



Anax strenuus. Photo: Karl Magnacca.

Terrestrial Invertebrates

Damselflies and dragonflies

Order Odonata

ORDER INCLUDES:

3 Native Families

4 Native Genera

29 Native Species

27 Endemic Species

GENERAL INFORMATION: Dragonflies are an ancient insect group that coexisted with dinosaurs, and are part of an easily recognized and well-known insect order (Odonata). All members of the order are predaceous, have large compound eyes, two pairs of large membranous wings, and a long, thin abdomen. No dragonfly or damselfly stings and all have an aquatic larval form (naiad). The order consists of two suborders, one contains the damselflies and the other the dragonflies. Damselflies are weak fliers, and at rest most hold their wings together above the body. Dragonflies are strong fliers, and at rest hold their wings spread. Because of the diversity and extensive adaptive radiation, the native damselfly genus *Megalagrion* is particularly well-studied. Many *Megalagrion* species are endemic to single islands or ridges, and at least ten of the 23 species in the genus are considered at risk. *M. oahuense* is one of the few truly terrestrial damselflies in the world. Also notable is the endemic dragonfly, *Anax strenuus*. It is the largest Hawaiian native insect with a wingspan of 15 centimeters (6 inches). Five endemic damselflies (*Megalagrion leptodemas*, *M. nesiotes*, *M. nigrohamatum nigrolineatum*, *M. oceanicum*, and *M. pacificum*) are federally listed as endangered, and another (*M. xanthomelas*) is a candidate for listing.

DISTRIBUTION: Dragonflies and damselflies are known from all the Main Hawaiian Islands except for Kaho'olawe.

ABUNDANCE: Unknown. The loss of native habitats likely means that many species within the order are declining.

LOCATION AND CONDITION OF KEY HABITAT: Larvae and adults occur in or near a wide range of aquatic habitats (e.g., streams, plunge pools, reservoirs, anchialine pools, lowland swamps and marshes), montane forests and bogs, and lowland habitats, many of which are threatened by habitat change and loss. In particular, the introduction of mosquitofish and topminnows (Poeciliidae) for control of mosquitoes has eliminated *Megalagrion* damselflies from many streams. Bullfrogs (*Rana catesbeiana*) also prey on naiads and can spread from stream to stream across land.

THREATS:

- Habitat loss or degradation caused by water diversions and disturbance by feral ungulates.
- Predation of naiads by non-native invasive invertebrates, fish, and frogs.

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 dragonflies and damselflies should include the following:

- Identify and protect streams currently free of non-native species and human alterations, particularly in lowland areas.
- Conduct surveys to determine distribution and abundance of known dragonfly and damselfly populations and to document and identify new species.
- Enhance protection of key watersheds.
- Support captive breeding and relocation/translocation of endangered *Megalagrion* species.
- Preserve, maintain, and restore habitats supporting existing populations.

MONITORING:

- Continue monitoring of known populations to assess population trends.
- Survey for additional, new populations.
- Conduct surveys for species believed to be extinct.

RESEARCH PRIORITIES:

- Determine the cause(s) of decline of stream-breeding species, particularly on O'ahu.
- Assess potential haplotype differences among island populations of widespread species to determine the importance of protecting populations on individual islands.

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