

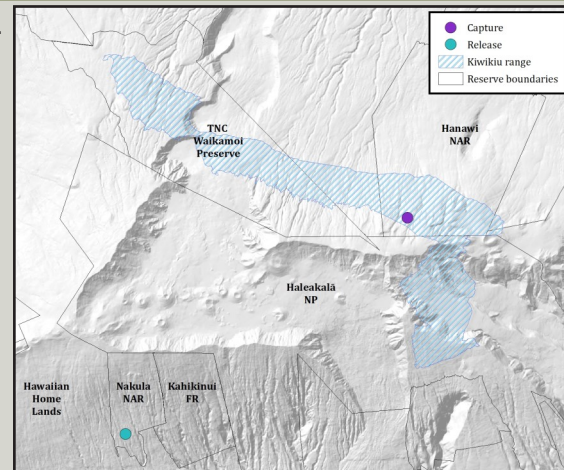
Kiwikiu news

Kiwikiu Reintroduction to Nakula NAR

In our [Spring 2019 newsletter](#), we told you about the [Kiwikiu Reintroduction Plan](#). In 2019, we put this into action. Many heard updates through great coverage like [Civil Beat](#) and [Star Advertiser](#) but here is summary of what happened.

Our goal was to reintroduce the critically endangered Kiwikiu to Nakula Natural Area Reserve (NAR) on the leeward slope of east Maui, where they used to be found. Their habitat has shrunk dramatically, and we aimed to increase the area that Kiwikiu are found. In October 2019, after years planning and forest restoration, we brought 14 Kiwikiu (seven birds from San Diego Zoo Global's Maui Bird Conservation Center and seven wild birds from Hanawi NAR, the core area of their current population on the windward slope of East Maui) to Nakula.

The morning that we transported the Kiwikiu to Nakula was so many years in the making, the teams were enthusiastic and emotional to see the birds finally arrive. The Kiwikiu were first put in on-site aviaries to acclimate. We got a rare opportunity to intensively observe individuals as they bathed and ate in their aviaries. Tragically, in the second week of observations and prior to release, three captive birds and two wild birds died in the aviaries. One bird was returned to Maui Bird Conservation Center due to behavioral issues.



Kiwikiu range on East Maui showing capture location (Hanawi), release site (Nakula), and related properties.

Eight individuals were released with color bands for identification from afar and most were fitted with a radio transmitter to help us track them. Despite our best planning, all eight birds are assumed dead and each recovered body shows the cause as avian malaria. Before the birds succumbed to disease, we made valuable observations, learning the plants and locations that each individual bird preferred. Captive birds stayed near their aviaries or came to camp, feeding off of trays with mealworms. The wild Kiwikiu foraged readily on wild vegetation. The first wild male released started foraging on koa immediately, a tree we think they used in the past in Nakula. Bird #7 settled in a gulch, foraging a lot on *Smilax*, and being very vocal. Bird #11 wandered further than the others and had a unique way of eating from ohia leaf buds. Bird #1 was the first bird captured in Hanawi and the longest surviving in Nakula. We thought we had lost him, but he popped up a week after all the other birds had died. It brought some hope to the team after so many sad losses.

The warm temperatures in 2019 made perfect conditions for the spread of non-native mosquitoes and avian malaria, a disease that adversely affects these birds. In pre-release surveys, disease was not found at such levels but it is now being found at higher elevations and abundance. In the face of climate change, the landscape is changing. Mosquito control measures need to be executed in order to reduce or eliminate mosquitoes; otherwise, we risk losing our last remaining Hawaiian honeycreepers.



Photos left to right: Bryce Masuda and Tess Hebebrand arrive with Kiwikiu in Nakula, Setting up the feeders in the aviaries, Releasing Kiwikiu in the aviary.

Kiwikiu Reintroduction *Continued*

Kiwikiu Next Steps

After the disease caused deaths, we set up adult mosquito traps in Nakula to see if mosquitoes had really increased or if the birds were more susceptible to low levels of mosquitoes than previously thought. Indeed, our traps found 8xs the number of mosquitoes in 2019 compared to similar trapping methods in November 2015 and 2016 despite intense treatment for mosquito larvae in standing water within the Nakula site. It is possible that adults were coming from outside of our treatment area (mosquitoes are known to travel long distances) or coming from other unknown breeding sources outside of treated pools. Thus, the need for landscape-level mosquito control methods.

In response to the increased disease prevalence on the leeward side, our team also went to the lower elevation range in Hanawi in December and January to investigate if Kiwikiu were still found below 6,000'. We did find individuals, but we also found mosquitoes at 5,300'.

The Maui Forest Bird Recovery Working Group consists of representatives from 14 organizations across the islands working to recover Maui's native forest birds. This team is in discussions to work on the next steps to recover the Kiwikiu. Several organizations are also pursuing techniques that can be applied at a landscape-level scale to reduce mosquito populations thus reducing the transmission of avian malaria. The current focus is the development of male mosquitoes infected with *Wolbachia*, a bacterium that can cause sterility after mating. See this [video](#) for more information. Habitat restoration on Maui will continue in preparation for *hopefully* a future without mosquitoes.

Timeline of activities (Summer - Fall 2019):

July-August: Flew 10 aviaries into Nakula and they were built so that each could hold two birds separately. Continued predator and mosquito larva control monthly in Nakula to reduce abundances and threats to the birds. Set up 3 telemetry towers to help with tracking Kiwikiu with transmitters. Hanawi camp and trail maintenance.

September-October: Finalized construction of aviaries, set up feeders, installed browse and perches. Each aviary had a feeder that was taken out post release, so birds had access to them. Game cameras were installed on the feeders to monitor activity. Kiwikiu surveys in Hanawi prior to capture in October. Continued trail maintenance in Hanawi.

October: Translocated 14 Kiwikiu to Nakula: 7 captive birds went to Nakula as a team set out to Hanawi to capture wild individuals, 7 wild birds arrived in Nakula from Hanawi about a week later.

November: 8 released Kiwikiu were tracked and observed as much as possible. The last Kiwikiu was seen on November 24th.

Thank you to all who helped with the reintroduction in the field October-November 2019:

Volunteers: Bryan Berkowitz, Becky Geelhood, Eric Hamren, Stephanie Levins, and Michelle Smith.

MFBRP: Hanna Mounce, Laura Berthold, Chris Warren, Zach Pezzillo, Erin Bell, Erin Johnson, and Marcus Collado.

Partners: *The Nature Conservancy:* Alison Cohan; *Civil Beat:* Nathan Eagle; *American Bird Conservancy:* Chris Farmer; *Haleakalā National Park:* Erika Kekiwi; *Pacific Bird Conservation:* Peter Luscomb; *US Fish & Wildlife Service:* John Vetter; *San Diego Zoo Global:* Deena Brenner, Tony Chen, Tess Hebebrand, Matt Kinney, Bryce Masuda, Koa Matsuoaka, Mālie Naho'olewa, Layla Rohde, Brenden Scott, and Rachael Sitzer; *State of Hawai'i Department of Land and Natural Resources:* Dave Albares, Lainie Berry, Dan Dennison, Fern Duvall, and Bret Mossman; *Windward Aviation:* Duke Baldwin, Don Shearer, and Peter Vorhes.

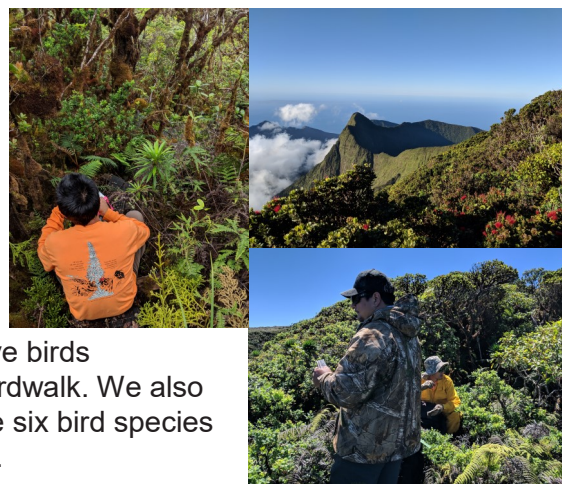
Photos top to bottom: Fitting a transmitter on a Kiwikiu, Chris Warren uses radio telemetry equipment to track Kiwikiu in Nakula, Released Kiwikiu eating mealworms from feeder tray in Nakula, Released Kiwikiu extracting caterpillar from kawa'u tree in Nakula, Kiwikiu capture team in Hanawi, "Bird room" in Hanawi where Kiwikiu were cared for prior to translocation, Hanawi team that surveyed for Kiwikiu post reintroduction.



Avian Research & Management *Update*

April - June 2019, MFBRP assisted the US Geological Survey (USGS) with a study on the evolution of Hawaiian forest birds in response to avian malaria, which is a serious threat to these birds. The study consisted of sampling forest bird DNA throughout their range and using genomic tools to search for the genes associated with disease immunity. By identifying genes that help forest birds survive malaria and mapping out the distribution of those genes across the islands, this will help develop conservation strategies to protect forest bird populations.

One of the sites we collected samples at was the Pu'u Kukui Boardwalk on west Maui. Both USGS and the Pu'u Kukui Watershed teams assisted. Fifty-five birds representing six species were caught at four different elevations along the boardwalk. We also conducted Variable Circular Plot (VCP) point-counts at 46 stations. There were six bird species detected, including three native species, Hawai'i 'Amakihi, 'Apapane, and 'I'iwi.



In June 2019, we surveyed and used mist nets to catch birds to assist with the avian disease study in Kaupo Gap in Haleakalā National Park. Thanks to help from the National Park Wildlife Crew and USGS, we caught 353 birds representing 10 species, including four native species, from three different elevations in Kaupo.

April - May 2019, in Nakula, samples were also taken to assist with the avian malaria study. We also conducted annual VCP counts on three transects. April - September 2019, we planted ~4500 plants representing 10 native species, continued monthly predator reduction program to decrease threat to released Kiwikiu in the fall, began monthly mosquito reduction program by applying larvicide in gulch pools to reduce the threat of disease to released Kiwikiu. We also collected seeds for plant propagation.



As part of the reintroduction, released Kiwikiu were fitted with radio transmitters to track movements. However, every location has its inherent challenges and radio telemetry had never been done in Nakula or with this species. In order to streamline the process for the release and to gain insight into bird movements within Nakula, we



monitored another honeycreeper, Hawai'i 'Amakihi. With the help of banding volunteers, we tracked eight birds from April - May 2019 in Nakula.

We analyzed 'Amakihi movements and home ranges and made observations. Check out the poster to the right for a summary of our findings. Thanks to volunteers who helped on this project: Erin Johnson, Nathalie Paquette, Wesley Shinsato, Karla Trigueros, Danya Weber, Nicole Preston, Eric Hamren, Taylor Saunders, and our KUPU intern Kristi Fukunaga.



Photos top to bottom: Pu'u Kukui Watershed team assisting with point counts on West Maui, USGS and NPS assisting with banding in Kaupo Gap, Banded 'Amakihi enjoying nectar from 'ohi'a, 'Amakihi in the hand prior to release.

Presentations & Publications:

Warren *et al.* 2019. [Troubling Declines in Maui's Endemic Honeycreepers: 2017 East Maui Hawai'i Forest Bird Survey](#). Hawai'i Conservation Conference. Honolulu, HI.

Fukunaga *et al.* 2019. [Tracking Hawai'i 'Amakihi \(*Chlorodrepanis virens wilsoni*\) in Nakula Natural Area Reserve on East Maui: home range estimation and evaluation of techniques for upcoming Kiwikiu \(*Pseudonestor xanthophrys*\) conservation translocation](#). Hawai'i Conservation Conference. Honolulu, HI. [Photo of poster](#). [Poster wording](#).

Mounce *et al.* 2019. [Saving the Kiwikiu \(*Pseudonestor xanthophrys*\): Recovery Efforts in Maui, Hawai'i](#). American Ornithology Society (AOS) meeting. Anchorage, Alaska.

Judge *et al.* 2019. [Pacific Island Landbird Monitoring Annual Report, Haleakalā National Park and East Maui Island, 2017](#).

Project Support & Partnerships

Voice of the Sea filming Funded by the Disney Conservation Fund, an episode on the program, [Voice of the Sea](#) was created about the Kiwikiu recovery efforts. Last August, Thor and Kanesa Seraphin of Kaua'i Sound & Cinema Media Corporation who develop and produce the series along with the University of Hawai'i Sea Grant went to Nakula with MFBRP, Bryan Berkowitz, and Lainie Berry to film. The episode was released in October and can be viewed [here](#). A follow up episode will be created about the reintroduction. Other short videos about the Kiwikiu release were created by Dan Dennison of the Hawai'i Department of Land and Natural Resources, links to these available [here](#).

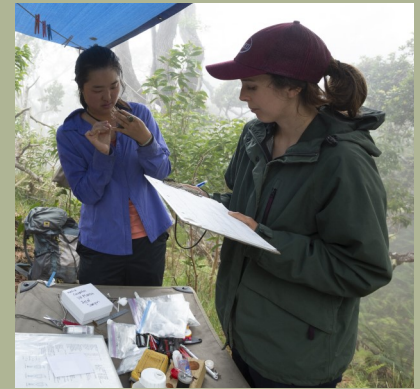


Art & Activism Last year, Maui Arts & Cultural Center presented Art & Activism: an exhibition about change, which assembled a group of artists who created political, environmental, and gender-based artwork that encourages activism. In this exhibit, local Maui artist, Abigail Romanchak's pieces, [Kāhea](#) and [Kani Le'a](#), embodied the calls of the forest birds, both past and present. Abigail used native Hawaiian bird spectrograms- three-dimensional visualizations of sounds measuring time, frequency and pitch- to create large-scale collagraph prints. *Kāhea* is "a call" to see the bird songs of the 'Ākohekohe and Kiwikui. *Kani Le'a* is "a distinct sound" mapping the unique calls of the remaining Hawaiian forest birds and the black space represents the silence of endemic Hawaiian birds now extinct. Those visiting the exhibit also got to listen to the calls, fully experiencing the symphony of the forest.



**MFBRP
Events
[Here](#)**

Rapid 'Ōhi'a Death Update One infected tree was found on Maui [July 2019](#) and has been destroyed. Remember to follow good sanitation protocols, don't move 'ōhi'a wood between places, avoid injuring 'ōhi'a, and report any 'ōhi'a with ROD symptoms to your local Invasive Species Committee. More information [here](#).



An official *e komo mai* to **Zach Pezzillo**, our new Field Associate. From September 2019 - January 2020, we welcomed Field Assistants: **Erin Bell, Marcus Collado, and Erin Johnson**, who assisted with the Kiwikiu reintroduction. **Aloha & mahalo** to 2019 interns, **Kristi Fukunaga and Megan King**. **Mahalo** to all our volunteers, donors, and supporters. We participated in the Give Aloha program and have had many supporters sponsor trees to be planted, donate Hawaiian Airlines Miles, adopt Kiwikiu, and provide assistance in so many ways.

Mahalo!

Thank you to our volunteers who helped in *Nakula and Hanawi* June-September, December 2019 and January 2020: Stephanie Yelenik, Erin Johnson, Dave Walters, Duncan Yeaman, Palani Wright, Jonathan Keyser, Lawrence Warnock, Conner Cesario, Jack Haggarty, Kristi Fukunaga, Ben Davis, Jamie Davidson, Gavin Taylor, and Brad Eichhorst.