Cochylis yinyangana (White Sands Yinyang Moth)

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Taxonomy

- **Class**: INSECTA
- **Order**: LEPIDOPTERA
- **Family**: TORTRICIDAE
- **Genus**: Cochylis
- **Scientific Name**: *Cochylis yinyangana* Metzler, 2012
- **Common Name**: White Sands Yinyang Moth
- **Synonyms**:
- **Taxonomic Name Source**:Metzler, E.H. and G.S. Forbes. 2012. The lepidoptera of White Sands National Monument 5: Two new species of Cochylini (Lepidoptera, Tortricidae, Tortricinae). Zootaxa 3444: 51-60.

Agency Status

- **NMDGF**:
- **Federal Status**:
- **BLM Sensitive**:
- **USFS**:
- **IUCN Red List**: Not Evaluated
- **Nature Serve Global**: GNR
- **NHNM State**: S1
- **NM Endemic**:YES

Description

Cochylis yinyangana is a small tortricid moth with a thin dark-colored body, subrectangular forewings and white hindwings. Its name is inspired by yin and yang• because the forewings are completely yellow-white on the dorsal surface, and charcoal-y gray on the underside (Metzler and Forbes 2012). Because it occurs in gypsum sands, the reflective white coloring likely functions as camouflage against the sand, similarly to many endemics of this ecosystem (Metzler *et al*. 2009).

Habitat and Ecology

Little is known about the habitats and ecology of this species. It is known only from grasslands and shrublands in the northern Chihuahuan Desert. At White Sands National Monument, it has been collected from interdune vegetation and at the sides of dunes and at Carlsbad Caverns National Park, it has been found in grasslands and basin bushland

habitats (Metzler and Forbes 2012). Cochylini tribe moths are internal feeders as larvae and are usually associated with Asteraceae host plants (Powell and Opler 2009). The larva and host plant of this species are unknown (Metzler and Forbes 2012). This species has been collected as an adult in both March and June (Metzler and Forbes 2012).

Geographic Range:

This moth is endemic to the northern Chihuahuan Desert, where it has been recorded in Eddy and Otero Counties, New Mexico and Hudspeth County, Texas, in the United States. Most known occurrences are from White Sands and Carlsbad Caverns National Parks (Metzler and Forbes 2012).

Conservation Considerations:

No conservation measures are in place specifically for this species. This species occurs in White Sands National Park, which is the worldâ€™s largest white gypsum sand field and is completely protected from resource extraction and development (Metzler *et al*. 2009). The neighboring dune area is managed by the DOD White Sands Missile Range, so the degree of disturbance affecting this mothâ€™s habitat there is unknown. This species also occurs in the protected Carlsbad Caverns National Park (Metzler and Forbes 2012). Habitat protection, however, will not mitigate against the main threats to this species. This species is poorly understood. Research on distribution, population size and trend, habitat and ecology, and threats is needed.

Threats:

This species is endemic to the northern Chihuahuan Desert, where it is known primarily from White Sands National Park and Carlsbad Caverns National Park. While the threats are not well understood, some inferences can be made about the threats at each locality.

The White Sands dune field is an ecosystem at risk of instability due to extensive groundwater extraction on the eastern edge of the Tularosa Basin. Hydrologic modeling has shown that increased groundwater pumping in response to increased temperatures and drought conditions will lead to water level decreases up to 1.5 meters. The dune field only exists as a permanent landscape feature because the gypsum sands are held in place at the base by water weight wicked up from the ground, so a decrease in water resources could result in increased sand motility, and therefore instability of the interdune habitats where herbivorous insects live (Bourret 2015).

Groundwater extraction is more heavily utilized in periods of drought and increased temperatures. 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). In addition to increased groundwater use, drought may impact the species in other ways. Drought has been shown to advanced timing to adulthood has been observed in some butterfly species, which may lead to phenological mismatch with plant resources (Forister *et al*. 2018) and drought may adversely impact larval host plants and nectar sources (Pettorelli *et al*. 2007, Gottfried *et al*. 2012). In addition, 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)

Carlsbad Caverns 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/m^2 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). White Sands in particular, is threatened by saltcedar (*Tamarix* spp.), which creeps into the interdune areas where the water table is high and outcompetes native plants while increasing soil salinity (Hager 1998).

Population:

The population size and trend are not known for this species.

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