



*Theridion grallator*. Photo: Ryan Chang

## Terrestrial Invertebrates

### Spiders

Order Araneae

#### ORDER INCLUDES:

Kaua‘i cave wolf spider, Federally Endangered  
16 Native Families  
44 Native Genera  
184+ Endemic Species

**GENERAL INFORMATION:** Spiders have four pairs of legs, no antennae, and are predaceous. Worldwide, there are over 75,000 species. Hawai‘i is home to at least 184 endemic species believed to have originated from 34 founder species. The original spider colonizers are thought to have reached Hawai‘i by ballooning, a method of travel where a spider is carried by the wind on a strand of web. Eighty percent of the known Hawaiian native spider species belong to ten genera in seven families: *Cyclosa* (Araneidae), *Orsonwelles* (Linyphiidae), *Pagiopalus* and *Pedinopistha* (Philodromidae), *Havaika* (Salticidae), *Tetragnatha* (Tetragnathidae), *Argyrodes*, *Ariamnes*, and *Theridion* (Theridiidae), and *Mecaphesa* (Thomisidae). However, many more species remain to be described, particularly in the genera *Argyrodes*, *Tetragnatha*, and *Theridion* and perhaps also in *Cyclosa* and *Havaika*. Widespread endemic species include *Tetragnatha quasimodo*, *Mecaphesa anguliventris*, *M. facunda*, and *Pagiopalus* spp. The happy-face spider (pictured above) is a well-known species that comes in a variety of color morphs. This variation may have evolved to reduce predation by preventing birds from establishing a reliable search image. Like many invertebrates found in Hawai‘i, some taxa of spiders have undergone extensive adaptive radiations. For example, the genus *Tetragnatha* (long-jawed spiders) contains about 37 described and around 13–23 additional undescribed endemic species that occur throughout the MHI and are found in various native habitats. The constituent species encompass a spectrum of colors, shapes, sizes, ecological affinities, and behaviors. They reach their highest diversity in montane wet and mesic forests, dry forests, high and low shrublands, and scrub. There are likely many species yet to be discovered in this genus. In the NWHI, the small islands of Nihoa and Mokumanamana (Necker) have a unique pair of endemic trapdoor spiders (*Nihoa mahina* and *N. hawaiiensis*), with no representatives on the MHI. Due to the lack of taxonomic specialists and the fact that most species are nocturnal, many Hawaiian native spiders remain poorly known or undescribed.

**DISTRIBUTION:** Spiders are known from all the MHI in addition to a few of the NWHI.

**ABUNDANCE:** As a group, unknown. A lack of systematic surveys hampers population estimates. However, the loss of native habitats likely means species within the order are declining. Of the known species, *Adelocosa anops* (limited to a single cave on Kaua‘i) and *Doryonychus raptor* (restricted to high elevation habitats on Kaua‘i) appear to be the most threatened on the MHI, while populations of single island endemics from the NWHI such as *Nihoa mahina* and *Nihoa hawaiiensis* remain mostly unknown.

**LOCATION AND CONDITION OF KEY HABITAT:** Spiders occur in all habitats in Hawai‘i including caves, lava flows, forests, and shrublands. Key habitat requirements are poorly known but mostly consist of mixed native to mostly native forests and ecosystems.

**THREATS:**

- Predation by invasive, non-native species, especially social insects such as ants and wasps, and perhaps also other spiders.
- Loss or degradation of habitat. *Adelocosa anops* (Lycosidae) is known from a single cave on Kaua‘i which is threatened by development.
- Insufficient information for species assessments.
- Lack of expertise to describe the large number of undescribed new species and review groups with taxonomic uncertainty.

**CONSERVATION ACTIONS:** The goals of conservation actions are not only to protect current populations and key breeding habitats but also to establish additional populations, thereby reducing the risk of extinction. In addition to common statewide and island conservation actions, specific management directed toward spiders should include:

- Forest restoration. Spider populations have responded positively to reforestation efforts at Auwahi Dry Forest in East Maui.
- Conduct surveys and document non-native predators and parasitoids of spiders.
- Control of invasive non-native invertebrate predators like ants and vertebrate predators such as coqui frogs.
- Conduct surveys to determine the distribution and abundance of known spiders and to document new species to science.
- Preserve, maintain, and restore habitats supporting existing populations.

**MONITORING:**

- Monitor known populations to assess trends in abundance.

**RESEARCH PRIORITIES:**

- Conduct systematic and taxonomic assessments of poorly known taxa, including radiations from the following families and genera: Lycosidae, Theridiidae (*Argyrodes*, *Ariamnes*, and *Theridion*), Araneidae (*Cyclosa*, *Araneus*), Linyphiidae, Philodromidae (*Pagiopalus* and *Pedinopistha*), Oonopidae, Salticidae (*Havaika*), Thomisidae (*Mecaphesa*), and Tetragnathidae (*Doryonychus* and *Tetragnatha*).
- Conduct and support systematic and taxonomic assessments of poorly known and understudied taxa. Review and revise genera in need of taxonomic scrutiny; work to identify and describe new species to science.
- Conduct studies to document the biology, habitat requirements, and life history of native species.

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