



Drosophila musaphilia. Photo: Glenn Uemura.

Terrestrial Invertebrates

Picture wing *Drosophila* *Drosophila musaphilia*

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 musaphilia* Hardy, 1965 is a member of the *hawaiiensis* species subgroup, the second largest within the *grimshawi* group. As far as known, all members of the group breed in fermenting sap fluxes of native trees rather than bark as is typical for picture wing *Drosophila*. It is dark gray with a continuous band across the middle of the wing, generally similar in appearance to related species and the unrelated, sympatric *D. villosipedis*. It can be readily distinguished from all other species by the wing pattern, with the median band sinuate rather than straight and the mark on the dm-cu crossvein L-shaped, as well as by the details of the male front leg setation. *Drosophila musaphilia* is endemic to Kaua‘i, occurring in mesic to wet forest where it breeds in fermenting sap fluxes of *Acacia koa* (koa).

DISTRIBUTION: *Drosophila musaphilia* was historically known three sites: Mt. Kāhili (Alexander Reservoir) and two sites in Kōke‘e State Park. It has been recently collected along the Nu‘alolo Trail and elsewhere along Kaunuohua Ridge in Kōke‘e.

ABUNDANCE: Unknown. This species appears to have always been rare within historical collecting, compared to others that have undergone clear declines between the early collecting period (1966–1975) and today. While it can be found occasionally at certain locations, typically no more than one or two individuals are seen at a time; it does not appear to experience population booms as some other endangered *Drosophila* species do.

LOCATION AND CONDITION OF KEY HABITAT: The breeding host of *Drosophila musaphilia* is *Acacia koa*, where larvae feed in fermenting sap fluxes. *Acacia koa* is abundant and reproducing at all sites where *D. musaphilia* is found, suggesting that unlike other rare *Drosophila*, its numbers may not be strictly host-limited at the sites where it occurs. It appears to be extremely limited in range compared to the broad distribution of *Acacia koa*, suggesting limiting due to either non-host factors or in the extent of suitable conditions for sap fluxes. Introduced saprophagous invertebrates may also affect breeding habitat quality.

THREATS:

- Habitat loss and degradation due to invasive plants and insects, disturbance by non-native ungulates, and fire from nearby agriculture and recreational 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 musaphilia* specifically, management needs include:

- Conduct surveys to determine distribution and abundance.
- Conduct studies on life history and essential habitats to better direct conservation measures.
- Use these results to create a management plan for species recovery.

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, 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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