Procanace acuminata.

Photo: Hawaii Biological Survey.

Terrestrial Invertebrates

Beach flies
Order Diptera
Family Canacidae
Genus *Procanace*

Genus Includes:
9 Endemic Species

GENERAL INFORMATION: Canacidae, or beach flies, is a relatively small family of acalyptrate Diptera found throughout coastal regions of the World. The genus *Procanace* contains nine endemic species in Hawai‘i. The endemic Hawaiian *Procanace* are notable within the genus and the family for their adaptation to freshwater habitats, rather than seashores like almost all others. They live along streams where the larvae feed on algae growing on rocks in fast-flowing sections and can be found from high elevations almost to sea level. A group of highly specialized endemic parasitoid wasps, *Aspidogyrus* (Hymenoptera: Figitidae) attacks them in the pupal stage.

DISTRIBUTION: Species are found on all the Main Hawaiian Islands except Ni‘ihau and Kaho‘olawe. Three species are endemic to Kaua‘i, while the rest are found on multiple islands.

ABUNDANCE: Largely unknown for individual species. Some taxa are locally abundant and can be observed in the hundreds of individuals while others are infrequently observed and known from only a few museum specimens. Seasonal abundance may vary with flow rate and water availability.

LOCATION AND CONDITION OF KEY HABITAT: Species in this genus are found in association with freshwater stream habitats throughout the MHI. They require fast stream flow, high oxygenation, and relatively high stream volume, so reduction in flow by human diversions and reduced rainfall has probably impacted habitat quality.

THREATS:

- Water scarcity. Extended periods of drought or human-made water diversions can threaten critical habitat by eliminating native stream ecosystems.
- Invasive species. These can have a negative impact either as predators or habitat competitors (Englund 2002; Englund and Polhemus 2002).

CONSERVATION ACTIONS: Specific management directed toward beach flies should include the following:

- Protect existing habitats in freshwater stream systems.
- Conduct surveys to determine distribution and abundance of known species and to document and identify new species.

MONITORING: Aquatic insects have been extensively used as indicators of water quality in freshwater streams and lakes (Rosenberg et al. 2008). The fauna of the Hawaiian islands has a reduced number of these indicator species because of the remote location of the archipelago and the difficulty of colonization for many freshwater aquatic groups. Native Hawaiian damselflies (*Megalagrion* spp.) have been used as bioindicators (Englund 2001; Englund et al. 2007) but populations of these species are small, difficult to monitor, and are subject to conservation action. Developing native Diptera (Canacidae, Ephydridae, and Chironomidae) as bioindicators will provide a new management tool for native Hawaiian aquatic ecosystems and will lead to more secure sources of fresh water. Monitoring actions should thus include the following: establish new monitoring for species that are not currently monitored.

RESEARCH PRIORITIES:

- Link distribution and abundance data for *Procanace* with measures of water quality to create a model for aquatic ecosystem monitoring in Hawai‘i.

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