

**Ontario Species at Risk Evaluation Report for Toothed
Globe (*Mesodon zaletus*)**

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

Prepared by Paiero and Kraus

Assessed by COSSARO as Endangered

September 2020

Gobelet dentelé (*Mesodon zaletus*)

Le gobelet dentelé est un gros escargot terrestre (largeur de la coquille adulte d'environ 2,4 à 3,1 cm) à coquille jaune non perforée, dotée d'un seul denticule légèrement soulevé au niveau de l'ouverture, et ayant un pied gris jaunâtre. Il vit dans les forêts matures à anciennes, et sa présence a été enregistrée dans neuf emplacements du sud de l'Ontario. Il semblerait maintenant extant dans tout au plus trois de ces emplacements, ce qui serait largement attribuable à la dégradation de l'habitat, aux conditions météorologiques et aux changements climatiques. En tant qu'escargot terrestre, il a une capacité limitée à se disperser à de nouveaux endroits ou à échapper aux menaces qui pèsent sur le paysage dans son ensemble, de même qu'à compter sur l'immigration en provenance de sources externes pour venir au secours des populations.

Le CDSEPO a évalué le gobelet dentelé et l'a classé dans la catégorie des espèces en voie de disparition en raison de la faiblesse de sa zone d'occurrence et de son indice de zone d'occupation, étant présent dans trois emplacements ou moins, et d'un déclin présumé de la qualité de l'habitat explicable par une dégradation continue de l'habitat causée par la présence d'espèces envahissantes et une altération anthropique du paysage. Ce statut est conforme à celui du COSEPAC (2019).

Cette publication hautement spécialisée «COSSARO Candidate Species at Risk Evaluation for Toothed Globe» 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

Toothed Globe is a large-sized terrestrial snail (shell ~2.4 – 3.1 cm in diameter), with a yellow, unperforated shell with a single weakly raised denticle in the opening, and a yellow-gray foot. It occurs in mature to old growth forests and has been recorded in 9 sites in southern Ontario. It is now thought to be extant in, at most, 3 of these sites, largely as a result of habitat degradation, weather and climatic change. As a terrestrial snail, it has limited ability to disperse to new sites or escape threats to the broader landscape, and for populations to be rescued from external sources.

Toothed Globe has been assessed as Endangered by COSSARO based on having small EOO and IAO, occurring in three or less locations, and an inferred decline of habitat quality based on ongoing habitat degradation from invasive species and anthropogenic alteration of the landscape.

This status is consistent with COSEWIC (2019).

1. Eligibility for Ontario status assessment

1.1. Eligibility conditions

1.1.1. Taxonomic distinctness

Toothed Globe is a distinct species and was described in 1837.

1.1.2. Designatable units

There is only one designatable unit in Ontario.

1.1.3. Native status

This species has been known to occur in Ontario from as early as the late 1800's (COSEWIC 2019).

1.1.4. Occurrence

This species has been reported in Ontario from Essex, Middlesex and Hamilton-Wentworth Counties. Although the species has not been observed alive since 1994, it may still occur at the remaining three inaccessible sites where suitable habitat still exists.

1.2. Eligibility results

Toothed Globe (*Mesodon zaletus*) is eligible for status assessment in Ontario.

2. Background information

2.1. Current designations

- GRANK: G5 (NatureServe 2020)
- IUCN: Not listed
- NRANK Canada: N1?
- COSEWIC: Endangered (November 2019)
- SARA: Not listed
- ESA 2007: Not listed
- SRANK: S1? (ranked in 2019)

2.2. Distribution in Ontario

Toothed Globe has been reported from three different counties in southern Ontario: Essex, Middlesex and Hamilton-Wentworth. From these counties, there are records of nine separate sites where Toothed Globe has been found, with the Hamilton-Wentworth

record lacking any specific datum on the record. Efforts to find this species at previously reported sites indicates that six have become extirpated, likely as a result of a decline in habitat quality (COSEWIC 2019). The remaining two sites in Essex County (Hen Island and Leamington) and one in Middlesex County (Caradoc Indian Reserve) were not accessible during the most recent sampling efforts but are considered extant based on the presence of viable habitat. Unfortunately, these three sites are surrounded by unsuitable habitat, suggesting there are no viable corridors between populations.

There are no recent reports of this species in Ontario (despite several directed sampling efforts to document the terrestrial snail fauna in southern Ontario), with the most recent record from 2013 based on weathered shells and the most recent live record from 1994 (Leamington). Despite a lack of recent records, it is expected that suitable habitat is still present in southern Ontario, and subpopulations may persist in unsearched sites. COSEWIC (2019) reported 0 to 3 locations, with the upper limit based on the three separate sites where it may still persist.

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

Toothed Globe is distributed in eastern North America from Ontario, south to Texas. Adjacent regions with reported populations include New York, Michigan, Ohio and Pennsylvania. As a terrestrial snail, the ability to colonize new areas is relatively limited and it is not thought that extra-provincial populations are biologically relevant.

2.4. Ontario conservation responsibility

Ontario represents less than 5% of the global distribution. There is no datum to suggest what proportion of the global population occurs in Ontario.

2.5. Direct threats

COSEWIC (2019) does not cite any specific threats to Toothed Globe, but does note threats based on known occurrences and habitat. Invasive species, including plants and worm species, and resultant ecosystem impacts may decrease the habitat quality. Some suggestion that colonization of Middle Sister, East Sister and Middle Islands by the Double Breasted Cormorant may be linked to the local extirpation of Toothed Globe on these islands, due to change of soil chemistry by guano and general decline in habitat quality from their nesting behaviour and abundance. Flooding and droughts caused by regional storms, along with climate change, may have also contributed to their disappearance on the Lake Erie islands, along with the decline of other terrestrial snails in Ontario. Additional impacts include fragmentation from roads, agricultural effluents, mining and logging, which may have an impact on the quality of forest patches.

2.6. Specialized life history or habitat use characteristics

Toothed Globe is a terrestrial snail, meaning it has a limited ability to colonize new localities or escape large scale threats. This species is associated with moist forests, and most commonly with old growth forest (Dourson 2013).

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

Does not apply. There is no available population data to support consideration in this criterion.

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

Endangered, meeting Criteria B1ab(iii) + B2ab(iii). Toothed Globe meets Endangered in both Criteria B1 and B2, due to its small EOO (552 km²) and IAO (12 km²), and having three or less locations [subcriteria a], and an inferred decline of habitat quality based on ongoing habitat degradation from invasive species and anthropogenic alteration of the landscape [subcriteria b(iii)].

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

Does not apply. There is no available population data to support consideration in this criterion.

3.1.4. Criterion D – Very small or restricted total population

Meets Criteria D2 for Threatened. Toothed Globe has 3 or less locations, based on records where the species has previously been reported and where viable habitat remains.

3.1.5. Criterion E – Quantitative analysis

Does not apply. No Population Viability Analysis has been done.

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 as Ontario has less than 10% of the global range.

3.3.2. Status modification based on rescue effect

Does not apply. As a terrestrial snail with limited vagility, there is very limited ability of rescue .

3.4. Other status categories

3.4.1. Data deficient

Does not apply. There is sufficient enough data to support consideration for the criteria.

3.4.2. Extinct or extirpated

Does not apply. While there have been no recent records of this species in Ontario, there has been insufficient effort to relocate this species in suitable habitat.

3.4.3. Not at risk

Does not apply.

4. Summary of Ontario status

Toothed Globe (*Mesodon zaletus*) is classified as Endangered, in Ontario based on meeting criterion B1ab(iii) + B2ab(iii)

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

This species has not previously been assessed by COSSARO.

5. Information sources

COSEWIC. 2019. COSEWIC assessment and status report on the Toothed Globe *Mesodon zaletus* in Canada. Committee on the Status of Endangered Wildlife in Canada. Ottawa. x + 38 pp.

Dourson, D.C. 2013. Land snails of the Great Smoky Mountains National Park and southern Appalachians. Goatslug Publications, Bakersville, NC. 336 pp..

NatureServe. 2020. NatureServe Explorer: An online encyclopedia of life [web

application]. Version 7.1. NatureServe, Arlington, Virginia. Available <http://explorer.natureserve.org>. Accessed: 7 August 2020.

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: Toothed Globe (*Mesodon zaletus*)

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.	5 – 6 years
Is there an observed, inferred, or projected continuing decline in number of mature individuals?	Yes based on reduction on number of records.
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
Projected or suspected percent reduction or increase in total number of mature individuals over the next 10 years or 3 generations.	Unknown
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.	Unknown
Are the causes of the decline (a) clearly reversible, and (b) understood, and (c) ceased?	a. Unknown b. Unknown c. Unknown
Are there extreme fluctuations in number of mature individuals?	Unknown

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>	552 km ²
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>	12 km ²
Is the total population severely fragmented? i.e., is >50% of its total area of occupancy is 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. <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>	0 – 3.
Number of NHIC Element Occurrences <i>Request data from MNRF.</i>	Not yet available
Is there an observed, inferred, or projected continuing decline in extent of occurrence?	Yes, there is inferred decline.
Is there an observed, inferred, or projected continuing decline in index of area of occupancy?	Yes, there is inferred decline
Is there an observed, inferred, or projected continuing decline in number of sub-populations or EOs?	Yes, there is inferred decline
Is there an observed, inferred, or projected continuing decline in number of locations?	Yes, there is inferred decline
Is there an observed, inferred, or projected continuing decline in [area, extent and/or quality] of habitat?	Yes, there is inferred decline
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)

There is no population data for any subpopulation.

Quantitative analysis (population viability analysis conducted)

Probability of extinction in the wild is unknown.

Threats

A specific threats assessment has not been done due to the absence of recent records of this species in Ontario, but COSEWIC (2019) does list the following threats, based on the sites and habitats and their impacts on other terrestrial snails: Roads and Railways (road mortality and habitat fragmentation), Other ecosystem modification (modification of habitat cause by invasive species), Invasive non-native/alien species (predation from introduced game birds and competition with exotic gastropods), Agriculture and Forestry Effluents (agricultural chemicals), Droughts and Temperature Extremes (lack of snow cover, extended drought conditions), Storms and Flooding (flooding of shoreline

habitat), and some cumulative anthropogenic impacts.

Rescue effect and broader biologically relevant geographic range

Rescue effect attribute	Value
Does the broader biologically relevant geographic range for this species extend beyond Ontario?	No, but populations do occur in adjacent regions.
Status of outside population(s) most likely to provide immigrants to Ontario	Pennsylvania is S3. Michigan, New York and Ohio populations are not ranked (SNR).
Is immigration of individuals and/or propagules between Ontario and outside populations known or possible?	Possible, but unlikely
Would immigrants be adapted to survive in Ontario?	Probably
Is there sufficient suitable habitat for immigrants in Ontario?	Possibly
Are conditions deteriorating in Ontario?	Possibly
Is the species of conservation concern in bordering jurisdictions?	Yes, in Pennsylvania
Is the Ontario population considered to be a sink?	Unknown
Is rescue from outside populations likely?	No

Sensitive species

Yes, COSEWIC (2019) designates this as a sensitive species, due to a moderate score for intentional killing of individuals.

Appendix 2: Broader biologically relevant geographic range

Information regarding rank and decline for Toothed Globe
(*Mesodon zaletus*)

Adjacent Jurisdictions	Biologically Relevant to Ontario (n/a, yes, no)	Status & Trends	Condition	Notes & Sources
Quebec	n/a	Does not occur		
Manitoba	n/a	Does not occur		
Michigan	SNR	SNR		NatureServe (2020)
Minnesota	n/a	Does not occur		
Nunavut	n/a	Does not occur		
New York	No	SNR		NatureServe (2020)
Ohio	No	SNR		NatureServe (2020)
Pennsylvania	No	S3	Unknown	NatureServe (2020)
Wisconsin	n/a	Does not occur		

Broader Biologically Relevant Geographic Range in Other Jurisdictions

Toothed Globe is broadly distributed in eastern North America, from Ontario to Texas. In the states that it occurs, most are SNR or S5. Pennsylvania currently lists this species as S3 but no further information is available on population condition.

Global Status and Trends

This species is considered stable globally. There is no information on population trends, but COSEWIC's (2019) map comparing historical versus recent records of this species across the entire range is suggestive of a potential decrease in occurrence and EOO but requires further study.

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