Drosophila montgomeryi, courtship dance.

Terrestrial Invertebrates

Picture wing Drosophila
Drosophila montgomeryi

SPECIES STATUS:
Federally Listed as Endangered
State Listed as Endangered
Designation of Critical Habitat for 12 Species of Picture-Wing Flies: Final Rule – USFWS 2008

GENERAL INFORMATION: *Drosophila montgomeryi* Hardy & Kaneshiro, 1971 is a member of the *vesciseta* species subgroup, which contains seven species of relatively uniform appearance – mostly yellow-brown, with few dark markings, and a similar pattern on the wings. They are among the smallest of the picture wings, and some individuals may even be smaller than non-picture wings. Each island has one species that breeds on *Pisonia* spp. (pāpala kēpau) and one on *Urera* spp. (ʻōpuhe), except that there is no *Pisonia* breeder known from Kauaʻi. The two groups appear similar, but the *Urera* breeding species can all be readily distinguished by having the median anterior mark on the wing longer than wide, rather than square. Other details of the coloration and male leg hairs, involved in courtship, serve to separate the species, all of which are rare. *Drosophila montgomeryi* is endemic to Oʻahu, occurring in diverse mesic forest where it breeds in *Urera*.

DISTRIBUTION: *Drosophila montgomeryi* was historically known mainly from the Waiʻanae range of Oʻahu, where it was recorded from three sites: Alaiheihe, Kaluaʻā, and ʻĒkahanui, with the majority coming from the last. There is a single historic record from the southeastern Koʻolau range, but it has not been adequately surveyed there. Since 2009, it has been found at a total of 10 sites in five populations, from Waiʻanae Valley, Schofield Barracks, Kaluaʻā and Hāpapa, Pualiʻi, and Puʻu Palikea. Lab-reared flies have been released into the wild at ʻĒkahanui in the Waiʻanae range and Mānoa Cliff in the Koʻolau range, but it is not yet clear if they have established self-sustaining populations.

ABUNDANCE: This species is still found in nearly its full historic range and some additional sites. However, it apparently can no longer be found at ʻĒkahanui, where it was historically most abundant. While the Kaluaʻā/Hāpapa and Waiʻanae populations consist of multiple sites with moderate numbers of flies and host plants, the other three sites have only small and ephemeral populations, with relatively few host plants available. In addition, the Waiʻanae sites have drastically declined in quality and abundance over the past 10 years. Nine years of ongoing monthly monitoring from 2013–2022 by the Oʻahu Army Natural Resources Program (OANRP) found a strong seasonal pattern to *D. montgomeryi* abundance at Kaluaʻā and Hāpapa, with high numbers from February through June and dropping to near zero between August and November (OANRP 2014). These observations, and the restricted distribution of *Urera*, suggest that it is primarily limited by the abundance of host plants.

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*

montgomeryi is documented as breeding in *Urera kaalae*, and is presumed to also breed in *U. glabra* since it occurs at sites where only the latter species is present. *Urera glabra* is still found at many sites and is long-lived and resilient, but suffers from low recruitment and few young plants are seen outside of heavily managed areas. Because broken branches root easily, many apparent individuals in a patch may be clones; since it is dioecious, this may result in all plants in the area being one sex. However, in recent years the invasive ambrosia beetle *Euwallacea* cf. *fornicatus* has been attacking damaged but living trees, causing their death rather than allowing them to regrow. On the other hand, *U. kaalae* is a relatively short-lived tree and has undergone a catastrophic decline over the past 40 years, with only a handful of wild plants remaining. Seedlings are especially vulnerable to slug predation. The loss of *U. kaalae* as a significant breeding host is probably responsible for the absence of *D. montgomeryi* from ʻĒkahanui, where both were formerly abundant. Palikea and Kaluaʻā/Hāpapa are fenced to exclude feral ungulates and intensively managed for rare plants and snails, and habitat is generally improving at both sites. The Waiʻanae sites cannot be fenced due to the likelihood of damage from falling rocks, which can also directly damage the host plants.

THREATS:

- Habitat loss and degradation due to invasive plants and invertebrates, disturbance by non-native ungulates, and fire from nearby agriculture, residential, and military activity.
- Non-native predators, including ants and wasps (*Vespula pensylvanica*).

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 montgomeryi* specifically, management needs include:

- Continue and expand fencing to protect habitat from ungulate disturbance.
- Outplant *Urera* spp. in protected areas to increase available breeding habitat, with the goal of creating self-sustaining populations of plants.
- 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, particularly limits on *Urera* reproduction.

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.

Oahu Army Natural Resources Program. 2014. Status Report for the Makua and Oahu Implementation Plans. Pacific Cooperative Studies Unit, Honolulu.

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.

U.S. Fish and Wildlife Service. 2008. Endangered and threatened wildlife and plants; designation of critical habitat for 12 species of picture-wing flies from the Hawaiian Islands. Federal Register 73: 73734–73895.