ontario populations of Gray Ratsnake represent less than 1% of the species global range. Ontario does have > 50% responsibility for the Great Lakes / St.

Lawrence DU, U.S.A, a small proportion of which occurs in the upper New York State (COSEWIC 2018) (see section 2.3 for more details). However, although a T-rank exists for this population unit, it is not clear whether the northern NY state component is included. Accordingly, the committee did not apply this modifier due to the uncertainty.

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

The Great Lakes / St. Lawrence DU is geographically disjunct from continuous portions of the species' range in the United States. The Great Lakes / St. Lawrence DU does extend into upper New York State; however, individuals would be required to cross the St. Lawrence River for immigration to be possible. While possible, there is a low likelihood of exchange of individuals between the two countries as the St. Lawrence River likely represents a barrier to movement for Gray Ratsnakes and as such the potential for rescue is very low and the rescue effect modifier does not apply.

The broader biologically relevant geographic range for Great Lakes / St. Lawrence DU is limited to the small proportion of this DU that extends into upper New York State (see section 2.3 for details). Because the upper New York State population is a smaller, continuous portion of the wider DU, its condition is considered to match the larger DU in Ontario, and therefore no status modification based on these factors is applicable.

3.4. Other status categories

3.4.1. Data deficient

Not applicable.

3.4.2. Extinct or extirpated

Not applicable.

3.4.3. Not at risk

Not applicable.

4. Summary of Ontario status

Gray Ratsnake (*Pantherophis spiloides*) is classified as Threatened in Ontario based on meeting criterion A2acd+3cd+4cd. No modifiers were applied. This classification is consistent with COSEWIC (2018).

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

5. Information sources

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Appendix 1: Technical summary for Ontario

Species: Gray Ratsnake (*Pantherophis spiloides*) – Great Lakes / St. Lawrence Population

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.	10 years
Is there an observed, inferred, or projected continuing decline in number of mature individuals?	Yes based on observed decline at hibernacula and an inferred decline due to habitat loss.
Estimated percent of continuing decline in total number of mature individuals within 5 years or 2 generations.	>30% decline over last three (3) generations, inferred from a 22% decline in EOO over 2 generations and significant threats
Observed, estimated, inferred, or suspected percent reduction or increase in total number of mature individuals over the last 10 years or 3 generations.	>30% reduction inferred from reduction in EOO.
Projected or suspected percent reduction or increase in total number of mature individuals over the next 10 years or 3 generations.	>30% reduction.
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.	>30% decline based on inferred decline from reduction of EOO and projected and suspected decline based on continuing threats.
Are the causes of the decline (a) clearly reversible, and (b) understood, and (c) ceased?	a. No 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).	2,565 km ²

Extent and occupancy attributes	Value
<i>If value in COSEWIC status report is not applicable, then use geocat.kew.org. State source of estimate.</i>	
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>	612 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 (b) separated from other habitat patches by a distance larger than the species can be expected to disperse?	a. No b. No
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>	Likely to be > 50 based on road mortality data.
Number of NHIC Element Occurrences <i>Request data from MNRF.</i>	Insert if available
Is there an observed, inferred, or projected continuing decline in extent of occurrence?	Yes. There is an observed 22% decline in EOO over 2 generations.
Is there an observed, inferred, or projected continuing decline in index of area of occupancy?	Yes, decline (inferred) based on reduction in EOO.
Is there an observed, inferred, or projected continuing decline in number of sub-populations or EOs?	Unknown but probable based on declining EOO and ongoing threats.
Is there an observed, inferred, or projected continuing decline in number of locations?	Yes, decline is inferred based on declining EOO.
Is there an observed, inferred, or projected continuing decline in [area, extent and/or quality] of habitat?	Yes. There is an inferred and projected decline in area, extent, and quality based on the declining EOO, habitat trends, and threats from road mortality.
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
<i>Total Ontario Population</i>	<i>25,000-67,000 (COSEWIC 2018)</i>

Quantitative analysis (population viability analysis conducted)

Probability of extinction in the wild is [unknown].

Threats

The threat assessment provided in the most recent COSSARO Report (2018) lists the following threats.

Cumulative Overall Threat

Impact: High, suggesting a possible 10-70% population reduction over the next 3 generations from threats operating for the next 10-years.

Transportation & service corridors: high – medium

Residential & commercial development: low

Agriculture & aquaculture: low

Energy production & mining: low

Biological resource use: low

Human intrusions & disturbance: negligible

Natural system modifications: negligible

Invasive & other problematic species: 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	S4 – New York
Is immigration of individuals and/or propagules between Ontario and outside populations known or possible?	No, while the Great Lakes / St. Lawrence DU extends into New York, immigration is unlikely or impossible as individuals would be required to cross the St. Lawrence River.
Would immigrants be adapted to survive in Ontario?	Yes
Is there sufficient suitable habitat for immigrants in Ontario?	Yes
Are conditions deteriorating in Ontario?	Yes
Is the species of conservation concern in bordering jurisdictions?	No.

Rescue effect attribute	Value
Does the broader biologically relevant geographic range for this species extend beyond Ontario?	No
Is the Ontario population considered to be a sink?	No as there is a low likelihood of receiving immigrants.
Is rescue from outside populations likely?	Very unlikely as the St. Lawrence River represents a barrier to movement.

Sensitive species

No, generally locations of this species are not sensitive; however, location of hibernacula and nesting sites are sensitive.

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