

**Ontario Species at Risk Evaluation Report for
Shagreen (*Inflectarius inflectus*)**

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

Prepared by Steven Paiero and Toby Thorne

Assessed by COSSARO as Endangered

September 2020

Escargot galuchat (*Inflectarius inflectus*)

L'escargot galuchat est un escargot terrestre brun de taille moyenne qui constitue le seul membre du genre *Inflectarius* vivant au Canada. Il vit dans les forêts humides où il est possible de l'observer dans la litière de feuilles, sur les débris ligneux et les roches exposées. Il est présent dans l'est de l'Amérique du Nord, de l'Ontario au Texas. En Ontario, il se limite actuellement à deux îles du lac Érié, l'île Pelée et l'île Middle. On croit que la population d'escargot galuchat décline en Ontario, dû aux conséquences de la présence d'espèces envahissantes et de la fragmentation de l'habitat, en plus des diverses menaces auxquelles il est exposé, comme les changements climatiques et des conditions météorologiques fortement localisées.

Le CDSEPO a évalué la situation de l'escargot galuchat et le classe dans la catégorie des espèces en voie de disparition en raison de sa petite aire de répartition, du nombre d'emplacements, d'une dégradation présumée de la qualité de l'habitat disponible et de celle, bien réelle, de l'habitat où des espèces se sont introduites en Ontario. Ce statut est conforme à celui du COSEPAC (2019).

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

Shagreen (*Inflectarius inflectus*) is a medium brown terrestrial snail and the only member of the genus *Inflectarius* in Canada. It occurs in moist forest where it can be found in the leaf litter, on logs and exposed rocks. It is found in eastern North America, from Ontario to Texas. In Ontario, it is currently restricted to two Lake Erie islands, Pelee Island and Middle Island. Shagreen is thought to be in decline in Ontario due to the impacts of invasive species and habitat fragmentation, and is threatened from various threats including climate change and strong localized weather patterns.

Shagreen has been assessed as Endangered by COSSARO based on having a small range, number of locations, an inferred decline in the quality of available habitat and decline in the quality of habitat from introduced species in Ontario.

This status is consistent with COSEWIC (2019).

1. Eligibility for Ontario status assessment

1.1. Eligibility conditions

1.1.1. Taxonomic distinctness

Shagreen is a medium-sized terrestrial snail (mature shell ~1 cm across) with the foot gray in colouration and an imperforate shell that is brownish in colouration and three rounded denticles at the shell opening. It is the only species of the genus *Inflectarius* in Canada.

1.1.2. Designatable units

Shagreen has only one designatable unit in Ontario.

1.1.3. Native status

Shagreen is a native species to Ontario, with the earliest documented record from the early 1900's (COSEWIC 2019).

1.1.4. Occurrence

Shagreen naturally occurs in southwestern Ontario, where it is found on two Lake Erie Islands, Pelee Island and Middle Island. Previously, it was also known from two mainland sites, but these subpopulations are thought to be no longer present, with recent surveys of the area, along with other sites in southwestern Ontario, finding no additional records (COSEWIC 2019).

1.2. Eligibility results

Shagreen (*Inflectarius inflectus*) is eligible for status assessment in Ontario.

2. Background information

2.1. Current designations

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

2.2. Distribution in Ontario

Shagreen is currently restricted to two Lake Erie Islands, Pelee Island and Middle Island. Historically, there were mainland populations in Essex County, but those subpopulations are thought to be extirpated. A directed survey in 2013/2018 for snails of conservation interest in southwestern Ontario found no additional records on the mainland (COSEWIC 2019), despite sampling 135 sites and undertaking 557 person-hours.

In Ontario, COSEWIC (2019) reports one to six locations, based on the threat. As there are several sites on Pelee Island with different characteristics that could alter how they are affected by both climate and weather extremes (e.g., droughts and flooding), an upper range of six was given, but as both Pelee and Middle Islands are closely located, it is possible that the threats will equally impact the broader area of occurrence.

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

Shagreen is widely distributed in eastern North America from southwestern Ontario to Texas (see COSEWIC 2019), with Ontario having less than 1% of historical global population range. In the majority of the states (16) that it is present in, Shagreen was unranked (SNR), with some ranked as S5 (4) and only three with other statuses. West Virginia and Virginia ranked it as S2 and S3, respectively, and the population in Wisconsin is considered extirpated. General population trends for Shagreen each state are not clear, although comparisons of historical (1868–1990) versus more recent records (1990–2016) throughout its entire range in COSEWIC (2019 suggests that there is a decline in observations throughout the entire range.

2.4. Ontario conservation responsibility

Ontario's global conservation responsibility is low, with certainly less than 5% (likely less than 1%) of the range. However, Ontario does have the only population in Canada. No datum is available to suggest the global population or the extent of it in southern Ontario but, based on comments suggesting it is commonly encountered in parts of its range, it is likely that the Ontario population represents substantially less than 5% of the global population.

2.5. Direct threats

As a terrestrial snail, Shagreen is susceptible to droughts and flooding on both Pelee and Middle Islands, caused by climate change and strong weather patterns on the Lake Erie shoreline. Additional threats include habitat quality decline due to invasive species (e.g., earthworms, cormorants) and the use of prescribed burns to maintain grassland habitats on parts of Pelee Island.

2.6. Specialized life history or habitat use characteristics

Shagreen is at the northern limit of its range in southern Ontario. It occurs in moist woodlands with open understories, and is found in the leaf litter and under rocks and

logs.

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. No information is available for number of mature individuals.

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

Endangered under criteria B1ab(iii) + 2ab(iii). Shagreen has an EOO of 41 km² and IAO of 32 km², well below the threshold for Endangered in criteria B1 and B2. The range in number of locations (subcriteria a) includes Endangered and the lower limit of Threatened. There is also an inferred decline in quality of habitat due to the impact of introduced species on the leaf litter quality, and the fragmentation of woodland habitat in southwestern Ontario.

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

Does not apply. No information is available on population status.

3.1.4. Criterion D – Very small or restricted total population

Does not apply. There is no data available for number of mature individuals to allow consideration of D1. Shagreen Area of Occupancy (32km²) does approach the threshold for Threatened under criterion D2, and the range of locations is small enough depending on how the threat of shared extreme weather may have on the all the subpopulations.

3.1.5. Criterion E – Quantitative analysis

Does not apply; not quantitative analysis has been done on the Ontario population.

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.

3.3.2. Status modification based on rescue effect

Not 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

Shagreen (*Inflectarius inflectus*) is classified as Endangered in Ontario based on meeting criterion B1ab(iii) + 2ab(iii).

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

Shagreen has not previously been assessed by COSSARO.

5. Information sources

COSEWIC. 2019. COSEWIC assessment and status report on the Shagreen *Inflectarius inflectus* in Canada. Committee on the Status of Endangered Wildlife in Canada. Ottawa. x + 51 pp

Dourson, D.C. 2013. Kentucky's land snails and their ecological communities. Goatslug Publications, Bakersville, NC. 298 pp.

NatureServe. 2020. NatureServe Explorer: An online encyclopedia of life [web application]. Version 7.1. NatureServe, Arlington, Virginia. Available

<http://explorer.natureserve.org>. Accessed: 18 September 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: Shagreen (*Inflectarius inflectus*)

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.	2 years
Is there an observed, inferred, or projected continuing decline in number of mature individuals?	Yes, there is an inferred decline based on continued 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
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. No b. Yes c. No
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 (EEO). <i>If value in COSEWIC status report is not applicable, then use geocat.kew.org. State source of estimate.</i>	41 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>	32 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. <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>	COSEWIC (2019) suggests 1–6 locations, depending on threat combinations
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 has been a decline (historic)
Is there an observed, inferred, or projected continuing decline in index of area of occupancy?	Yes, there has been a decline (historic)
Is there an observed, inferred, or projected continuing decline in number of sub-populations or EOs?	Yes, there has been a decline (historic)
Is there an observed, inferred, or projected continuing decline in number of locations?	Yes, there has been a decline (historic)
Is there an observed, inferred, or projected continuing decline in [area, extent and/or quality] of habitat?	Yes, habitat quality is in decline and once had a more extensive distribution
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 presently no population size datum for any of the subpopulations.

Quantitative analysis (population viability analysis conducted)

Probability of extinction in the wild is unknown.

Threats

A threats calculator was prepared by COSEWIC (2019) and reported the following threats. Climate Change and Severe Weather was considered to be the highest threat (High-Low). The greatest threat in this category is from mortality from increasing temperatures, which may precipitate drought conditions, and early season frosts. As the Erie Islands also are susceptible to strong storm conditions, mortality from flooding is also possible.

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, as the limited dispersal ability of this species limits any rescue effect
Status of outside population(s) most likely to provide immigrants to Ontario	Michigan (SNR), New York (SNR), Ohio (SNR), Pennsylvania (S2)
Is immigration of individuals and/or propagules between Ontario and outside populations known or possible?	Possibly, but unlikely
Would immigrants be adapted to survive in Ontario?	Yes
Is there sufficient suitable habitat for immigrants in Ontario?	Yes
Are conditions deteriorating in Ontario?	Unknown, but probably
Is the species of conservation concern in bordering jurisdictions?	Yes, Pennsylvania
Is the Ontario population considered to be a sink?	Unknown, but unlikely
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 Shagreen (*Inflectarius inflectus*)

Adjacent Jurisdictions	Biologically Relevant to Ontario (n/a, yes, no)	Status & Trends	Condition	Notes & Sources
Quebec	n/a		Not present	
Manitoba	n/a		Not present	
Michigan	SNR			
Minnesota	n/a		Not present	
Nunavut	n/a		Not present	
New York	SNR			
Ohio	SNR			
Pennsylvania	SNR			
Wisconsin	SX			

Broader Biologically Relevant Geographic Range in Other Jurisdictions

This species is distributed from Ontario south to Texas, with the majority of regions without a rank for this species. In Arkansas, Kentucky, Tennessee and North Carolina, it is ranked as S5, with only Virginia (S3) and West Virginia (S2) having lower status ranks. As noted above, this species is now thought to be extirpated from Wisconsin. The broader biological impact of these regions on the Ontario population is extremely limited as Shagreen's migration capacity is extremely limited. There is not datum to suggest any general trends or conditions of these populations, although Dourson (2013) suggests that Shagreen is commonly encountered in marginal habitats in Kentucky.

Global Status and Trends

Global status: G5. Considered secure in four out of seven US states with published rankings, and vulnerable, imperiled and extirpated in Virginia, West Virginia and Wisconsin respectively.

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