

Species Listing PROPOSAL Form:
Listing Endangered, Threatened, and Special Concern Species in Massachusetts

Scientific name: Papaipema cerina

Current Listed Status (if any): None

Common name: Golden Borer

Proposed Action:

Add the species, with the status of: Endangered

Remove the species

Change the species' status to: _____

Change the scientific name to: _____

Change the common name to: _____

(Please justify proposed name change.)

Proponent's Name and Address:

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Association, Institution or Business represented by proponent: Massachusetts Division of Fisheries & Wildlife

Proponent's Signature:  Date Submitted: March 1, 2023

Please submit to: Natural Heritage & Endangered Species Program, Massachusetts Division of Fisheries & Wildlife, 1 Rabbit Hill Road, Westborough, MA 01581

Justification

Justify the proposed change in legal status of the species by addressing each of the criteria below, as listed in the Massachusetts Endangered Species Act (MGL c. 131A) and its implementing regulations (321 CMR 10.00), and provide literature citations or other documentation wherever possible. Expand onto additional pages as needed but make sure you address all of the questions below. The burden of proof is on the proponent for a listing, delisting, or status change.

- (1) **Taxonomic status.** Is the species a valid taxonomic entity? Please cite scientific literature.
 - Yes, *Papaipema cerina* (Grote, 1874) is a currently recognized species (Hodges 1983, Lafontaine & Schmidt 2010).
- (2) **Recentness of records.** How recently has the species been conclusively documented within Massachusetts?
 - The most recent Massachusetts records are from 2022 (NHESP database).
- (3) **Native species status.** Is the species indigenous to Massachusetts?
 - Yes (NHESP database).
- (4) **Habitat in Massachusetts.** Is a population of the species supported by habitat within the state of Massachusetts?
 - Yes (NHESP database).
- (5) **Federal Endangered Species Act status.** Is the species listed under the federal Endangered Species Act? If so, what is its federal status (Endangered or Threatened)
 - No, *Papaipema cerina* is not listed under the federal Endangered Species Act.
- (6) **Rarity and geographic distribution.**
 - (a) Does the species have a small number of occurrences (populations) and/or small size of populations in the state? Are there potentially undocumented occurrences in the state, and if so, is it possible to estimate the potential number of undocumented occurrences?
 - Prior to 2014, *Papaipema cerina* was considered historic in Massachusetts, the most recent record from a specimen collected in Leverett in 1983 (specimen at Yale Peabody Museum). In 2014, Brian Klassanos documented a previously unknown population in Ware. This population was re-documented in 2016, 2020, 2021, and 2022, and is currently the only known population of this species in the state.
 - It is unlikely that there are more than a few (if any) undocumented populations of *P. cerina* in Massachusetts. The state's moth fauna is well documented historically, and increasingly so in recent decades due to a growing interest in nocturnal Lepidoptera amongst amateur naturalists. Furthermore, *P. cerina* is rare in every state and province in which it occurs and its conservation status has been assessed: S3 (vulnerable) in Connecticut; S2 (imperiled) in Michigan and Ontario; S1 (critically imperiled) in Indiana, Massachusetts, and North Carolina; and SX (extirpated) in New Hampshire, New Jersey, and New York (NatureServe 2022).
 - (b) What is the extent of the species' entire geographic range, and where within this range are Massachusetts populations (center or edge of range, or peripherally isolated)? Is the species a state or regional endemic?
 - The geographic range of *Papaipema cerina* extends from Maine west to Saskatchewan and south to North Carolina and Kansas; however, it is absent from large portions of this range (Schweitzer et al. 2010, NatureServe 2022). The global conservation status rank for *P. cerina* is G2G4 (imperiled to apparently secure), indicating significant uncertainty in its global status (NatureServe 2022). However, the case for G4 (apparently secure) is weak.
- (7) **Trends.**
 - (c) Is the species decreasing (or increasing) in state distribution, number of occurrences, and/or population size? What is the reproductive status of populations? Is reproductive capacity naturally low? Has any long-term trend in these factors been documented?

- *Papaipema cerina* has declined over the past 50 years in the northeastern portion of its range (New England, New York and New Jersey) (Schweitzer et al. 2010, NatureServe 2022).

(8) Threats and vulnerability.

(d) What factors are driving a decreasing trend, or threatening reproductive status in the state? Please identify and describe any of the following threats, if present: habitat loss or degradation; predators, parasites, or competitors; species-targeted taking of individual organisms or disruption of breeding activity.

- *Papaipema cerina* is threatened by habitat loss to development, as well as suppression of natural disturbance such as fire or flooding, which is needed to maintain its grassland habitat and allow growth of its larval host plants; other threats include loss of habitat and host plants to exotic invasive plants, and excessive browse of host plants by overabundant deer (Schweitzer et al. 2010, NatureServe 2022).

(e) Does the species have highly specialized habitat, resource needs, or other ecological requirements? Is dispersal ability poor?

- In the Midwest (southern Wisconsin in particular), *Papaipema cerina* inhabits native prairie; in the northeastern portion of its range, it is a species of grassland openings and edges within a typically forested landscape (Schweitzer et al. 2010, NatureServe 2022).
- The primary larval host plant of *P. cerina* is Bottlebrush Grass (*Elymus hystrix*), with early instar larvae boring in the lower stems; late instar larvae have been found in other plants including Canada Lily (*Lilium canadense*), Turk's Cap Lily (*Lilium superbum*), and Mayapple (*Podophyllum peltatum*) (Robinson et al. 2010, Wagner et al. 2011). While the life history of *P. cerina* is not fully understood, it is thought that while specialized to Bottlebrush Grass as an early instar, late instar larvae are more generalized, and sometimes leave their initial host plant and use herbaceous plants such as lilies or Mayapple as "secondary" hosts when these plants co-occur with Bottlebrush Grass.

Conservation goals.

What specific conservation goals should be met in order to change the conservation status or to remove the species from the state list? Please address goals for any or all of the following:

- (a) State distribution, number of occurrences (populations), population levels, and/or reproductive rates
- (b) Amount of protected habitat and/or number of protected occurrences
- (c) Management of protected habitat and/or occurrences
 - Determination of the extent of the breeding habitat for the single known Massachusetts population of *Papaipema cerina* should be determined, and this habitat should be protected from loss to development and suppression of natural disturbance such as fire or flooding. Other threats should be controlled, including exotic invasive plants and excessive browse of host plants by overabundant deer.
 - If any additional populations of *P. cerina* are discovered in the state, they should be protected and managed as described above.
 - If more than 5 populations of *P. cerina* are documented in the state (which seems unlikely at this time), then this species should be considered for a status change under the MESA.

Literature cited, additional documentation, and comments.

Hodges, R.W. (ed.). 1983. *Check List of the Lepidoptera of America North of Mexico*. E.W. Classey Limited and the Wedge Entomological Research Foundation. Cambridge University Press, Cambridge, UK. 284 pp.

Lafontaine, J.D., and B.C. Schmidt. 2010. Annotated check list of the Noctuoidea (Insecta, Lepidoptera) of North America north of Mexico. *ZooKeys* 40:1-239.

NatureServe. 2022. NatureServe Network Biodiversity Location Data accessed through NatureServe Explorer [web application]. NatureServe, Arlington, Virginia. <https://explorer.natureserve.org/>. (Accessed: February 8, 2022).

Robinson, G.S., P.R. Ackery, I.J. Kitching, G.W. Beccaloni, and L.M. Hernández. 2010. HOSTS - A Database of the World's Lepidopteran Hostplants. Natural History Museum, London, UK. <http://www.nhm.ac.uk/hosts>. (Accessed: February 8, 2022).

Schweitzer, D.F., M.C. Minno, and D.L. Wagner. 2010. *Rare, Declining, and Poorly Known Butterflies and Moths (Lepidoptera) of Forests and Woodlands in the Eastern United States*. USFS Technology Transfer Bulletin, FHTET-2009-02. 517 pp.

Wagner, D.L., D.F. Schweitzer, J.B. Sullivan, and R.C. Reardon. 2011. *Owlet Caterpillars of Eastern North America*. Princeton University Press, Princeton, New Jersey. 576 pp.