Nemoria rindgei (Rindge's Emerald Moth)

American Museum of Natural History, 1990

David Heckard,

Taxonomy

- **Class**: INSECTA
- **Order**: LEPIDOPTERA
- **Family**: GEOMETRIDAE
- **Genus**: Nemoria
- **Scientific Name**: *Nemoria rindgei* Ferguson, 1969
- **Common Name**: Rindge's Emerald Moth
- **Synonyms**:
- **Taxonomic Name Source**:Scoble, M. J. (ed.), M. S. Parsons, M. R. Honey, L. M. Pitkin, and B. R. Pitkin. 1999. Geometrid moths of the world: a catalogue. Volumes 1 and 2: 1016 pp. + index 129 pp. CSIRO Publishing, Collingwood, Victoria, Australia.

Agency Status

- **NMDGF**:
- **Federal Status**:
- **BLM Sensitive**:
- **USFS**:
- **IUCN Red List**: Not Evaluated
- **Nature Serve Global**: GNR
- **NHNM State**: S2
- **NM Endemic**:NO

Description

Nemoria rindgei is a small geometrid moth (Ferguson, 1985). Moths in the genus *Nemoria* are one of the "emerald moths" because they are green in color (Canfield *et al*. 2008). The males have feathery antennae (Ferguson, 1985). This species is completely bright green with a thin, white stripe across both wings, and a pointed forewing with pink fringe (Ferguson, 1985). Larval *Nemoria* are brown inchworms with projecting tubercles along the back, but the immature stage of this species in particular is unknown (Ferguson, 1985).

Habitat and Ecology

Habitat and ecology information for this species is lacking. Adult geometrid moths are floral visitors and transport pollen (Van Zandt et al. 2020). Larvae in this subfamily, Nemoriini, are solitary leaf-feeders (Ferguson, 1985) but the larval habits and host plant of this species are unknown. Adult *Nemoria rindgei* have been collected from April through

August (GBIF.org 2024).

Geographic Range:

This emerald moth occurs in the Sacramento, Brokeoff, and Guadalupe Mountains of southern New Mexico and West Texas (GBIF.org 2024, BugGuide 2019, Friends' Central Research 2024). In New Mexico, it has been recorded in Eddy, Otero, and Lincoln Counties (GBIF.org 2024), and in Texas, it is known only from Guadalupe Mountains National Park, in Culberson County (BugGuide 2019).

Conservation Considerations:

There are no targeted conservation actions for this species. It is found in several protected areas, such as Guadalupe Mountains National Park, Carlsbad Caverns, and Little Black Peak, Guadalupe Escarpment and Brokeoff Mountains Wilderness Study Area (GBIF.org 2024, Friends' Central Research 2024). However, presence in these areas will not safeguard against threats including climate change and air pollution. Research on distribution, population size and trend, habitat and ecology and impacts of inferred threats is needed for this poorly understood, rare species.

Threats:

The threats to this species are not well understood, though based on threats to other sympatric Lepidoptera, some inferences about threats can be made. Other Lepidoptera, such as the Sacramento Mountains Checkerspot Butterfly, have slowly declined in this region due to historical fire suppression regimes which have altered the plant community structure and have created forests more prone to catastrophic wildfire (Kaufmann *et al*. 1998), livestock grazing which may promote the spread of invasive species and limit host plant availability (McIntyre 2010, Souther *et al*. 2019), and large scale, broad spectrum pesticide use. For example, in 1983 and 1984 during peak flight of many Lepidopteran species, including this one, carbaryl pesticides were sprayed using aerial application over 240,900 acres in the Sacramento Mountains at elevations between 6,000 and 11,000 feet, to control an outbreak of Western Spruce Budworm (Bennett and Linnea 1985).

This species is endemic to the Sacramento and Guadalupe Mountains, and endemic species are on average at three times higher risk of extinction from threat of climate change than other native species (Manes *et al*. 2021). The Southwestern U.S. saw its driest 22-year period from 2000 to 2021, since at least 800 CE (the time period used in previous climatic reconstructions) (Williams *et al*. 2022). Droughts are projected to become more prolonged, severe, and common in the region under future climate change scenarios (USGCRP 2018). The impact of drought on specific Lepidoptera populations is not well understood, though advanced timing to adulthood has been observed in some butterfly species, which may lead to phenological mismatch with plant resources (Forister *et al*. 2018). Drought may also adversely impact larval host plants and nectar sources (Pettorelli *et al*. 2007, Gottfried *et al*. 2012).

This species occurs in proximity to one of the countryâ€™s most active oil and gas fields; the Permian Basin alone had over 350 operating oil rigs as of December 2022 (The Coalition to Protect Americaâ€™s National Parks, 2023). The most significant impact this has on the park is reduced air quality. In Carlsbad specifically, ozone exceeded 70 parts per billion on 73 days of the year 2020 (Hedden 2021). Ozone has been shown to significantly impact flower visitation by many pollinating insects, including moths (Ryalls *et al.* 2022).

This species may also be impacted by invasive species. Chihuahuan Desert grasslands in general have been invaded by several notable non-native grass species, especially buffelgrass (*Cenchrus ciliaris*), fountaingrass (*C. setaceus*), Lehmannâ€™s lovegrass (*Eragrostis lehmanniana*), and African lovegrass (*E. echinochloidea*), many of which were planted for use by livestock. Lehmannâ€™s lovegrass is the most common exotic species within Carlsbad Caverns, and

frequently forms dense monocultures (Reiser *et al*. 2011). Invasion by these grasses has been shown to negatively affect the local invertebrate communities; in one study, for every 100 g/m2 of *E. lehmanniana*, a 21% decrease in Lepidoptera and a 14% decrease in overall insect abundance was observed (Litt and Steidl 2010). This loss in biodiversity and abundance may partly be due to the crowding out of native plants required by these herbivores. Nonnative grasses can compete with native species for resources and reduce establishment success of native seedlings (Morales-Romero and Molina-Freaner 2008, Sommers *et al.* 2022).

Population:

Population size and trends are unknown for this species, though the species is considered rare. It is known from very few collections within a restricted range (Ferguson, 1985).

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