

Ontario Species at Risk Evaluation Report for
Aweme Borer
Perce-tige d'Aweme
(*Papaipema aweme*)

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

Assessed by COSSARO as Data Deficient

April 2021

Perce-tige d'Aweme (*Papaipema aweme*)

Le perce-tige d'Aweme (*Papaipema aweme*) a été classé dans la catégorie des espèces pour lesquelles les données sont insuffisantes en Ontario par le CDSEPO.

Le perce-tige d'Aweme est l'un des papillons nocturnes capturés le plus rarement en Amérique du Nord. En Ontario, il a été capturé en 1936 et, dernièrement, en 2005, 2016 et 2020 (COSEPAC, 2006; COSEPAC, 2020).

En 2015, le trèfle d'eau a été confirmé à titre d'hôte larvaire de l'espèce, ce qui a permis de déterminer que les tourbières minérotrophes et les tourbières à végétation flottante constituent son habitat principal (COSEPAC, 2020). Avant cette découverte, ni son habitat ni son hôte larvaire n'étaient connus, et on supposait que les dunes de sable et les habitats ouverts et peuplés de chênes constituaient son habitat de prédilection et que le liatris à épi (*Liatris spicata*) pouvait être son hôte larvaire (COSEPAC, 2006). Donc, récemment encore, les relevés étaient axés sur les dunes de sable et les prairies herbeuses sèches, ouvertes et peuplées de chênes, au lieu des tourbières où il réside.

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Executive summary

The Aweme Borer is one of the most rarely collected moths in North America. In Ontario, it has been collected in 1936 and most recently in 2005, 2016 and 2020 (COSEWIC, 2006; COSEWIC, 2020). In 2015, Bog Buckbean was confirmed as the larval host plant with its primary habitat comprising of fens/peatlands (COSEWIC, 2020). Prior to this discovery, neither its habitat nor host plant was known, and it was assumed that Aweme Borer 's preferred habitat was sand dunes and open oak habitats with a possible host plant being Blazing-star (*Liatris sp*) (COSEWIC, 2006). So, until recently, survey efforts for this species have been focused on dry open oak savannah/dune habitats instead of peatlands in which it resides.

Aweme Borer (*Papaipema aweme*) is classified as Data Deficient in Ontario.

1. Eligibility for Ontario status assessment

1.1. Eligibility conditions

1.1.1. Taxonomic distinctness

Aweme Borer is part of the subfamily Noctuidae (COSEWIC, 2020). It appears to have no closely related species and is not part of a species complex or a group of sibling species (COSEWIC, 2006; COSEWIC, 2020). There is no evidence to suggest the characteristics defining the species are questionable (COSEWIC, 2020).

1.1.2. Designatable units

Aweme Borer has one Designatable Unit in Canada ranging through parts of the Boreal Plains and Boreal Shield ecozones, and the northern parts of the Prairies and Mixedwood Plains ecozones (COSEWIC, 2020).

1.1.3. Native status

First collected in Aweme, Manitoba in 1908 and most recently in 2005 from Manitoulin Island. The 2005 collection is the first report of this species in almost 70 years (COSEWIC, 2006).

1.1.4. Occurrence

The Canadian range extends from central Saskatchewan through central Manitoba and south to Manitoulin Island, Grand Bend and Ottawa, Ontario (COSEWIC, 2020). There is more of an understanding of where this species occurs since the 2006 COSEWIC assessment. At the time of the last assessment, when the species' preferred habitat was unknown, there were only three collection sites in Canada: one in southwestern Manitoba and two in Ontario (COSEWIC, 2006).

1.2. Eligibility results

Aweme Borer (*Papaipema aweme*) is eligible for status assessment in Ontario.

2. Background information

2.1. Current designations

- GRANK: G3 (NatureServe 2021)
- IUCN: na
- NRANK Canada: N3
- COSEWIC: Data deficient (November, 2020)

- SARA: Endangered (Schedule 1)
- ESA 2007: Endangered
- SRANK: S1 (ranked in 1995)

2.2. Distribution in Ontario

Areas in Ontario in which this species has been found is Pike Lake/ Turtle Lake, Manitoulin Island in 2005; Agassiz Peatlands Provincial Park in 2016; Richmond Fen, Ottawa in 2020; and Grand Bend in 1936. The Grand Bend area was generally surveyed in 2016 for areas of where the host plant, Bog Buckbean (*Menyanthes trifoliata*), might occur. The species is assumed extirpated from the Grand Bend area as the only place where the host plant occurs is in a small private nature reserve, where the plants appear too small to support developing larvae. This private nature reserve and numerous additional sites throughout the Grand Bend area, including Pinery Provincial Park, have been moth trapped for decades without recording Aweme Borer (COSEWIC, 2020).

There is one recent NHIC record of an observation in Agassiz Peatlands Provincial Park.

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

Aweme Borer has a limited geographic range and is known to occur in Ontario, Saskatchewan and Manitoba in Canada. In the United States, the species is known to occur in Minnesota, Michigan and New York. The latter two states, Aweme Borer is ranked as critically imperiled or possibly extirpated.

The range of Aweme Borer's host plant, Bog Buckbean occurs throughout North American. Its status within the areas of Aweme's Borer's broader biologically relevant geographic range is secure within Canada. In Minnesota and Michigan, the host plant has not been ranked. In New York it is considered apparently secure.

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	yes	SNR	
Michigan	yes	S1	
Minnesota	yes	SNR	
Nunavut	n/a	-	
New York	yes	SH	
Ohio	n/a	-	

Adjacent Jurisdictions	Biologically Relevant to Ontario (n/a, yes, no)	Condition	Notes & Sources
Pennsylvania	n/a	-	
Wisconsin	n/a	-	
<i>Other Relevant Jurisdiction</i>	n/a		

2.4. Ontario conservation responsibility

Approximately 8% of the species' global range is in Ontario. However, the percentage of the global population that exists in Ontario is unknown.

2.5. Direct threats

The main threats the spread of native and non-native plants. The impacts of climate change or development that alter peatland and fen hydrology has the potential to impact larval development. For example, habitat that is too dry can induce premature host plant senescence and larval mortality. Habitat that is too wet, or prolonged flooding drowns the plants and the larvae (COSEWIC, 2020).

2.6. Specialized life history or habitat use characteristics

The Aweme Borer is one of the most rarely collected moths in North America. In Ontario, it has been collected in 1936 and most recently in 2005, 2016 and 2020 (COSEWIC, 2006; COSEWIC, 2020). In 2015, Bog Buckbean was confirmed as the larval host plant with its primary habitat comprising of fens/peatlands (COSEWIC, 2020). Prior to this discovery, neither its habitat nor host plant was known, and it was assumed that Aweme Borer 's preferred habitat was sand dunes and open oak habitats with a possible host plant being Blazing-star (*Liatris sp*) (COSEWIC, 2006). So, until recently, survey efforts for this species have been focused on dry open oak savannah/dune habitats instead of peatlands in which it resides.

The Aweme Borer is a medium size (33-37mm wingspan), robust, noctuid moth. The forewing colour is a greyish flesh-colour. The base of the forewings is light brown, with a slightly darker transverse shade near the base and a more pronounced but somewhat diffuse one arcing across the median area. The hind wings are yellow-white, much paler than, and contrasting with, the forewings. The head and thorax are darker brown. Adults of both sexes are superficially alike (COSEWIC, 2006).

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. Population estimates are unknown.

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

Not applicable. Distribution range could be larger than currently known as the species' host plant and habitat has been recently determined.

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. It is unknown if total population is restricted as newly determined host plant is common and found in peatland habitats across Northern Ontario.

3.1.5. Criterion E – Quantitative analysis

Not applicable.

3.2. Application of Special Concern in Ontario

Not applicable. Unsure if species has declined to a level of abundance at which its persistence is increasingly threatened. Unsure if species is likely to become Threatened. There is no demonstration of rescue effect.

3.3. Status category modifiers

3.3.1. Ontario's conservation responsibility

Not applicable. Ontario's conservation responsibility is unknown.

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

Status modification based on rescue effect not applicable as there is not sufficient information to determine if Aweme Borer is considered threatened or endangered. However long distance dispersal may be possible as Aweme Borer has been recorded 8-10km from host plant sites. Further, the specimen found from Pike Lake (Manitoulin Island) was a male and not collected in suitable habitat (COSEWIC, 2020).

Status modification based on level of risk in broader biologically relevant geographic range not applicable. The status of this species is either not ranked or it is considered critically imperiled. Further, given that the habitat preference and host plant for this species has been recently determined, the level of risk within the broader biologically relevant geographic range may change.

3.4. Other status categories

3.4.1. Data deficient

Applicable. There have been extensive Lepidoptera surveys for this species, but only recently have surveys been targeting the correct habitat (COSEWIC, 2006; COSEWIC, 2020). In 2015, Bog Buckbean was confirmed as the larval host plant and fens with quaking mats it's primary habitat. During this discovery, it was learned that larvae live inside the stem of the host plant making detection difficult. New records extending the species' geographic range suggest it is more common and widespread than previously understood. However, suitable habitat within the moth's range has not been extensively surveyed creating further unknowns with respect to population size and trends.

3.4.2. Extinct or extirpated

Not applicable. There have been recent records of this species.

3.4.3. Not at risk

There is not enough data to determine if this species is not at risk. There is much suitable habitat that has not been surveyed within the moth's range

4. Summary of Ontario status

Aweme Borer (*Papaipema aweme*) is classified as Data Deficient in Ontario. In 2015, Bog Buckbean was confirmed as the larval host plant with its primary habitat comprising of fens/peatlands (COSEWIC, 2020). Prior to this discovery, neither its habitat nor host plant was known, and it was assumed that Aweme Borer 's preferred habitat was sand dunes and open oak habitats with a possible host plant being Blazing-star (*Liatris sp*) (COSEWIC, 2006). So, until recently, survey efforts for this species have been focused on dry open oak savannah/dune habitats instead of peatlands in which it resides.

5. Information sources

Bourgeau-Chavez, L.L., S. Endres, M. Battaglia, and E. Banda. 2017. NACP Peatland Land Cover Map of Upper Peninsula, Michigan, 2007-2011. ORNL DAAC, Oak Ridge, Tennessee, USA. <http://dx.doi.org/10.3334/ORNLDAAAC/1329>

COSEWIC. 2020. IN PRESS. COSEWIC assessment and status report on the Aweme Borer *Papaipema aweme* in Canada. Committee on the Status of Endangered Wildlife

in Canada. Ottawa. xi + 44 pp. (<http://www.canada.ca/en/environment-climate-change/services/species-risk-public-registry.html>).

COSEWIC. 2006. COSEWIC assessment and status report on the Aweme Borer *Papaipema aweme* in Canada. Committee on the Status of Endangered Wildlife in Canada. Ottawa. vi + 25 pp.

Appendix 1: Technical summary for Ontario

Species: Aweme Borer (*Papaipema aweme*)

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 lack of surveys in suitable habitat.
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. No 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>	Unknown
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>	Unknown
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 – likely for most subpopulations

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>	Not applicable
Number of NHIC Element Occurrences <i>Request data from MNRF.</i>	3
Is there an observed, inferred, or projected continuing decline in extent of occurrence?	Unknown
Is there an observed, inferred, or projected continuing decline in index of area of occupancy?	Unknown
Is there an observed, inferred, or projected continuing decline in number of sub-populations or EOs?	Unknown
Is there an observed, inferred, or projected continuing decline in number of locations?	No
Is there an observed, inferred, or projected continuing decline in [area, extent and/or quality] of habitat?	Unknown
Are there extreme fluctuations in number of populations?	Unknown
Are there extreme fluctuations in number of locations?	Unknown
Are there extreme fluctuations in extent of occurrence?	Unknown
Are there extreme fluctuations in index of area of occupancy?	Unknown

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

Sub-population (or total population)	Number of mature individuals
<i>Agassiz Peatlands</i>	<i>1 worn adult, collected August 2016</i>
<i>Pike Lake/ Turtle Lake, Manitoulin Island</i>	<i>1 adult male, collected 2005</i>
<i>Richmond Fen, Ottawa</i>	<i>Larvae, unknown number, obs 2020</i>
<i>Grand Bend, Ontario</i>	<i>1 adult collected, 1936, assumed extirpated</i>

Quantitative analysis (population viability analysis conducted)

Probability of extinction in the wild is unknown as a quantitative analysis has not been conducted.

Threats

A threats calculator was prepared for this species within the COSEWIC 2020 assessment report. It was assigned Low Impact as follows:

- Ecosystem modifications from European and American Reed (Invasive & Native Phragmites) – Low Impact
- Habitat shifting & alteration – Unknown impact
- Droughts – 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, Critically Imperiled
Is immigration of individuals and/or propagules between Ontario and outside populations known or possible?	Possible
Would immigrants be adapted to survive in Ontario?	Yes
Is there sufficient suitable habitat for immigrants in Ontario?	Yes
Are conditions deteriorating in Ontario?	No
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?	Yes

Sensitive species

Aweme Borer 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