

**Ontario Species at Risk Evaluation Report for
Domed Disc
Ponctin voûté / Bouton voûté
(*Discus patulus*)**

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

Assessed by COSSARO as Endangered

October 2024

Final

Executive summary

Domed Disc is a small terrestrial snail, one of three species in the genus found in Canada. The entire Canadian population of the species occurs in the Great Lakes Plains National Ecological Area. It is historically known at several sites but is currently only known to occur at a single site; a second site remains unconfirmed while surveys at other historic sites suggest the species is no longer present. Domed Disc is considered globally secure and has a large range across eastern North America. However, there is conservation concern for populations in multiple jurisdictions in the northern extent of its range. Domed Disc is likely threatened by climate change and associated weather events, modification of natural systems such as non-native species introductions, and pollution. The Domed Disc is a small snail with limited mobility, and therefore very limited ability for self-dispersal or rescue effect from neighboring populations.

Domed Disc is classified as Endangered in Ontario under criterion B1ab(iii)+2ab(iii). The species has a very small geographic range (B1 and B2), regardless of whether uncertain locations are included in estimates. It occurs at fewer than five locations (a) and is expected to experience ongoing declines in habitat quality (b(iii)). Domed Disc was not previously assessed by COSSARO.

1. Eligibility for Ontario status assessment

1.1. Eligibility conditions

1.1.1. Taxonomic distinctness

Domed Disc has the currently accepted scientific classification of *Discus patulus* (Pilsbry 1948; Turgeon et al. 1998; MolluscaBase 2024). The taxonomy and inclusion of species in this genus has experienced some flux in recent years, but Domed Disc is considered to be a distinct species and one of three native *Discus* species in Canada (COSEWIC 2024, IN PRESS).

1.1.2. Designatable units

The entire Canadian population of Domed Disc occurs in the Great Lake Plains National Ecological Area in Ontario (COSEWIC 2024, IN PRESS).

1.1.3. Native status

Domed Disc is historically known at multiple sites in Southern Ontario, first recorded in the late nineteenth and early twentieth centuries (COSEWIC 2024, IN PRESS). It is considered a native species in Ontario.

1.1.4. Occurrence

Domed Disc is currently known to occur at one site in Southern Ontario, while several historic locations have not received sufficient search effort to determine presence. Individuals in the Ontario population spend their entire life cycle in the province.

1.2. Eligibility results

Domed Disc (*Discus patulus*) is eligible for status assessment in Ontario.

2. Background information

2.1. Current designations

- GRANK: G5 (NatureServe 2024)
- IUCN: not assessed
- NRANK Canada: N2 (NatureServe 2024)
- COSEWIC: Endangered (May 2024)
- SARA: no status, under consideration for addition
- ESA 2007: not listed
- SRANK: S2 (ranked in 2019)

2.2. Distribution in Ontario

The population of Domed Disc in Ontario represents the entire known Canadian range for the species. It is historically known at 14 sites in Southern Ontario (Oughton 1948). It is currently confirmed only to occur at Joany's Woods at the Ausable River in Middlesex County (COSEWIC *In Press*, 2024). The only existing NHIC element occurrence for Domed Disc is a historic 1994 observation at White Oak Woods, near Leamington. Continued presence at this site is unconfirmed as the land is private and has not been searched, though suitable habitat remains. One other historic observation does not include sufficient location data to conduct a contemporary search, and the species is considered absent at the 11 other historic locations.

Depending on whether the uncertain White Oak Woods site is included, Domed Disc occurs at 1–2 locations in Ontario. The extent of occurrence (EOO) ranges from 4 km² to 345 km² depending on whether the second location is included, while the area of occupancy (IAO) ranges from 4 km² to 8 km². EOO and IAO have both declined around 80% in the last 20–100 years (COSEWIC 2024, IN PRESS).

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

Domed Disc is considered “Secure” globally. The species is widely distributed across eastern North America, occurring in multiple US states, ranging from Arkansas in the west to North Carolina in the east and Alabama in the south to Michigan and Ontario in the north (COSEWIC 2024, IN PRESS). The species' status across this range varies from Secure and Apparently Secure in Tennessee, West Virginia, Virginia, and Kentucky, to Vulnerable in North Carolina and Pennsylvania, and Critically Imperiled in Michigan. Thirteen other states have not assessed their populations.

There are limited data available to describe many aspects of the biology and ecology of Domed Disc, and as a result it is challenging to appropriately define the BBRGR for the species. No metapopulation dynamics are known, beyond the expectation that the Ontario population has no interaction or exchange with other populations, and no evolutionary units or genetic distinctions have been investigated or identified. With no other data, ecoregion could represent an appropriate means to distinguish the BBRGR for a species that with very limited mobility and high dependence on locally specific habitat. The Ontario population of Domed Disc occurs within the Mixed Wood Plains level two ecosystem, which also occurs in Michigan, New York, and Pennsylvania, three other jurisdictions where the species occurs. Domed Disc is ranked as S1 in Michigan, S3 in Pennsylvania, and not assessed in New York. Domed Disc received a medium score in Pennsylvania's 2015–2025 Wildlife Action Plan (PGC-PFBC 2015) under the categories of “prevent common species from becoming at risk” and “maintain rare native species”. It was also identified as a “Species of Greatest Conservation Need” in Michigan's Wildlife Action Plan 2015–2025 (Michigan Department of Natural Resources 2015).

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	Yes	S1	Natureserve 2024
Minnesota	N/A	-	-
Nunavut	N/A	-	-
New York	Yes	SNR	Natureserve 2024
Ohio	No	SNR	Natureserve 2024
Pennsylvania	Yes	S3	Natureserve 2024
Wisconsin	No	SNR	Natureserve 2024

2.4. Ontario conservation responsibility

Less than 5% of the species' global range occurs in Ontario (COSEWIC 2024, IN PRESS).

2.5. Direct threats

Domed Disc is threatened by the cumulative effects of multiple threats. These are summarised below, drawn from the threat assessment completed by COSEWIC (2024).

- Climate change and severe weather, high–low impact: the Ontario population is considered vulnerable to extreme weather events such as droughts, floods and temperature extremes, as well as habitat shifting due to changes in frequency and intensity of rainfall.
- Natural system modifications, unknown impact: non-native plants and earthworms in the species' known Ontario location have the potential to impact terrestrial snail communities, although the extent and direction of this impact is not known for Domed Disc.
- Invasive and other problematic species and genes, unknown impact: competition with exotic gastropods is an unknown, but potential threat to Domed Disc.
- Pollution, unknown impact: the effects of pesticide runoff from agriculture and forestry on native gastropods are unknown, though laboratory studies have demonstrated increased mortality of some snail species in response to some herbicides; the close proximity of the single confirmed Location for Domed Disc in Ontario to agricultural land means the population may be exposed to pesticide drift.

2.6. Specialized life history or habitat use characteristics

There is limited specific information available on the biology or ecology of Domed Disc. Active movement is likely negligible, and the species has been observed to form small colonies and stay under logs, presumably giving very low dispersal ability (Boag 1985; COSEWIC 2024, IN PRESS). Other dispersal mechanisms for the species are unknown.

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. The number of mature individuals is unknown.

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

Endangered, B1ab(iii)+2ab(iii). EOO is below 5,000 km² and IAO is below 500 km² (B1 and B2 respectively), there are fewer than five locations (a) and there is an observed or projected continuing declines in quality of habitat due to a variety of threats (b(iii)).

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

Does not apply. The number of mature individuals is unknown.

3.1.4. Criterion D – Very small or restricted total population

Threatened, D2. Fewer than five locations known in Ontario.

D1 does not apply as the number of mature individuals is unknown.

3.1.5. Criterion E – Quantitative analysis

Does not apply. No relevant analysis has been conducted.

3.2. Application of Special Concern in Ontario

Does not apply. Meets the criteria and definition for endangered.

3.3. Status category modifiers

3.3.1. Ontario's conservation responsibility

Does not apply. Species is G5 and less than five percent of the global population occurs in Ontario.

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

Does not apply. Species is considered vulnerable or critically imperilled in other jurisdictions within the BBRGR that have completed assessments. Access to appropriate data to complete an accurate assessment for the BBRGR as a whole is not available. However, reported occurrences appear to be low (e.g., four occurrences in

Michigan; Michigan Department of Natural Resources 2015) and therefore unlikely to alter the applicability of criterion B.

3.3.3. Rescue Effect

Does not apply. Dispersal from outside Ontario is unlikely due to distance, barriers, and unsuitable habitat between the population and nearest neighbours.

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

Domed Disc (*Discus patulus*) 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 Endangered under the *Endangered Species Act, 2007*.

5. Information sources

COSEWIC. 2024. IN PRESS. COSEWIC assessment and status report on the Domed Disc *Discus patulus* in Canada. Committee on the Status of Endangered Wildlife in Canada. Ottawa. x + 46 pp. (<https://www.canada.ca/en/environment-climate-change/services/species-risk-public-registry.html>).

Michigan Department of Natural Resources. 2015. Michigan Wildlife Action Plan 2015–2025. https://www.michigan.gov/-/media/Project/Websites/dnr/%20Documents/WLD/WAP/wap_intro_ada.pdf?rev=2e548cab1dcf42358350f52977778b8a

MolluscaBase. 2024. MolluscaBase, *Discus patulus* (Deshayes, 1832). Website: <https://www.molluscabase.org/aphia.php?p=taxdetails&id=1338535> [accessed 25 January 2024].

Pilsbry, H.A. 1948. Land Mollusca of North America (North of Mexico). Volume 2, Part 2. Academy of Natural Sciences of Philadelphia, Pennsylvania. Monograph 3:i–xlvii + 521–1113.

Oughton, J. 1948. A Zoogeographical Study of the Land Snails of Ontario. University of Toronto Press, Toronto, Ontario. 128 pp.

PGC-PFBC (Pennsylvania Game Commission and Pennsylvania Fish & Boat Commission). 2015. Pennsylvania Wildlife Action Plan, 2015-2025. C. Haffner and D. Day, editors. Pennsylvania Game Commission and Pennsylvania Fish & Boat Commission, Harrisburg, Pennsylvania. <https://www.pgc.pa.gov/Wildlife/WildlifeActionPlan/Pages/default.aspx>

Turgeon, D.D., J.F. Quinn, Jr., A.E. Bogan, E.V. Coan, F.G. Hochberg, W.G. Lyons, P.M. Mikkelsen, R.J. Neves, C.F.E. Roper, G. Rosenberg, B. Roth, A. Scheltema, F.G. Thompson, M. Vecchione, and J.D. Williams. 1998. Common and scientific names of aquatic invertebrates from the United States and Canada: Mollusks. Second Edition. American Fisheries Society, Special Publication 26: 526 pp.

Appendix 1: Technical summary for Ontario

Species: Domed Disc (*Discus patulus*)

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, based on past declines inferred from reduction in the number of occupied sites and future decline inferred from continuing 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 (EOO)	4–345 km ² (depending on the inclusion of one uncertain occurrence)
Index of area of occupancy (IAO).	4–8 km ² (depending on the inclusion of one uncertain occurrence)

Extent and occupancy attributes	Value
<p>Is the total population severely fragmented? i.e., is >50% of its total area of occupancy is in habitat patches that are:</p> <p>(a) smaller than would be required to support a viable population, and</p> <p>(b) separated from other habitat patches by a distance larger than the species can be expected to disperse?</p>	<p>a. Unknown b. Yes</p>
<p>Number of locations.</p>	<p>1–2 (depending on the inclusion of one uncertain occurrence)</p>
<p>Number of NHIC Element Occurrences</p>	<p>1 (historic)</p>
<p>Is there an observed, inferred, or projected continuing decline in extent of occurrence?</p>	<p>Yes. Historic decline inferred from reduction in number of sites, potential future decline inferred from continuing threats</p>
<p>Is there an observed, inferred, or projected continuing decline in index of area of occupancy?</p>	<p>Yes. Historic decline inferred from reduction in number of sites, potential future decline inferred from continuing threats</p>
<p>Is there an observed, inferred, or projected continuing decline in number of sub-populations or EOs?</p>	<p>Yes. Historic decline inferred from reduction in number of sites, potential future decline inferred from continuing threats</p>
<p>Is there an observed, inferred, or projected continuing decline in number of locations?</p>	<p>Yes. Historic decline inferred from reduction in number of sites, potential future decline inferred from continuing threats</p>
<p>Is there an observed, inferred, or projected continuing decline in [area, extent and/or quality] of habitat?</p>	<p>Yes. Historic habitat loss/degradation observed in area, extent, and quality of habitat, and continuing decline is projected due to threats</p>
<p>Are there extreme fluctuations in number of populations?</p>	<p>No</p>
<p>Are there extreme fluctuations in number of locations?</p>	<p>No</p>
<p>Are there extreme fluctuations in extent of occurrence?</p>	<p>No</p>
<p>Are there extreme fluctuations in index of area of occupancy?</p>	<p>No</p>

Number of mature individuals in each sub-population or total population (if known)

Number of mature individuals is not known.

Quantitative analysis (population viability analysis conducted)

Probability of extinction in the wild is unknown.

Threats

A threats calculation was completed by COSEWIC (2024). The following threats were identified:

Climate Change and Extreme Weather (HIGH-LOW impact)

Natural system modifications (UNKNOWN impact)

Invasive & other problematic species & genes (UNKNOWN impact)

Pollution (UNKNOWN impact)

Rescue effect

Rescue effect attribute	Value
Does the broader biologically relevant geographic range for this species extend beyond Ontario?	Yes
Status of outside population(s) most likely to provide immigrants to Ontario	S1S2 (Michigan), S3 (Pennsylvania), SNR (Ohio & New York)
Is immigration of individuals and/or propagules between Ontario and outside populations known or possible?	Yes (Incidental)
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. Primarily historic but projected to continued.
Is the species of conservation concern in bordering jurisdictions?	Yes
Is the Ontario population considered to be a sink?	No
Is rescue from outside populations likely?	No

Sensitive species

Domed Disc is not a data sensitive species.

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
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