

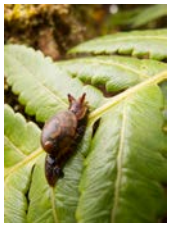


Upper left: *Achatinella byronii*, Upper right: *Laminella sanguinea*, Lower left: *Succinea* sp. Lower right: *Philonesia* sp. Photos by: D. R. Sischo

Terrestrial Invertebrates

Land snails

Orders Stylommatophora, Archaeogastropoda

ORDERS INCLUDE:
44 Achatinelline species Federally/State Listed as Endangered
13 Native Families
51 Native Genera
767+ Native Species
767+ Endemic Species

GENERAL INFORMATION: The Hawaiian Islands hosted one of the most spectacular evolutionary radiations of land snails known to science with 98 percent of the 767 nomenclaturally valid species endemic to the islands. All but two families, Hydrocenidae and Helicinidae, are in the order Stylommatophora. The families Amastridae and Achatinellidae are the most speciose with 325 and 209 species, respectively. The family Endodontidae may contain as many as 200 undescribed species; to date only 33 are described. There are 60 described species in the family Helicarionidae, 56 in Pupillidae, 42 in Succineidae, 14 in Helicinidae, ten in Zonitidae, ten in Ellobiidae (native but mostly not endemic), two in Hydrocenidae, and one in Punctidae. The systematics of the amastrids, achatinellids, helicarionids, pupillids, helicinids, and zonitids was revised in the first half of the 20th century, but these taxonomies are currently under revision using modern molecular genetic techniques combined with morphological analyses. The phylogenetic and life history traits of some species in the family Achatinellidae, especially those in the genera *Achatinella* and *Partulina* are well understood, however the basic ecology of most other species is severely lacking.

DISTRIBUTION: Land snails are known from all Main Hawaiian Islands and Northwestern Hawaiian Islands.

ABUNDANCE: Because of declines in the availability and suitability of appropriate habitat, combined with the widespread presence of introduced predators, particularly non-native carnivorous snails (*Euglandina rosa and Oxychilus alliarius*), rats (*Rattus* spp.), and chameleons (*Chamaeleo jacksonii*), it is believed that 60 to 90 percent of native snail species are extinct, with remaining species in steep decline. While abundance estimates are available for most species in the genus *Achatinella*, and some species in the genera *Partulina*, *Perdicella*, *Newcombia*, *Laminella*, and *Amastra* (see species profiles), most other species are poorly understood because of a lack of systematic surveys.

LOCATION AND CONDITION OF KEY HABITAT: Hawaiian land snails occur in all native forests, including dry, mesic, and wet.

THREATS:

- Loss and degradation of habitat.
- Non-native invasive predators, particularly carnivorous snails, rats, and chameleons.
- Small population sizes and low reproductive rates makes them vulnerable to demographic and environmental stochastic threats such as loss of genetic diversity, inbreeding, hurricanes, fires, and disease.
- Global warming.

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 land snails should include:

- Systematic surveys to determine the geographic ranges of all extant species.
- Systematic surveys of all extant populations to determine abundance and threats.
- Systematic surveys to locate unknown populations.
- Conservation of remaining native forests from further loss and/or degradation.
- Localized predator control.
- Establish populations in habitat protected by predator-proof fencing.
- Captive rearing to temporary hold individuals for safe keeping or produce offspring for reestablishment or augmentation of populations.

MONITORING: Implement scientifically robust monitoring of priority species and populations to assess trends and respond with appropriate conservation measures.

RESEARCH PRIORITIES:

- Conduct life history studies to quantify growth, population size, age distribution, and habitat needs.
- Develop and refine survey protocols to facilitate the collection of useful population data.
- Develop cryo-storage techniques for tissues lines or other genetic material for long-term storage.
- Develop effective predator control strategies.

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