



*Drosophila mulli*. Photo: Karl Magnacca.

## Terrestrial Invertebrates

### Picture wing *Drosophila* *Drosophila mulli*

#### SPECIES STATUS:

Federally Listed as Threatened  
State Listed as Threatened

Designation of Critical Habitat for 12 Species of  
Picture-Wing Flies: Final Rule – USFWS 2008

**GENERAL INFORMATION:** *Drosophila mulli* Perreira & Kaneshiro, 1990 is an unusual fly with no clear affinity to other picture wing species groups. It can be immediately distinguished from all others by the small size of the wing spots, nearly all yellow-brown color, and long hairs covering both the front tibia and tarsus of the male. It is endemic to Hawai‘i, occurring in lowland to montane wet forest. The breeding host of *D. mulli* is unclear. It is closely associated with native *Pritchardia* palms – adults have been found almost exclusively by collecting them from the undersides of *P. beccariana* leaves. However, it has never been reared and the breeding location is unknown. No other *Drosophila* are known to be associated with palms.

**DISTRIBUTION:** *Drosophila mulli* is known from three sites between 2500 and 3200 feet elevation: ‘Ōla‘a Forest Reserve (1985–86), Stainback Highway (1998), and Saddle Road (2013–14). It is probably more widely distributed than these records suggest; since it is apparently not attracted to baits, flies can only be collected from very short palm trees, which are rare.

**ABUNDANCE:** Unknown. *Drosophila mulli* is difficult to collect and may occur more abundantly than is recognized if taller palms could be searched.

**LOCATION AND CONDITION OF KEY HABITAT:** All known picture wing *Drosophila* live in rotting bark or sap fluxes of native trees as larvae, and are generally host-specific. The uncertainty about the breeding host of *D. mulli* makes it difficult to ascertain the habitat quality. However, it is clear that it has a strong association with *Pritchardia* palms. Although *P. beccariana*, the only species on which *D. mulli* has been found, is surviving better than the other species on Hawai‘i, it still suffers from poor reproduction due to rat and beetle predation on the seeds, and the extinction of birds that formerly dispersed the fruit. The fungal disease Rapid ‘Ōhi‘a Death (ROD) has had a greater impact on the lower elevation forests where *D. mulli* occurs than the higher sites where most other picture wing flies are typically found. The Saddle Road site where it was last collected in 2013-2014 is now much more open and dry, and may not support *D. mulli* anymore despite the continued presence of *Pritchardia*.

#### THREATS:

- Habitat loss and degradation due to invasive plants, invertebrates, fungal pathogens, and rats, disturbance by non-native ungulates.
- Non-native predators, including wasps (*Vespula pensylvanica*).
- Insufficient information hampers conservation efforts.

**CONSERVATION ACTIONS:** Conservation of *Drosophila* requires 1) knowledge of the current sites occupied by the species; 2) conservation of a steady supply of breeding hosts at multiple sites; and 3) mitigation of ongoing threats, such as habitat destruction by feral ungulates and the presence of destructive alien arthropod predators. A general understanding of life history and habitat requirements is a prerequisite for management actions, though not for determining endangered status. The goals of conservation actions are not only to protect current populations and key breeding habitats but also to establish additional populations and maintain sustainable populations of host plants, thereby reducing the risk of extinction. For *Drosophila mulli* specifically, management needs include:

- Conduct surveys to determine distribution and abundance.
- Continue and expand fencing to protect habitat from ungulate disturbance.
- Conduct studies on life history and essential habitats to better direct conservation measures, including determining habitat requirements such as microclimate.

**MONITORING:**

- Continue surveys to identify populations in order to assess their stability and trends.

**RESEARCH PRIORITIES:**

- Survey for new populations, in both historic and novel sites.
- Determine major threats and limiting factors.

**References:**

Kaneshiro, KY, Kaneshiro, K. 1995. Draft listing proposal for 18 species of Hawaiian picture-wing *Drosophila*. Document submitted to the Pacific Islands Office, U.S. Fish and Wildlife Service, Honolulu, Hawaii.

Montgomery, SL 1975. Comparative breeding site ecology and the adaptive radiation of picture-winged *Drosophila* (Diptera: Drosophilidae) in Hawaii. Proceedings of the Hawaiian Entomological Society 22(1): 65–103.

U.S. Fish and Wildlife Service. 2006. Endangered and threatened wildlife and plants; determination of status for 12 species of picture-wing flies from the Hawaiian Islands. Federal Register 71: 26835–26852.

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