

**Ontario Species at Risk Evaluation Report for
Finlayson's Oakworm Moth
Anisote de Finlayson
(*Anisota finlaysoni*)**

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

Assessed by COSSARO as Threatened

October 2024
Final

Executive summary

Finlayson's Oakworm Moth (*Anisota finlaysoni*) is a member of the giant silk moth family. It is a medium-sized moth: male forewing length measures 17-20 mm and female forewing length measures 24-30 mm. This species is phenotypically similar to the Orange-striped Oakworm Moth (*A. sentoria*).

This species has an annual life cycle, and one generation, which occurs over four life stages – egg, larva (with five instars), pupa and adult.

Finlayson's Oakworm Moth distribution is restricted to southern Ontario where it occurs at limited locations within the Mixedwood Plains ecozone, mostly restricted to the northeastern areas of Lake Ontario and Lake Erie. General habitat includes open oak savannahs and woodlands; preferred habitat includes open-grown oak trees with a low density and abundance of shrubby understorey.

This moth flies from mid-June to mid-July. Eggs are laid in clusters on the underside of oak leaves, including White Oak (*Quercus alba*), Bur Oak (*Q. macrocarpa*), Black Oak (*Q. nigra*) and Red Oak (*Q. rubra*). Larvae mature in late August – September, overwintering as pupae in the soil until the following June.

Impacts from the spread of the non-native Spongy Moth (*Lymantria dispar dispar*) and other larval pest species is the most serious and plausible threat to Finlayson's Oakworm Moth. Spongy Moth defoliates oak trees, decreasing the main food supply for Oakworm moth larvae. *Bacillus thuringiensis* (var. *kurstaki*) Btk is routinely deployed to control Spongy Moth, which also kills Oakworm moth larvae. Additional threats include vegetation succession and fire suppression of their preferred habitat, oak savannah, which is a critically imperiled (S1) habitat type in Ontario.

Finlayson's Oakworm Moth has been assessed and classified as Threatened in Ontario. While it does not meet the criteria for Threatened (criteria met include B1, B2 and B2b), and it does meet the consideration of Special Concern (b and c), it also qualifies under status category modifier 3.3.1. Therefore, when the modifier is applied, the status is elevated to Threatened. Finlayson's Oakworm Moth was not previously assessed by COSSARO.

1. Eligibility for Ontario status assessment

1.1. Eligibility conditions

1.1.1. Taxonomic distinctness

It has been disputed whether or not Finlayson's Oakworm Moth is a full species; however, current moth taxonomic information sources treat Finlayson's Oakworm Moth as a full valid species (e.g., Pohl et al. 2016; Schmidt pers. comm. 2023 *in* COSEWIC 2023). It is taxonomically distinct.

1.1.2. Designatable units

There is no evidence to justify separate designatable units. No subspecies are recognized, and there is no behavioural or genetic information that supports a taxonomic separation below the species level.

1.1.3. Native status

Finlayson's Oakworm Moth is native to Ontario and believed to be globally endemic to Ontario, Canada.

1.1.4. Occurrence

Finlayson's Oakworm Moth is found within a limited range in southern Ontario, mostly restricted to the northeastern area of Lake Ontario and the northeastern area of Lake Erie. Its geographic range overlaps with the larger geographic range of its larval host plants, oak trees.

1.2. Eligibility results

Finlayson's Oakworm Moth (*Anisota finlaysoni*) is eligible for status assessment in Ontario.

2. Background information

2.1. Current designations

- GRANK: G2 (NatureServe 2024)
- IUCN: not listed
- NRANK Canada: N2
- COSEWIC: Special Concern (December 2023)
- SARA: Special Concern, under consideration for addition to Schedule 1
- ESA 2007: not listed
- SRANK: S2 (ranked in 2023)

2.2. Distribution in Ontario

Finlayson's Oakworm Moth is restricted to a small region of southern Ontario. Its northernmost range reaches Lindsay and extends westward along the north shores of Lake Ontario at Breslau, south to Long Point and eastward through the Niagara Peninsula to Fort Erie and Rockport.

Historically, Finlayson's Oakworm Moth has been recorded from at least 81 subpopulations. Its current range is now restricted to a minimum of 15 subpopulations. The plausible range of locations is estimated at 7 (counties with extant subpopulations) to 30 (minimum number of municipalities with potential extant subpopulations).

When combining the historical and extant subpopulations of Finlayson's Oakworm Moth, the extent of occurrence (EOO) is 41,592 km² and the index area of occupancy (IAO) is 336 km². If only factoring the extant subpopulations, the EOO is 19,310 km² and the IAO is 140 km².

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

Finlayson's Oakworm Moth's historical range included the Thousand Island region, west along the north shores of Lake Ontario, south to the northeastern shore of Lake Erie, and east through the Niagara Peninsula to Fort Erie. Its global range is restricted to southern Ontario, and it is currently thought to occur within in a small region of this part of the province.

Given its restricted global range to southern Ontario, the BBRGR is not relevant for this species.

2.4. Ontario conservation responsibility

100% of the global range and global population is within Ontario, therefore Ontario has high conservation responsibility.

2.5. Direct threats

COSEWIC (2023) completed a threats calculator; impacts from the spread of non-native Spongy Moth (*Lymantria dispar dispar*) and other larval pest species is the most serious and plausible threat to Finlayson's Oakworm Moth. Spongy Moth defoliates oak trees, decreasing the main food supply for Oakworm moth larvae. *Btk* is routinely deployed to control Spongy Moth, which also kills Oakworm moth larvae. Additional threats include vegetation succession and fire suppression of their preferred habitat, oak savannah.

Other threats, though considered low, include residential, urban, agricultural, aggregate and road construction developments that fragment the preferred habitat for this species.

2.6. Specialized life history or habitat use characteristics

Finlayson's Oakworm Moth habitat includes open oak woodlands and savannahs, which are considered a critically imperiled (S1) habitat type in Ontario (NHIC 2021).

2.7. Existing Conservation and Recovery Actions

No recovery actions have been undertaken for Finlayson's Oakworm Moth.

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

A1-A4. Unknown. Insufficient data.

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

B1. Extent of occurrence (EOO) is <20,000 km². Indicator applies.

- The EOO for extant subpopulations is 19,310 km².

B2. Index area of occupancy (IAO) is <500 km². Indicator applies.

- The IAO for extant subpopulations is 140 km².

B2. a) indicator does not apply; The plausible range of locations is estimated at 7 (counties with extant subpopulations) to 30 (minimum number of municipalities with potential extant subpopulations). The range of estimated locations (7-30) is >10 (<10 locations would meet the definition of threatened).

B2. b) indicator applies; shows continuing decline, observed, inferred or projected, in (i) EOO, (ii) IAO, (iii) area, extent and/or quality of habitat, (iv) number of locations or subpopulations.

B2. c) indicator does not apply; unknown and insufficient data.

Meets B1, B2 and B2b.

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

Unknown. Insufficient data.

3.1.4. Criterion D – Very small or restricted total population

Unknown. Insufficient data.

3.1.5. Criterion E – Quantitative analysis

Does not apply. No suitable analyses have been conducted for this species.

3.2. Application of Special Concern in Ontario

Finlayson's Oakworm Moth does not meet the criteria for Threatened or Endangered. It can be considered for Special Concern as it meets b and c.

3.3. Status category modifiers

3.3.1. Ontario's conservation responsibility

A species may be upgraded to a higher classification if its NatureServe Global Rank ranges anywhere from G1 to G3, *and* its Ontario Conservation Responsibility is >25% of the global range *or* its population is found in Ontario.

Finlayson's Oakworm Moth is globally at risk (G2), and 100% of its population is found in southern Ontario. Therefore, it is within G1 to G3 and its Ontario Conservation Responsibility is >25%.

This category modifier has been applied in this situation given that this species only occurs in Ontario and that its habitat is critically imperiled. This elevates the status of Special Concern to Threatened.

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

Does not apply. Given its restricted global range to southern Ontario, the BBRGR is not relevant for this species.

3.3.3. Rescue Effect

Does not apply. No other populations exist outside of Ontario.

3.4. Other status categories

3.4.1. Data deficient

Does not apply. Data are limited but sufficient to support an assessment.

3.4.2. Extinct or extirpated

Does not apply.

3.4.3. Not at risk

Does not apply.

4. Summary of Ontario status

Finlayson's Oakworm Moth (*Anisota finlaysoni*) is classified as Threatened in Ontario. The species meets the criteria for Special Concern (b) as well as (c) as it is close to meeting criteria for Threatened (meets B1, B2 and B2b). However, it also qualifies for status modifier 1 (Ontario Conservation Responsibility) and is therefore classified as Threatened.

This status differs from COSEWIC, which assigned a status of Special Concern. COSSARO assessment criteria include status category modifiers, allowing a status to be modified if certain criteria are met. These criteria were met for this species, elevating the status of Special Concern to Threatened.

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

5. Information sources

COSEWIC. 2023. IN PRESS. COSEWIC assessment and status report on the Finlayson's Oakworm Moth *Anisota finlaysoni* in Canada. Committee on the Status of Endangered Wildlife in Canada. Ottawa. xi + 69 pp.

(<https://www.canada.ca/en/environment-climate-change/services/species-risk-public-registry.html>).

NatureServe. 2023. NatureServe Explorer 2.0. *Anisota finlaysoni*.

https://explorer.natureserve.org/Taxon/ELEMENT_GLOBAL.2.118613/Anisota_finlaysoni [accessed 20 March 2024].

Ministry of Natural Resources and Forestry. Natural Heritage Information Centre. 2023. Species lists – all species (Excel). February 6, 2024. <https://www.ontario.ca/page/get-natural-heritage-information#The%20Natural%20Heritage%20Information%20Centre> [accessed March 2024].

Appendix 1: Technical summary for Ontario

Species: Finlayson's Oakworm Moth (*Anisota finlaysoni*)

Data provided for Appendix 1 has been pasted from the COSEWIC report (December 2023). The NHIC data was provided in March 2024.

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.	1 year, based on the biology of the moth.
Is there an observed, inferred, or projected continuing decline in number of mature individuals?	Unknown. Insufficient data.
Estimated percent of continuing decline in total number of mature individuals within 5 years or 2 generations.	Unknown. Insufficient data.
Observed, estimated, inferred, or suspected percent reduction or increase in total number of mature individuals over the last 10 years or 3 generations.	Unknown. Insufficient data.
Projected or suspected percent reduction or increase in total number of mature individuals over the next 10 years or 3 generations.	Unknown. Insufficient data.
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. Insufficient data.
Are the causes of the decline (a) clearly reversible, and (b) understood, and (c) ceased?	a) No. Historical habitat loss and fragmentation are not reversible. b) No. The moth historically occurred at outbreak levels however species specific and locality information is vague; habitat loss is inferred but there are additional unknown contributors to declines. c) No. There are numerous cumulative ongoing threats in known and potential habitats.
Are there extreme fluctuations in number of mature individuals?	Unknown. Insufficient data.

Extent and occupancy information in Ontario

Extent and occupancy attributes	Value
Estimated extent of occurrence (EOO).	41,592 km ² ; calculated based on convex polygon around historical and extant subpopulations. The moth can occur at low abundance and may reside within historical sites with suitable habitat.
Index of area of occupancy (IAO).	> 336 km ² (84 grid cells; includes historical and extant sites)
<p>Is the total population severely fragmented? i.e., is >50% of its total area of occupancy 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. No. It is not known if habitat patches support viable subpopulations, but it is known that the moth can occur at low abundance within oak patches.</p> <p>b. Yes. Historically, oak-savannah habitats were more connected and widespread, but present-day ecosystems are isolated and fragmented. Fragmented habitat, poor dispersal ability and a low number of separate and isolated extant subpopulations across unsuitable habitat support this.</p>
<p>Number of locations.</p> <p><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></p>	7-30. There are 15 extant subpopulations of Finlayson's Oakworm Moth that span a minimum of 7 counties in southern Ontario. Each county can further be subdivided into municipalities, and each municipality may have differing spray regimes. There are likely undocumented subpopulations of the

Extent and occupancy attributes	Value
	moth, based on the low detection probability of the species and these subpopulations would also be threatened from pesticide spray to control Spongy Moth. The plausible range of locations is estimated at 7 (counties with extant subpopulations) - 30 (minimum number of municipalities with potential extant subpopulations).
Number of NHIC Element Occurrences <i>Request data from MNRF.</i>	n/a
Is there an observed, inferred, or projected continuing decline in extent of occurrence?	Yes. Inferred decline based on current and ongoing threats to habitat quality and quantity (see Threats and Habitat Trends).
Is there an observed, inferred, or projected continuing decline in index of area of occupancy?	Yes. Inferred decline based on current and ongoing threats to habitat quality and quantity (see Threats and Habitat Trends).
Is there an observed, inferred, or projected continuing decline in number of sub-populations or EOs?	Yes. Inferred decline based on current and ongoing threats to habitat quality and quantity (see Threats and Habitat Trends).
Is there an observed, inferred, or projected continuing decline in number of locations?	Yes. Inferred decline based on the threat of potential spray of pesticide to control non-native Spongy Moth.
Is there an observed, inferred, or projected continuing decline in [area, extent and/or quality] of habitat?	No. Historical data document moth larvae at outbreak abundance; however, species specific and locality information is

Extent and occupancy attributes	Value
	vague, and the moth may persist undetected.
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
81 known subpopulations (>15 extant; 65 historical)	Most records are presence/not detected and/or the abundance was not recorded. It is not possible to determine subpopulation size. See Appendix 3.
Total	Most records are presence/not detected and/or the abundance was not recorded. It is not possible to determine subpopulation size. See Appendix 3.

Quantitative analysis (population viability analysis conducted)

Probability of extinction in the wild is unknown. Analysis not conducted.

Threats

A threats calculator conducted in December 2023, as part of the COSEWIC report (see Appendix 2) identified the following threats in decreasing order from highest to lowest, as per the IUCN Threats Calculator:

- 9.3 Agricultural and Forestry Effluents (High-Low impact)
- 7.3 Other ecosystem modifications (Medium impact)
- 8.1 Invasive non-native/alien species/diseases (Medium impact)
- 1.1 Housing and Urban Areas (Low impact)
- 2.1 Annual & perennial non-timber crops (Low impact)
- 3.2 Mining & quarrying (Low impact)
- 4.1 Roads and railroads (Low impact)
- 9.6 Light Pollution (Low impact)

What additional limiting factors are relevant?

- Larvae are dependent on specific oak (*Quercus* spp.) species to complete their life cycle.
- Adults do not feed so larvae must consume all necessary energy to sustain individuals through pupation to an adult (mating, egg development and

- oviposition).
- Small subpopulation size, both spatial area (e.g., limited habitat) and low moth abundance.
- Poor dispersal ability of females and short life span may limit (re)colonization of habitats.
- Increasing dense vegetation may limit the female's pheromone plume and ability for males to detect calling females.

Rescue effect

Rescue effect attribute	Value
Does the broader biologically relevant geographic range for this species extend beyond Ontario?	Not applicable. The species has only been recorded in Ontario and seems to be endemic to Ontario.
Status of outside population(s) most likely to provide immigrants to Ontario	Not applicable. The species has only been recorded in Ontario and seems to be endemic to Ontario
Is immigration of individuals and/or propagules between Ontario and outside populations known or possible?	Not applicable. The species has only been recorded in Ontario and seems to be endemic to Ontario.
Would immigrants be adapted to survive in Ontario?	Not applicable. The species has only been recorded in Ontario and seems to be endemic to Ontario.
Is there sufficient suitable habitat for immigrants in Ontario?	No. Habitat availability is considered critically imperiled in Ontario.
Are conditions deteriorating in Ontario?	Yes. Ecosystem modifications are a Medium impact threat.
Is the species of conservation concern in bordering jurisdictions?	No. The species has only been recorded in Ontario and seems to be endemic to Ontario.
Is the Ontario population considered to be a sink?	No.
Is rescue from outside populations likely?	Not applicable. The species has only been recorded in Ontario and seems to be endemic to Ontario.

Sensitive species

Finlayson's Oakworm Moth is not 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