



kiwiku © Zach Pezillo



HAWAIIAN HONEYCREEPERS FOUND NOWHERE ELSE

- The Hawaiian honeycreepers evolved in Hawai'i and can only be found here.
- They are considered 'ohana, or family, and provide direct connection to 'akua, or gods.
- Native birds are essential to the health of our native forest ecosystems that provide freshwater and resources for our communities.
- These unique birds are at high risk of extinction due to avian malaria, a disease transmitted by introduced mosquitoes.
- There is hope—there is a mosquito “birth control” method that can be used to suppress mosquito populations.
- Our goal is to save our honeycreepers from extinction and create forests where they can live and thrive.



'akikiki © Robby Kohley

Benefits of Mosquito Birth Control

- Will reduce mortality of the native honeycreepers due to avian malaria.
- Preventing the extinction of several critically endangered birds, including 'akeke'e and 'ākohekohe.
- Controlling invasive mosquitoes without using chemical pesticides.
- Protecting and expanding access to these cultural resources.
- This technique provides insight into protecting humans from mosquito-borne diseases in Hawai'i.

MOSQUITO BIRTH CONTROL

Wolbachia to the Rescue

'akeke'e © Lucas Behnke

The southern house mosquito (*Culex quinquefasciatus*) transmits avian malaria, a disease that can quickly kill the native honeycreepers. Neither the disease nor the mosquito are native to Hawai'i. Most honeycreepers have disappeared from lower elevations where mosquitoes are abundant, and these birds are now limited to cooler, high-elevation forests. However, warming due to climate change is allowing mosquitoes and avian diseases to invade these high-elevation habitats. Alarmingly, several forest bird species are predicted to go extinct within the next few years.



Scientists have developed a "birth control" method using a bacteria (*Wolbachia*) that occurs within the cytoplasm of many insects that can suppress mosquito populations. This method has been used around the world to reduce the transmission of human diseases. In laboratory settings, scientists can give male mosquitoes a different strain of *Wolbachia* than what is found in the wild population. If the *Wolbachia* in the male and female mosquitoes are incompatible, any eggs laid by the female do not develop. When these lab-reared male mosquitoes containing an incompatible *Wolbachia* are released to mate with wild females, the next generation of mosquito eggs will not hatch, causing the wild mosquito population to decrease. Male mosquitoes do not bite humans or birds.



The Birds, Not Mosquitoes partnership is developing methods to safely deploy mosquito "birth control" to the remote forests of Hawai'i where our native birds still reside to suppress wild mosquito populations there.



FREQUENTLY ASKED QUESTIONS

'alauahio © Zach Pezzillo

Are *Wolbachia*-incompatible mosquitoes genetically-modified?

No, they are not. There is no gene modification in the mosquitoes or *Wolbachia* using the birth control method.

Can this have an adverse effect on the overall environment?


Suppressing mosquitoes should not have an adverse effect on the overall environment in Hawai'i. Our native birds, plants, and insects evolved over millions of years without mosquitoes, which were first introduced to Hawai'i about 200 years ago. They are not a significant part of the diets of any native species, aren't needed to pollinate native plants, and don't serve any other known ecosystem function in Hawai'i.

How do you make sure you are only releasing male mosquitoes?

Mosquitoes can be separated by sex using several techniques. Males and females are different sizes at various life stages, with females being larger. A technique filters out females using a mechanical sieving system that only allows the smaller male pupae to fall through. Another technique uses artificial intelligence technology to scan the adults and separate them by sex. Ongoing monitoring will occur for quality assurance and control in both the lab and release environments.

Where else has this "birth control" method been used to control mosquitoes?

This method is currently being used worldwide and in the continental US to reduce populations of yellow fever mosquitoes (*Aedes aegypti*) and Asian tiger mosquitoes (*Aedes albopictus*) for public health and quality of life. Both of these mosquitoes are found in Hawai'i, and can spread human diseases such as dengue, chikungunya, and Zika virus.



FREQUENTLY ASKED QUESTIONS

ʻiwi © Dayu Yu

What about the mosquitoes that spread human diseases?

This technique will not impact the other five mosquito species present in Hawaiʻi. Though this current effort is targeted at saving the honeycreepers, researchers hope to learn more about control methods that could eventually be applied to other mosquito species that affect human health. The Hawaiʻi Department of Health is exploring these techniques that could be potentially implemented in the future.

What needs to happen before you release any incompatible male mosquitoes?

Numerous state and federal regulations will have to be complied with, including permit requirements, that ensure that the public knows about the project and has the opportunity to provide input. This will include discussions with communities and opportunities to provide feedback, including comments on formal compliance documents like Environmental Assessments.

When do you plan to release the mosquitoes?

It is anticipated that small-scale field trials will be conducted in 2023-2024. Following field trials, large-scale landscape releases would begin in 2024.

Learn More

To get more information on mosquitoes, the Incompatible Insect Technique, and our efforts to save Hawaiʻi's native honeycreepers, visit www.birdsnotmosquitoes.org



Contact Person

Lukanicole Zavas,
Outreach Associate
lzavas@abcbirds.org

