

**Ontario Species at Risk Evaluation Report for**  
**Wood Turtle**  
**Tortue des bois**  
**(*Glyptemys insculpta*)**

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

Assessed by COSSARO as Endangered

November 2020

## Tortue des bois (*Glyptemys insculpta*)

Le nombre de tortues des bois diminue dans la majorité de leur aire de répartition en Ontario. Là où elle se rencontre, cette espèce est présente en petites sous-populations disjointes qui se situent au-delà de sa capacité de dispersion. Les tortues des bois se révèlent très fidèles à un emplacement et ont besoin d'habitats aquatiques et terrestres. Cette espèce est plus terrestre que d'autres tortues vivant en Ontario, ce qui la rend plus vulnérable à la mortalité sur les routes et à la perte d'habitat causée par des changements d'utilisation des sols. Les tortues des bois font l'objet d'une cueillette active pour le commerce des animaux de compagnie, ce qui réduit encore plus leurs populations sauvages. Leur long temps de génération et leur faible recrutement annuel exposent cette espèce à un risque d'effondrement de la population en cas d'augmentation de la mortalité des adultes ou des jeunes. La mortalité sur les routes, la perte d'habitat, les prédateurs favorisés par l'activité humaine et la mortalité résultant des activités forestières ont entraîné une réduction du nombre de tortues des bois en Ontario.

Après son évaluation, le CDSEPO a classé la tortue des bois dans la catégorie des espèces en voie de disparition en Ontario en raison des soupçons de diminutions antérieures du nombre d'individus matures causées par le braconnage et la mortalité sur les routes et dans les forêts, de même que des diminutions projetées qui découleront des mêmes menaces. Aucun modificateur d'évaluation n'a été appliqué en raison de la faible probabilité d'un effet d'immigration et de la piètre situation de l'espèce dans son aire de répartition plus vaste pertinente sur le plan biologique (ARVPPB). Cette évaluation accorde un statut plus élevé que celui d'espèce menacée décerné par le COSEPAC (2018), puisqu'elle tient compte du déclin marqué de la population de l'Ontario et des menaces précises auxquelles elle est exposée.

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### **Remarque :**

L'acronyme ARVPPB correspond à « aire de répartition plus vaste pertinente sur le plan biologique » qui se retrouve à l'alinéa 5 (4) b) de la *Loi de 2007 sur les espèces en voie de disparition*.

## Executive summary

Wood Turtles are declining across the majority of their range in Ontario. Where this species does occur, it is present in small, disjunct subpopulations located beyond this species dispersal abilities. Wood Turtles show high site fidelity and require both aquatic and terrestrial habitats. This species is more terrestrial than other turtles in Ontario, rendering it vulnerable to road mortality and habitat loss due to changing land use practices. Wood Turtles are actively collected for the pet trade, further reducing wild populations. Wood Turtles have long generation times and low annual recruitment making this species at risk of population collapse if increases in adult or juvenile mortality occur. Road mortality, habitat loss, subsidized predators, and mortality from forestry operations have led to reductions in numbers of Wood Turtles in Ontario.

Wood Turtle is listed as Endangered in Ontario by COSSARO, based on suspected past declines in the number of mature individuals due to poaching and road and forest related mortality, and projected future declines from the same threats. No classification modifiers were applied, because of the low probability of rescue effect, and poor condition of the species across its broader biologically relevant geographic range. This classification is higher than the status of Threatened reached by COSEWIC (2018), reflecting large declines and clear threats to Ontario's population.

# 1. Eligibility for Ontario status assessment

## 1.1. Eligibility conditions

### 1.1.1. Taxonomic distinctness

Wood Turtle is recognized as a distinct taxon with no known sub species (COSEWIC 2018).

### 1.1.2. Designatable units

While Wood Turtles occur in three distinct portions of the province there is no evidence for genetic or morphological differences among them and as such this species is treated as a single designatable unit.

### 1.1.3. Native status

This species is considered native to Ontario (NatureServe 2020).

### 1.1.4. Occurrence

Wood Turtle is known to occur in Ontario (COSEWIC 2018).

## 1.2. Eligibility results

Wood Turtle (*Glyptemys insculpta*) is eligible for status assessment in Ontario.

## 2. Background information

### 2.1. Current designations

- GRANK: G3 (NatureServe 2020)
- IUCN: Endangered (August 2010)
- NRANK Canada: N3
- COSEWIC: Threatened (November 2018)
- SARA: Threatened (Schedule 1)
- ESA 2007: Endangered (October 2006)
- SRANK: S2 (ranked in year)

### 2.2. Distribution in Ontario

In Ontario, Wood Turtles are found in three (3) distinct locations: along the north shore of Lake Huron, in eastern Ontario proximate to the Ottawa River, and southern Ontario along the eastern shore of Lake Huron (COSSARO 2018). The Natural Heritage Information Centre (NHIC) identifies 44 extant element occurrences (EOs) with an additional 28 Historical and 1 Extirpated (NHIC). Many of these EOs are based on single observations and may not be indicative of viable populations (COSEWIC 2018). Limited information on the historic distribution of Wood Turtles in Ontario is available; however, Wood Turtles are considered to be extirpated from municipalities, mainly in southern Ontario (Durham, Essex, Halton, Hamilton-Wentworth, Kent, Lanark, Ottawa-Carleton, Parry Sound, Victoria and Waterloo).

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

In Canada, Wood Turtles are found in discrete areas through southern and central Quebec, New Brunswick, and Nova Scotia. Outside of Canada, Wood Turtle range includes Minnesota, Virginia, and Maryland. Of the populations of Wood Turtle in Ontario, only the population in eastern Ontario shares a border with another jurisdiction. As such, the broader biologically relevant range for Ontario individuals is limited to the province of Quebec. This definition of the broader biologically relevant range is further supported by the species spatial ecology in that individuals typically do not move more than a few kilometers within a given season and these movements are typically along watercourses thereby limiting the potential for dispersal events to adjacent jurisdictions outside of Ontario.

The s-rank for Wood Turtle in Quebec is S3 as of August 2019. Minimum population for the province is estimated to be 8 790 (Personal Communication, Y. Dubois 2020), although COSWEIC (2018) increased this estimate by 50% to 13 087 in order to provide a comparable estimate to other regions, based on expert opinion. Data on the condition of the species in Quebec are limited by challenges to monitoring and minimal historic data. A population decline of approximately 50% was recorded in one population on Sutton River between 1995 and 2002 (Daigle and Jutras, 2005), although a specific cause could not be determined. A third estimate, carried out 11 years later in 2013,

suggested that the size of the population remained stable. However, a 2018 estimate suggests a further decrease of more than 50% of the population (Équipe de Rétablissement des Tortues Du Québec 2019; MFFP, in preparation; Doucet, in preparation). These data suggest a 75% decline in less than a single generation for this species. Such long-term trend data are not available for other populations in Quebec, however a population viability assessment of the 119 occurrences of Wood Turtle recorded in Quebec indicated that 32% are considered to have a good chance of surviving over the next 50 years if no new threats occur, while a further 24% are considered precarious or unfavorable. The remaining occurrences are considered extirpated, or did not have sufficient information (Équipe de Rétablissement des Tortues Du Québec 2019). Overall, recovery of the Wood Turtle population in Quebec is considered viable at the current time, though the condition remains precarious despite considerable recover efforts to date (Pelletier, 2011). However, data that may be used to assess the current condition are sparse. Planned survey efforts may begin to improve this situation in coming years, but these will require considerable extrapolation given the long lifespan of this species.

For the purpose of COSSARO assessment, although the provincial ranking in Quebec is S3, other measures of population condition are comparable to the Ontario population. Status trends, based on the limited available data, show historic declines and similar risk of future declines. Projected future risk trends and habitat risk are also comparable, with road mortality considered the largest threat in Quebec (Équipe de Rétablissement des Tortues Du Québec 2019), life cycle viability, permanence and adaptability are likely identical. The occurrence of illegal harvest is considered low in Quebec (Équipe de Rétablissement des Tortues Du Québec 2019), but the risk is noted as significant. It is considered that recovery of the species in Quebec is viable, but that recovery efforts must continue (Équipe de Rétablissement des Tortues Du Québec 2019).

Overall, despite legislative differences in s-ranks, the condition of Wood Turtle populations in Ontario and Quebec appear comparable.

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

<b>Adjacent Jurisdictions</b>	<b>Biologically Relevant to Ontario (n/a, yes, no)</b>	<b>Condition</b>	<b>Notes &amp; Sources</b>
Quebec	Yes	S3	NatureServe (2020)
Michigan	No	S2S3	NatureServe (2020)
Minnesota	No	S2	NatureServe (2020)
New York	No	S3	NatureServe (2020)
Ohio	No	SH	NatureServe (2020)
Pennsylvania	No	S3S4	NatureServe (2020)
Wisconsin	No	S3	NatureServe (2020)

## 2.4. Ontario conservation responsibility

Approximately 8% of the global distribution of this species is found in Ontario (Cowin 2005).

## 2.5. Direct threats

Agricultural activities and transportation infrastructure are the most significant threats to Wood Turtles. Generally, agricultural activities can result in direct mortality through machinery collisions and destruction of nests during tilling. Indirectly agriculture can result in habitat loss and the increase in local populations of subsidized predators. Roads result in direct mortality of individual Wood Turtles through vehicle collisions. Indirectly, roads result in habitat fragmentation and provide increased access for humans to Wood Turtles and their habitats. Increase human access to Wood Turtles is especially problematic as this species is subject to illegal collection. Illegal collection is particularly of concern as Wood Turtles occur in dense concentrations at specific times of year (e.g., spring emergence, nesting season, mating season) providing the opportunity for poachers to remove significant numbers from a subpopulation in a single event. As Wood Turtle habitat is associated with watercourses, alterations to stream flow regimes and the introduction of invasive species are also threats.

Wood Turtles experience high juvenile mortality and low recruitment. In Ontario, this species is at their northern limit, and hatching success is low or near zero in cool years (Foscarini 1994, Smith 2002). As a result, additive adult mortality is a threat to the long-term viability of this species.

Forestry activities such as clear cutting have the potential to reduce habitat suitability for Wood Turtles; however, these effects are likely only short-term (Arvisais 2000, Tingley and Herman 2008). Wood Turtles are susceptible to being killed by heavy machinery during forestry operations occurring during summer months as this species has limited ability to evade this equipment.

The Wood Turtle population size in Ontario is unknown; however, it is estimated to be between 1,100 and 4,400 (COSEWIC 2018). Long-term monitoring data that can provide population trends are available for only a limited number of subpopulations. Cameron and Brooks 2002 documented a 70% decline in one Wood Turtle subpopulation in southern Ontario between 1992/93 and 2002). This decline was hypothesized to be the result of poaching (Ontario Wood Turtle Recovery Team 2010). A second subpopulation in central Ontario experienced a decline of 30–50% 1990 (Ontario Wood Turtle Recovery Team 2010). More recently, a subpopulation that has been monitored annually since 2005 has been found to be experiencing high adult mortality as a result of subsidized predators. Data available from the NHIC indicates that approximately 40% of all Wood Turtle EOs are now considered historic or extirpated. Generally, subpopulations in eastern and central Ontario appear to be in decline while subpopulations located along the north shore of Lake Huron appear to be stable (COSEWIC 2018).

Results of the threats calculator completed by COSEWIC (2018) concluded that the threat level is High for Wood Turtles. A High ranking indicates that Wood Turtles are

expected to decline by 10–70% over the next 100 years (~3 generations) (COSEWIC 2018).

## 2.6. Specialized life history or habitat use characteristics

Wood Turtles are atypical of Ontario turtles in that they spend considerably more of their time in terrestrial than aquatic communities. This species makes use of riparian habitats and uplands forests adjacent to their 'home rivers'. Foraging habitat for Wood Turtles includes both terrestrial and wetland habitats that are located in close proximity to rivers or streams; agricultural fields are also known to be used for foraging by this species. Wood Turtles reach sexual maturity between 11 and 22 years of age; this range largely depends on latitude, with turtles farther north maturing later and at larger body sizes. Wood Turtles have been found to use the same home range each year and have been documenting returning to these areas from several kilometers away. While male Wood Turtles typically remain close to their home rivers, females are more likely to move larger distances away from rivers exposing them to greater risk of mortality.

Wood Turtle hibernation sites are characterized by flowing water in areas that do not freeze to the bottom. Wood Turtles were reported to hibernate in the main river rather than tributary streams or oxbows at a site in northern Ontario (Greaves and Litzgus 2007, 2008). The main river was colder (about 0 degrees Celsius) and had more stable temperatures and higher levels of dissolved oxygen (12.6 parts per million) than adjacent aquatic habitats (Greaves and Litzgus 2008). Within the river, Wood Turtles remained in locations under about 1m in depth and less than 2 m from shore (Greaves and Litzgus 2007, 2008). Individuals are known to make small movements during winter, but their average winter home range varied from 3.4 m<sup>2</sup> to 7.1 m<sup>2</sup> (Greaves and Litzgus 2007, 2008).

### 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 the criteria for Endangered, A2cd+A3cd+A4cd.

A2cd as there is a suspected reduction of greater than 50% in the population based on (c) decline in habitat quality over 3 generations (>100 years), and (d) exploitation in the form of illegal collecting, and road and forestry related mortality.

A3cd as there is a suspected population reduction greater than 50% over the next 3 generations (>100 years) (c), particularly due to (but not limited to) threats associated with (d) roads, forestry, and subsidized predators.

A4cd Over 50% suspected reduction based on (c) decline in habitat quality over 3 generations (>100 years), and inferred minimum 24% reduction in past due to observed reduction in IAO nationally, and (d) past exploitation in the form of road and agriculture-related mortality, as well as a suspected 10-70% population reduction in future based on a high overall threat impact.

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

Does not apply.

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

Meets the criteria for Threatened, C1. The population is estimated to be between 1,100 and 4,400 and is expected to decline by 10-70% over the next 100 years (~3 generations).

##### 3.1.4. Criterion D – Very small or restricted total population

Not applicable. Insufficient data are available for this species and population estimate exceeds 1000 individuals.

##### 3.1.5. Criterion E – Quantitative analysis

Does not apply. Data only available for a few small subpopulations.

#### 3.2. Application of Special Concern in Ontario

Not applicable.

#### 3.3. Status category modifiers

### 3.3.1. Ontario's conservation responsibility

Not applicable. Although the species is globally at risk (G3), Ontario's Conservation Responsibility, at approximately 8 percent of the global distribution of this species (Cowin 2005), is not significant.

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

Status modification due to rescue effect does not apply due to the species' low dispersal potential, the limited number of adjacent populations to provide rescue, and the vulnerable status of those populations.

Status modification due to broader biologically relevant range may be applicable because Wood Turtles are listed as Vulnerable in Quebec, the only jurisdiction outside Ontario considered part of the broader biologically relevant range. However, the Quebec population only has the potential to influence one (1) of the three (3) Ontario populations of this species. Further, while limited data mean it is challenging to accurately assess the condition of the Wood Turtle population in Quebec, the existing data illustrate significant declines and questionable viability for many occurrences. Accordingly, the condition of Wood Turtle in Quebec may be comparable to that in Ontario (see section 2.3 for further discussion), and so it may not be appropriate to apply this modifier.

## 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

Wood Turtle (*Glyptemys insculpta*) is classified as Endangered, in Ontario based on meeting criterion A2cd+A3cd+A4cd, with no modifiers applied. This classification is higher than the classification of Threatened determined by COSEWIC (2018), reflecting large declines and clear threats to Ontario's population.

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

## 5. Information sources

Arvisais, M. 2000. Caractérisation et sélection d'habitats à l'intérieur des domaines vitaux chez la tortue des bois (*Clemmys insculpta*) au nord de son aire de répartition, Québec, Canada. Master of Science thesis, Université du Québec à Trois-Rivières, Canada. 150 pp.

COSEWIC. 2018. COSEWIC assessment and status report on the Wood Turtle *Glyptemys insculpta* in Canada. Committee on the Status of Endangered Wildlife in Canada. Ottawa. xiii + 51 pp. (<http://www.registrelep-sararegistry.gc.ca/default.asp?lang=en&n=24F7211B-1>).

Cowin, S. 2005. Ontario's conservation responsibility for reptiles: the development of a conservation responsibility index based on proportion of range and current conservation ranks. Unpublished report prepared for the Natural Heritage Information Centre, Ontario Ministry of Natural Resources, Peterborough.

Foscarini, D.A. 1994. Demography of the wood turtle (*Clemmys insculpta*) and habitat selection in the [location name removed]. Unpublished Master's thesis, Department of Zoology, University of Guelph, Ontario, Canada.

DAIGLE, C. (1997). "Size and characteristics of a wood turtle, *Clemmys insculpta*, population in southern Québec", *Canadian Field-Naturalist*, 111: 440-444.

Équipe de Rétablissement des Tortues Du Québec (2019). Plan de rétablissement de la tortue des bois (*Glyptemys insculpta*) au Québec — 2020-2030, produit pour le ministère des Forêts, de la Faune et des Parcs, Direction générale de la gestion de la faune et des habitats, 57 p.

Greaves, W.F., and J.D. Litzgus. 2007. Overwintering ecology of wood turtles (*Glyptemys insculpta*) at the species' northern range. *Journal of Herpetology* 41:32-40.

Greaves, W.F., and J.D. Litzgus. 2008. Variation in life-history characteristics among populations of North American wood turtles: A view from the north. *Journal of Zoology* 279:298-309.

Ontario Wood Turtle Recovery Team. 2010. Recovery strategy for the Wood Turtle (*Glyptemys insculpta*) in Ontario. Ontario Recovery Strategy Series. Prepared for the Ontario Ministry of Natural Resources. vi + 25 pp.

Pelletier, S. (2011). Proposition de cotes de qualité aux occurrences actuelles de la tortue des bois au Québec, Service canadien de la faune, Environnement Canada, 9 p. + annexes.

Smith, K.A. 2002. Demography and spatial ecology of Wood Turtles (*Clemmys insculpta*) in Algonquin Provincial Park. M.Sc. Thesis, University of Guelph.

Tingley, R., and T.B. Herman. 2008. The effects of agriculture and forestry on the distribution, movements and survival of wood turtles in an intensively managed landscape. Report to the Nova Scotia Habitat Conservation Fund.

## Appendix 1: Technical summary for Ontario

Species: Wood Turtle (*Glyptemys insculpta*)

### 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.	35 years
Is there an observed, inferred, or projected continuing decline in number of mature individuals?	Yes (inferred) based on range wide declines in EOO, documented direct mortality, and projected decline based on threats.
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.	Unknown as there is insufficient baseline observation data over the past three (3) generations (105 years)
Projected or suspected percent reduction or increase in total number of mature individuals over the next 10 years or 3 generations.	10–70% reduction is suspected based on Threats Calculator (COSEWIC 2018)
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% inferred reduction over 3 generations (105 years)
Are the causes of the decline (a) clearly reversible, and (b) understood, and (c) ceased?	a. Unknown 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). <i>If value in COSEWIC status report is not applicable, then use <a href="http://geocat.kew.org">geocat.kew.org</a>. State source of estimate.</i>	~194,000 km <sup>2</sup> however this includes considerable areas of inaccessible and unsuitable habitat.
Index of area of occupancy (IAO).	526 km <sup>2</sup>

<b>Extent and occupancy attributes</b>	<b>Value</b>
<i>If value in COSEWIC status report is not applicable, then use <a href="http://geocat.kew.org">geocat.kew.org</a>. State source of estimate.</i>	
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. Unknown b. Yes.
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>	3-44
Number of NHIC Element Occurrences <i>Request data from MNRF.</i>	44
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?	Unknown
Is there an observed, inferred, or projected continuing decline in number of sub-populations or EOs?	Yes. ~40% of EOs are now considered historic or extirpated (NHIC 2020)
Is there an observed, inferred, or projected continuing decline in number of locations?	Unknown
Is there an observed, inferred, or projected continuing decline in [area, extent and/or quality] of habitat?	Yes [inferred]. The extent of roads within the IAO squares occupied by Wood Turtle is increasing.
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)

<b>Sub-population (or total population)</b>	<b>Number of mature individuals</b>
Ontario	1,100-4,400 (COSEWIC 2018)

Quantitative analysis (population viability analysis conducted)

Probability of extinction in the wild is unknown.

## Threats

Yes; completed by COSEWIC as part of the April 2018 assessment.

Calculated overall threats impact High (high range) and High (low range).

- i. Roads and railroads, including logging roads: medium.
- ii. Annual and perennial non-timber crops, particularly mowing (which can directly kill adults) and tilling (which can destroy/expose nests): medium/low
- iii. Problematic native species, esp. subsidized predators (foxes, Raccoons, skunks, corvids), particularly on nests and juveniles, but adults in some subpopulations as well: low
- iv. Mining and quarrying for gravel: low.
- v. Hunting and collecting terrestrial animals: low
- vi. Recreational activities, particularly ATVs: low
- vii. Housing and urban development, including cottages: low
- viii. Other ecosystem modifications, esp. changing flow regimes in watersheds: low
- ix. Livestock farming and ranching, due to trampling: low
- x. Logging and wood harvesting (excluding logging roads): low.
- xi. Storms and flooding, particularly through nest flooding: low

What additional limiting factors are relevant?

All turtles are limited by their “bet-hedging” life history strategy, wherein adults are long-lived with high lifetime reproductive output but low annual reproductive success, and few hatchlings survive to adulthood. Even slight increases in adult mortality above natural levels will cause long-term declines in a subpopulation.

## Rescue effect

<b>Rescue effect attribute</b>	<b>Value</b>
Does the broader biologically relevant geographic range for this species extend beyond Ontario?	Yes, one (1) of the three (3) occupied areas in Ontario is bordered by Quebec
Status of outside population(s) most likely to provide immigrants to Ontario	S3
Is immigration of individuals and/or propagules between Ontario and outside populations known or possible?	Possible
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?	Yes
Is the Ontario population considered to be a sink?	Unknown
Is rescue from outside populations likely?	Possibly

## Sensitive species

Due to the threats from collection of individuals for the pet trade, Wood Turtle is a data sensitive species.

## 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