

**Ontario Species at Risk Evaluation Report for
Reversed Haploa Moth**

**Haploa inversé
(*Haploa reversa*)**

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

Assessed by COSSARO as Threatened

February 2021

Haploa inversé (*Haploa reversa*)

L'haploa inversé (*Haploa reversa*) est classé dans la catégorie des espèces menacées en Ontario par le CDSEPO.

L'haploa inversé est un papillon à l'envergure de 33 à 48 mm, dont le dessus des ailes est marqué de bandes brunes et de taches blanches. Les ailes antérieures présentent une tache basale blanche triangulaire partant du thorax ainsi que trois taches costales blanches de grandeur semblable le long du bord d'attaque, qui sont distinctives de l'espèce. Les ailes postérieures sont généralement entièrement blanches, sauf chez certains individus qui portent une ou deux petites taches submarginales brunes. La tête, le prothorax et les palpes sont jaune ocre. Le thorax est blanc et est traversé d'une large bande dorsale brune. Les pattes sont jaune ocre, avec du brun le long de la face externe. La chenille est noire, porte des rayures longitudinales jaunes à orange et une rayure dorsale orangée à rougeâtre et est recouverte d'épines soyeuses (COSEPAC, 2019).

L'haploa inversé est associé aux habitats de savanes à chênes, de chênaies et de dunes. Cette espèce est polyphage, peut se nourrir de nombreuses espèces de plantes, et est couramment associée aux espèces du genre *Eupatorium* (eupatoires) (COSEPAC, 2019).

L'haploa inversé (*Haploa reversa*) est classé dans la catégorie des espèces menacées, conformément aux critères B1ab(i)(ii)(iii)(iv) et B2ab(i)(ii)(iii)(iv), sa zone d'occurrence étant 9 098 km², l'indice de la zone d'occurrence 36 km², son nombre de localités 5 et la réduction de la zone d'occurrence, de l'indice de la zone d'occurrence, de la qualité de l'habitat et du nombre de localités étant déduite.

Cette publication hautement spécialisée 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

Reversed Haploa Moth has a wingspan of 33-48mm with a dorsal wing pattern of brown bands and white patches, including a distinctive white triangular basal patch extending from the thorax through to the forewings; and three similarly sized, distinctive white costal patches. The hindwings are entirely white with some individuals displaying one to two small brown submarginal spots. The head, prothorax and palpi are ochre yellow. The thorax is white with a broad dorsal brown stripe. The legs are ochre yellow and lined with brown along the outer surface. The larvae are black with yellow to orange longitudinal stripes and an orangish to reddish dorsal stripe with bristly spines (COSEWIC, 2019).

Reversed Haploa Moth is associated with oak savanna, oak woodland and dune habitats. They are polyphagous where they are able to eat on many plant species and are commonly associated with *Eupatorium* species (bonesets, thoroughworts or snakeworts) (COSEWIC, 2019).

Reversed Haploa Moth (*Haploa reversa*) is classified as Threatened based on meeting criteria B1ab(i)(ii)(iii)(iv) and B2ab(i)(ii)(iii)(iv) where the extent of occurrence is 9,098km², the index of area of occupancy is 36km², there are 5 locations, an inferred decrease in extent of occurrence, index of area of occupancy, habitat quality and number of locations.

1. Eligibility for Ontario status assessment

1.1. Eligibility conditions

1.1.1. Taxonomic distinctness

Reversed Haploa Moth is part of the subfamily Arctiinae (Tiger and Lichen Moths). No subspecies have been described and there is no evidence to suggest they represent discrete and evolutionary significant populations. Only three specimens have had their mitochondrial DNA barcoded, none of which are from Canada and are unable to distinguish Reversed Haploa Moth from three other Haploa species in North America: Leconte's Haploa Moth and Confused Haploa Moth, which also occur in Ontario (COSEWIC, 2019).

1.1.2. Designatable units

Reversed Haploa Moth is considered to represent a single designatable unit throughout its Canadian Range (COSEWIC, 2019).

1.1.3. Native status

Reversed Haploa Moth was first described in 1885 with revisions in 2010 (COSEWIC, 2019).

1.1.4. Occurrence

Reversed Haploa Moth is known from four extant subpopulations in Southwestern Ontario restricted to the Carolinian ecoregion (COSEWIC, 2019).

1.2. Eligibility results

Reversed Haploa Moth (*Haploa reversa*) is eligible for status assessment in Ontario.

2. Background information

2.1. Current designations

- GRANK: G5 (NatureServe 2021)
- IUCN: na
- NRANK Canada: N2N3
- COSEWIC: Endangered (November, 2019)
- SARA: Not on Schedule 1
- ESA 2007: Not on ESA
- SRANK: S1? (2000)

2.2. Distribution in Ontario

There are four currently known subpopulations: two locations in Lambton County; one location in Walsingham, Norfolk County; one location at the Coves in London; and one location at Ojibway Prairie, Essex County. All known subpopulations are considered extant with presence confirmed in 2018 or 2019 (COSEWIC, 2019).

There are 70 observation records on NHIC documented between 1993 and 2019.

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

The full range of Reversed Haploa Moth extends across North America and occurs from southeast Minnesota to Texas and western Arizona east to Ohio and North Carolina (COSEWIC, 2019). Reversed Haploa Moth is considered globally secure (G5) and is not listed on the IUCN Red List of Threatened Species.

Populations of Reversed Haploa Moth from southern Ontario occupy North American Terrestrial Ecoregion 8.1, which extends into southern Minnesota, Wisconsin, and Michigan, northern Iowa, Illinois, Indiana, Ohio, New York, and Pennsylvania (North America Atlas, 2006). The subpopulation in the Ojibway Prairie area may be connected to known subpopulations in Michigan, which have records approximately 11-21km away.

Dispersal abilities of Reversed Haploa Moth are unknown. However, the oak woodland and savanna habitat in which it is associated is limited where up to 98% has been lost and remaining oak woodlands are small and fragmented (COSEWIC, 2019).

Table 1. Condition of Reversed Haploa Moth 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	n/a	n/a
Manitoba	n/a	n/a	n/a
Michigan	Yes	SNR	NatureServe
Minnesota	No	n/a	n/a
Nunavut	No	n/a	n/a
New York	Yes	SNR	NatureServe
Ohio	Yes	SNR	NatureServe
Pennsylvania	Yes	SNR	NatureServe
Wisconsin	No	n/a	n/a
<i>Other Relevant Jurisdiction</i>	n/a	n/a	n/a

2.4. Ontario conservation responsibility

Estimated to be less than one percent given the global range for Reversed Haploa Moth. The percentage of the global population that exists in Ontario is unknown.

2.5. Direct threats

Threats to Reversed Haploa Moth are associated with the decline of oak woodland and savanna habitats and the associated effects of habitat fragmentation. Wide-spread pesticide spraying of *Bacillus thuringiensis* to control the non-native European Gypsy Moth (*Lymantria dispar dispar*) is considered the highest threat to Reversed Haploa Moth subpopulations. Recreational activities and inappropriate habitat management, leading to competition with invasive plant species and/or canopy closure is also a likely threat (COSEWIC, 2019). Climate change may make the timing of emergence of larvae asynchronous with the availability of their larval host plants (COSEWIC, 2019).

A threats calculation was completed for Reversed Haploa Moth as part of the COSEWIC (2019) report as follows:

- i) Agricultural and forestry effluents – High Impact
- ii) Invasive non-native/alien species – Unknown Impact
- iii) Fire and fire suppression –Low Impact
- iv) Recreational activities – Low Impact
- v) Climate Change and severe weather – Unknown Impact

2.6. Specialized life history or habitat use characteristics

Reversed Haploa Moth has a wingspan of 33-48mm with a dorsal wing pattern of brown bands and white patches, including a distinctive white triangular basal patch extending from the thorax through to the forewings; and three similarly sized, distinctive white costal patches. The hindwings are entirely white with some individuals displaying one to two small brown submarginal spots. The head, prothorax and palpi are ochre yellow. The thorax is white with a broad dorsal brown stripe. The legs are ochre yellow and lined with brown along the outer surface. The larvae are black with yellow to orange longitudinal stripes and an orangish to reddish dorsal stripe with bristly spines (COSEWIC, 2019).

Reversed Haploa Moth has one generation per year and adults fly from late June to late July and peak in mid-July. Mating, oviposition and larval feeding behaviour is undescribed, however, may be similar to other *Haploa* species where courtship is initiated when the female releases sex attractant pheromones and females oviposit directly on host plants. Reversed Haploa Moth is non-migratory (COSEWIC, 2019).

Reversed Haploa Moth is associated with oak savanna, oak woodland and dune habitats. Oak savanna habitats once covered more than 11,000,000 hectares in North

America, but are now one of the most endangered habitat types in Canada (Rodger, 1998). Reversed Haploa Moth are polyphagous where they are able to eat on many plant species and are commonly associated with *Eupatorium* species (bonesets, thoroughworts or snakeworts) (COSEWIC, 2019).

There is no information that suggests that Reversed Haploa Moth has an important cultural or economic role for Indigenous peoples (COSEWIC, 2019).

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

Not applicable. No population estimates are available.

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

Meets Threatened B1ab(i)(ii)(iii)(iv) + B2ab(i)(ii)(iii)(iv). The EOO is 9,098km², the AOO is 36km², there are 5 locations, an inferred EOO decrease, an inferred AOO decrease, an inferred decline of habitat quality based on a number of threats and an inferred decrease in the number of locations.

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

Not applicable. Number of mature individuals unknown

3.1.4. Criterion D – Very small or restricted total population

Not applicable. There are 5 locations, but these are not prone to effects of human activities or events.

3.1.5. Criterion E – Quantitative analysis

A quantitative analysis has not been completed.

3.2. Application of Special Concern in Ontario

Not applicable.

3.3. Status category modifiers

3.3.1. Ontario's conservation responsibility

Not applicable.

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

Rescue effect may be possible for Ojibway Prairie subpopulation from populations in Michigan.

Broader biologically relevant geographic range includes oak habitats extending south to central United States. This species has not been ranked in any of the jurisdictions it is observed (NatureServe, 2020). Habitat availability, in particular oak forests, is in decline (Rodewald, 2003; Rodger, 1998).

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

Reversed Haploa Moth (*Haploa reversa*) is classified as Threatened based on meeting criteria B1ab(i)(ii)(iii)(iv) and B2ab(i)(ii)(iii)(iv) where the extent of occurrence is 9,098km², the index of area of occupancy is 36km², there are 5 locations, an inferred decrease in extent of occurrence, index of area of occupancy, habitat quality and number of locations.

5. Information sources

COSEWIC. 2019. COSEWIC assessment and status report on the Reversed Haploa Moth *Haploa reversa* in Canada. Committee on the Status of Endangered Wildlife in Canada. Ottawa. xi + 40pp. (<https://www.canada.ca/en/environment-climate-change/services/species-risk-public-registry.html>).

NatureServe. 2021. NatureServe Explorer: An online encyclopedia of life [web application]. Version 7.1. NatureServe, Arlington, Virginia. Website: <http://explorer.natureserve.org> [accessed January 2021].

Natural Heritage Information Centre. 2021: An online database of species observations for Ontario

North American Atlas. 2006. Ecological Regions of North America: Level I-III. In partnership with: cec.org; atlas.gc.ca; nationalatlas.gov; www.inegi.gov.mx. Website: <https://www.epa.gov/eco-research/ecoregions-north-america>

Rodewald, A.D. 2003. Decline of Oak Forests and Implications for Forest Wildlife Conservation. *Natural Areas Journal* 23(4): 368-371

Rodger, L. 1998. Tallgrass Communities in Southwestern Ontario: A Recovery Plan. Prepared for World Wildlife Fund and the Ontario Ministry of Natural Resources and Forestry. February 1998. Pp. 78

Appendix 1: Technical summary for Ontario

Species: Reversed Haploa Moth (*Haploa reversa*)

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
Is there an observed, inferred, or projected continuing decline in number of mature individuals?	Unknown based on insufficient data.
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?	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 geocat.kew.org. State source of estimate.</i>	9,098 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>	36 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>	5 locations
Number of NHIC Element Occurrences <i>Request data from MNRF.</i>	not available
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?	Yes
Is there an observed, inferred, or projected continuing decline in number of sub-populations or EOs?	Yes
Is there an observed, inferred, or projected continuing decline in number of locations?	Yes
Is there an observed, inferred, or projected continuing decline in [area, extent and/or quality] of habitat?	Yes
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)

Number of mature individuals unknown.

Sub-population (or total population)	Number of mature individuals
<i>Lambton County, Pinery Provincial Park</i>	<i>unknown</i>
<i>Lambton County, Port Franks, Grand Bend residence and Ipperwash Dune</i>	<i>unknown</i>
<i>Norfolk County, Walsingham</i>	<i>unknown</i>
<i>Essex County, Ojibway Prairie</i>	<i>unknown</i>
<i>City of London, The Coves ESA</i>	<i>unknown</i>

Quantitative analysis (population viability analysis conducted)

No population viability analysis has been conducted.

Threats

A threats calculation was completed for Reversed Haploa Moth as part of the COSEWIC (2019) report as follows:

- i) Agricultural and forestry effluents – High Impact
- ii) Invasive non-native/alien species – Unknown Impact
- iii) Fire and fire suppression –Low Impact
- iv) Recreational activities – Low Impact
- v) Climate Change and severe weather – 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	Michigan SNR
Is immigration of individuals and/or propagules between Ontario and outside populations known or possible?	Dispersal capability unknown
Would immigrants be adapted to survive in Ontario?	Yes
Is there sufficient suitable habitat for immigrants in Ontario?	Unknown
Are conditions deteriorating in Ontario?	Yes
Is the species of conservation concern in bordering jurisdictions?	No
Is the Ontario population considered to be a sink?	No
Is rescue from outside populations likely?	Possible for Ojibway Prairie subpopulation

Sensitive species

Not a data sensitive species group.

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