

Terrestrial Invertebrates

Picture wing *Drosophila*

Drosophila substenoptera



Drosophila substenoptera. Photo: Karl Magnacca.

SPECIES STATUS:

Federally Listed as Endangered

State Listed as Endangered

State Recognized as Endemic

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

GENERAL INFORMATION: *Drosophila substenoptera* Hardy, 1969 is a member of the *planitibia* species group, which includes the largest, most charismatic, and beautiful of the native pomace flies. This group is distinctive for having an extra crossvein in the wing in all except the Kaua‘i representatives. The unusual wing pattern is similar to the related *D. hemipeza* and the unrelated *D. pilipa*, but is otherwise distinctive. It can be distinguished from the partially sympatric *D. hemipeza* (which is also endangered) by having the two crossveins widely staggered rather than nearly in line, with the marks over them distinctly separate. Both species have an unusual habit of both sexes frequently walking with the wings spread and facing forward, even when not displaying to another fly, possibly making them more vulnerable to predators. The species is endemic to O‘ahu, occurring in wet forest. It was historically found widely throughout both mountain ranges of the island, but its range has dramatically contracted. Like other members of the *cyrtoloma* subgroup, it breeds in rotting bark of araliads, including *Cheirodendron* spp. (‘ōlapa and lapalapa) and *Polyscias* spp. (‘ohe mauka).

DISTRIBUTION: *Drosophila substenoptera* was historically known from five sites in the Ko‘olau range (from the Castle Trail to Ka‘au Crater) and four in the Wai‘anae range (Pu‘u Palikea and three sites around Ka‘ala) of O‘ahu. In the latter, it can still be found at most of its historic sites – just below the summit of Ka‘ala, along the crestline to Pu‘u Kalena, and at Palikea. However, except at the last, it is only ever seen as single individuals. In the Ko‘olau range, it has declined more severely and only one site is known, from the middle Pe‘ahināi‘a Trail.

ABUNDANCE: During two years of ongoing monthly monitoring from 2013–2014, the O‘ahu Army Natural Resources Program (OANRP) found a low but relatively consistent population of this species at Palikea, and only rare individual observations in the vicinity of Ka‘ala and at Pe‘ahināi‘a (OANRP, 2014). While this indicates at least one stable population, it is probably also small enough to be vulnerable to stochastic events such as droughts.

LOCATION AND CONDITION OF KEY HABITAT: All picture wing *Drosophila* live in rotting bark or sap fluxes of native trees as larvae, and are generally host-specific. *Drosophila substenoptera* breeds in Araliaceae, primarily *Cheirodendron* spp. and secondarily the rarer *Polyscias* (= *Tetraplasandra*) spp. *Cheirodendron* is abundant and reproducing at all sites where *D. substenoptera* is found, suggesting that unlike other rare *Drosophila*, its numbers are not strictly host-limited at the sites where it occurs. However, it appears to prefer the taller, slightly drier forest such as that at Palikea and Pe‘ahināi‘a rather than the stunted, boggy forest found at the summits of both Ka‘ala and the Koolau crest, where most *Cheirodendron* is now found.

THREATS:

- Habitat loss and degradation due to invasive plants, disturbance by non-native ungulates, and fire from nearby agriculture, residential, and military activity.
- Non-native predators, including ants and 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 substenoptera* specifically, management needs include:

- 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.
- Establish laboratory breeding colonies for reintroduction to sites where the species has been extirpated.

MONITORING:

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

RESEARCH PRIORITIES:

- Survey for additional 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, Hawai'i.
- 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.
- Oahu Army Natural Resources Program. 2014. Status Report for the Makua and Oahu Implementation Plans. Pacific Cooperative Studies Unit, Honolulu, Hawai'i.
- 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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