



Drosophila heteroneura.

Photo: Karl Magnacca.

Terrestrial Invertebrates

Picture wing *Drosophila* *Drosophila heteroneura*

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 heteroneura* (Perkins, 1910) is a member of the *planitibia* species group, which includes the largest, most charismatic, and most beautiful species of native pomace flies. This group is distinctive due to the extra crossvein in the wings of all species except the Kaua‘i representatives. The species is endemic to Hawai‘i, occurring in montane mesic to wet forest, where it cooccurs with *D. silvestris*, except in Kohala. Like other members of the *planitibia* subgroup, it breeds in rotting bark of lobeliads. *Drosophila heteroneura* closely resembles other members of the subgroup including *D. differens* of Moloka‘i, *D. planitibia* of Maui, and *D. silvestris* of Hawai‘i. However, *D. heteroneura* differs strikingly from all of these in having a broad head, particularly in the males which possess a distinct “hammerhead”. Laboratory experiments have shown that they can produce viable hybrids with *D. silvestris*, and hybrid individuals have been detected in the wild. Combined with the relative ease of laboratory rearing, this has led to *D. heteroneura* being used extensively in genetics research.

DISTRIBUTION: *Drosophila heteroneura* is historically known from many collections at twelve sites across the island of Hawai‘i except for Kohala. However, sometime after 1980, it underwent a serious decline, disappearing from sites in east Hawai‘i where it had formerly been common. Since 1998, it has only been known from a small area in South Kona.

ABUNDANCE: Unknown. *Drosophila heteroneura* has been extirpated throughout nearly all of its historic range, including many sites where it was formerly regularly collected, indicating a population decline of over 95%. At the sites where it remains, it was sometimes moderately abundant during surveys conducted from 1998–2011. However, access is extremely limited, and much of the area has not been surveyed in many years. Some sites were resurveyed in 2022–2023 and found to have undergone a catastrophic decline in host plants compared to 2011, with no flies found.

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. The primary host of *D. heteroneura* is the bark of lobeliads, particularly larger trees of *Clermontia*. These are especially vulnerable to disturbance by feral ungulates and direct herbivory by rats and slugs. Most of the current range of *D. heteroneura* is not fenced from ungulates. The disappearance of *D. heteroneura* coincided with both the decline of an important host species, *Clermontia*

hawaiiensis, and the arrival of the western yellowjacket (*Vespula pensylvanica*), a major predator of native insects.

THREATS:

- Habitat loss and degradation due to invasive plants, invertebrates, 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 heteroneura* 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.
- Establish laboratory breeding colonies for reintroduction to sites where the species has been extirpated.

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:

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