

## **INFORMATION ON THE EMERGENCE OF MIDGES AT KEĀLIA POND NATIONAL WILDLIFE REFUGE**

The U.S. Fish and Wildlife Service (Service) has been receiving complaints about the seasonal emergence of midges at Keālia Pond since the refuge was established in 1992. While the midges are present every winter and spring, their population tends to reach nuisance level when winter rains fill the pond after drying out the previous summer. Unfortunately, prevailing winds and bright lights attract the midges toward our neighbors at Sugar Beach.

Midges are small fly-like insects found throughout the world on all the major land masses, including the Arctic and Antarctic, and are even found on most islands. They are an important component of the aquatic food chain, providing food for fish, birds and some other invertebrates. The immature larva are decomposers that recycle organic matter in wetland sediments into nutrients for plants. Midges require an aquatic environment to complete their life cycle, living in the water for several weeks before emerging simultaneously, producing large mating clouds with huge numbers of mainly adult males trying to attract females. These swarms typically last about a month since the adults live only for a few days. Keālia Pond includes one native and two introduced species of midges. Unlike mosquitoes, they do not bite and are not known to pose a human health hazard.

USFWS biologists studied the midges from 1996-2012 to better understand the factors that cause their populations to be much larger in some years. The research suggested that the emergences are larger when the pond is fuller, salinity is lower, and after die-offs on invasive tilapia. In 2008-2009, refuge staff experimented with an insecticide called methoprene to control the midges, applying the chemical on two occasions. This chemical was never considered as a long-term solution to this issue. The research concluded that the best way to manage the midges was by maintaining lower water levels during midge breeding season. However, this is difficult because refuge staff are not able to control the inflow of freshwater from the Waikapu watershed during the rainy season.

Although we experience midges every winter, we believe the current midge emergence was made worse by several factors including high water and low salinity after the January rainfall and the die-off of the invasive tilapia over the previous summer. Although highly invasive across Hawai'i, Tilapia are a major predator of midge larvae and also eat algae, which is the primary food for midge larvae.

Per the [FWS Handbook for Mosquito Management on National Wildlife Refuges](#), “The Service allows mosquitoes on refuges to exist unimpeded unless they pose a specific human or wildlife health risk.”

Link to Handbook:

[https://www.fws.gov/sites/default/files/policy/pdfs/MosquitoHandbook\\_6\\_2018.pdf](https://www.fws.gov/sites/default/files/policy/pdfs/MosquitoHandbook_6_2018.pdf)

The Service's intent is to manage Keālia Pond as a healthy ecosystem that benefits our endangered waterbirds and other wildlife. We believe that we can do this while also being a good and responsive neighbor to our local community and visitors. Unfortunately, we are not always able to control the unintended consequences resulting from natural wetland processes, persistent drought, or heavy rainfall.

The Service is looking for ways to better manage water levels to limit habitat for midges during the dry season. For our neighbors who are affected by the midges, we recommend limiting bright lights that may be a factor in midges being attracted to the condominiums. Keep your blinds closed starting at dusk and turn off unneeded outdoor lighting. We do understand that lighting is necessary for safety and enjoying outdoor areas. However, replacing bright exterior lights with yellow LED lights has been shown to be effective, since insects are unable to see yellow light. We have also seen some positive results using citronella and fans on lanais. Fogging or using bug zappers are not likely to be effective.

We will continue to communicate with our Sugar Beach neighbors and hope this annoyance soon abates. The midges typically subside by early to mid-spring. Please direct your questions and concerns to 808-875-1582 or [kealiapondnwr@fws.gov](mailto:kealiapondnwr@fws.gov).

Aloha,  
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