Terrestrial Invertebrates

Shore Flies
Scatella (Diptera: Ephydridae)

Genus Includes:
17 species
15 endemic species
1 indigenous species
1 introduced species

General Information: Ephydridae, or shore flies, is a moderately large family of acalyptrate Diptera that contains over 2000 described species. Most Ephydridae are found in association with fresh, brackish or salt water where their larvae develop eating algae. The genus *Scatella* contains 17 species in Hawaii, 15 of which are endemic. These species can be found from brackish estuary habitats on the coast to freshwater streams above 4000 ft. in elevation (Hardy and Delfinado 1980; O'Grady et al. 2014).

Distribution: Endemic *Scatella* species are found on the main Hawaiian Islands (Hardy and Delfinado 1980; O'Grady and Pak 2015). Two widespread species, *S. sexnotata* and *S. stagnalis,* are also found on several northwest Hawaiian Islands (Hardy and Delfinado 1980; O'Grady and Pak 2015). In contrast to many groups of native Hawaiian flies, only four of the 17 species are single island endemics. It is possible that the tolerance these species have for salt water has allowed them to disperse more widely from island to island.

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 (O'Grady personal communication; O'Grady et al. 2014). Seasonal abundance may vary with flow rate and water availability.

Location and Condition of Key Habitat: Scatella species are found in association with coastal, estuary and freshwater stream habitats throughout the Hawaiian Islands.

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

Conservation Actions:
- 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.

- Establish new monitoring for species that are not currently monitored.

Research Priorities:

- Link distributional and abundance data for *Scatella* with measures of water quality to create a model for aquatic ecosystem monitoring in Hawaii.

References

Englund, R.A. 2001. Long-term monitoring of one the most restricted insect populations in the United States, *Megalagrion xanthomelas* (Selys-Longchamps), at Tripler Army Medical Center, Oahu, Hawaii (Zygoptera: Coenagrionidae). Odonatologica 30 (3): 255-263.

Englund, R.A. 2002. The loss of native biodiversity and continuing nonindigenous species introductions in freshwater, estuarine, and wetland communities of Pearl Harbor, Oahu, Hawaiian Islands. Estuaries 25(3): 418-430.

Englund, R.A. and D.A. Polhemus. 2001. Evaluating the effects of introduced rainbow trout (*Oncorhynchus mykiss*) on native stream insects on Kauai Island, Hawaii. Journal of Insect Conservation 5: 265-281.

Englund, RA, Wright, MG and Polhemus, DA. 2007. Aquatic insect taxa as indicators of aquatic species richness, habitat disturbance and invasive species impacts in Hawaiian Streams. Biology of Hawaiian Streams and Estuaries (NL Evenhuis, ed). Bishop Museum Bulletin in Cultural and Environmental Studies 3: 207-232.

Hardy, DE and Delfinado, MD. 1980. Diptera: Cyclorhhapha III. Insects of Hawaii 13: 1-451.

O'Grady, PM, Arakaki, K, and Evenhuis, N. 2014. Studies in Hawaiian Diptera II: New distributional records for endemic Scatella (Ephydridae). Biodiversity Data Journal 2:e1110.

Rosenberg, DM, Resh, VH and King, RS. 2008. Chapter 7: Use of Aquatic Insects in Biomonitoring. An Introduction to the Aquatic Insects of North America, 4th Edition (Merritt, RW, Cummins, KW and Berg, MB, eds.). Kendall Hunt Publishing, Dubuque, IA.