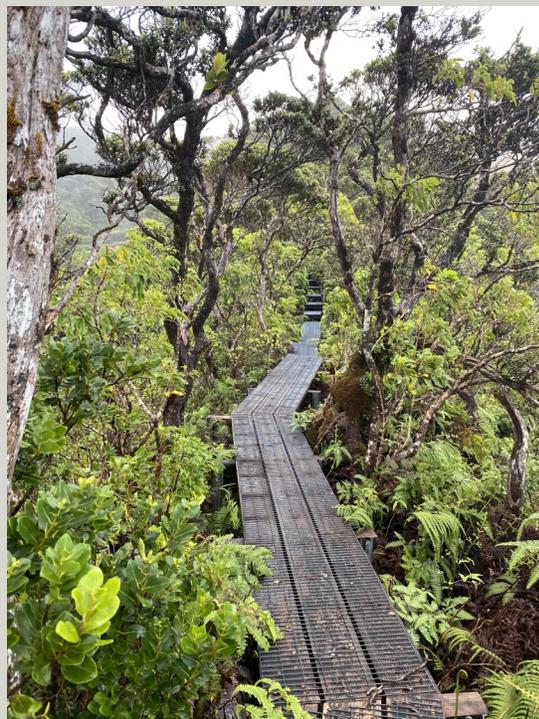


Kiwikiu news

West Maui Forest Bird Surveys



In February and March 2020, nine agencies (see page 5 for list) coordinated to conduct the Hawai'i Forest Bird Survey (HFBS) on Mauna Kahalawai, west Maui. The HFBS' were originally conducted on Maui in 1980 in both the east and west regions. In the early 1990s, the State of Hawai'i decided to repeat the surveys in each region across the islands approximately every five years.

The Mauna Kahalawai surveys took 560 person hours over 68 person days to complete the flagging, scouting, and counting. Like the [2017 East Maui surveys](#), the 2020 HFBS covered the largest area in the history of this region. In total, 215 stations along eight transects (1500-5314 ft in elevation) were surveyed. These transects covered the majority of forest bird habitat above 1400 ft, mostly in areas dominated by native vegetation. Many transects began in native bog at the highest elevations, transitioned to open or closed canopy 'ōhi'a forest at the middle, and then scattered 'ōhi'a/'ūluhe forest at the lowest elevations. Some transects ended in areas dominated by non-native tree species.

These surveys allow researchers to understand more about bird population numbers, trends, densities, and distributions. During these surveys, researchers record the distance to and the species identity of all birds detected for eight minutes at each station (a method called variable circular plot point count). In addition to bird observations, data on the vegetation and habitat at each station are collected. The vegetation data had not been collected for decades and the 2020 data will allow for comparison with historic data going back to 1980. *Continued on next page...*



Photos from top to bottom: Pu'u Kukui Watershed boardwalk transect, Mauna Kahalawai Watershed Partnership's, Kainoa Marchello along the transect in Lihau.



In memory of Bob Taylor: We received the tragic news that one of our previous team members passed away last year. Bob started with MFBRP in 2013 as a field assistant during Kiwikiu surveys in Waikamoi Preserve. After travelling and working elsewhere, he came back to MFBRP in 2015 to help with restoration work in Nakula and stayed as our Field Associate until the fall of 2016. He went on to get his Master's degree in Ecology at California State University in Los Angeles and continued his work protecting and studying birds as well as exploring the natural world. Bob will be remembered for his quiet sense of humor, his love for the birds, for always losing "the game", and the memories we have of camping in the field with him. We know many of you worked with Bob over the years and will share a common sadness of his passing. We have planted an 'ōhi'a mamo at the MFBRP office to honor Bob's memory.

West Maui Forest Bird Surveys *continued*

This region is known for weather conditions (high winds) that make these surveys difficult and helicopter access challenging (thick clouds). However, we were very lucky with the weather in 2020 and all counts were conducted March 3-19.

We detected 20 bird species: five natives and 15 non-natives. 'Apapane, Japanese Bush-warblers, and Warbling White-eyes were the three most detected species and collectively made up > 80% of detections. Native species made up 39.7% of detections. 'Apapane were found on 93% of stations, making them the most common native species detected. We recorded Hawai'i 'Amakihi at 48% of stations. 'Amakihi were relatively common where taller trees dominated, and they appeared denser at lower elevations. The lower edge of the 'Amakihi and 'Apapane range is possibly better defined by habitat rather than elevation.

'I'iwi, a federally threatened species has declined significantly in large portions of their statewide range, however, the results of the 2020 HFBS were encouraging and indicated that they persist in this region and possibly in a larger area and overall abundance than is generally appreciated. 'I'iwi were detected on or off count at 17 stations along three transects.

One non-native species that we were on the lookout for during these surveys is the [White-rumped Shama](#). These birds were not known from Maui until recently. After consistent sightings in 2018, MFBRP determined that a breeding population had recently become established in several low-elevation stream bottoms adjacent to and including Honolua Valley. By 2019, shama had spread to windward Kahalawai including Waihe'e, 'Iao Valley, and Wailuku as well as Ha'iku (East Maui). During the 2020 survey, shamas were only detected at the lowest station on one transect. In the area just below the transect, shamas were common in the fully invaded, low elevation forest dominated by *Eucalyptus*, Strawberry Guava, and *Clidemia*. The 2020 surveys indicate that the species had not yet invaded upper elevation native habitats.

The 2020 Moloka'i HFBS' were postponed due to COVID19 and we hope they will occur in April 2021.

Photos from top to bottom: The sunrise over East Maui from Pu'u Kukui summit, The Nature Conservancy's Kekoa Gurat in Kapunakea, The bogs of Keahikauo.



COVID19 and MFBRP: Shortly after these surveys, like much of the world, our team was quarantined at home. Thankfully, we were all healthy and able to work remotely and still push forward. In May, our team was able to go back to the field as our work was designated essential.

However, there are several big changes to our field protocols including social distance camp setup (no cabins or communal spaces), no volunteers, limited vehicle sharing, and helicopter operations now include masks, limited passengers, and no doors (for airflow). The team has done a great job adapting, coping with the more challenging field setups, keeping each other safe, and completing our important work and still meeting goals. Our hearts go out to all those who are dealing with economic and mental impacts from the pandemic and for all those who have suffered from illness and/or lost loved ones.

Avian Research & Management *Update*



The [outcome of the 2019 translocation of kiwikiu](#) raised serious concerns about the species in the wild. While investigating the mortality in the translocated birds, we discovered that most individuals had been infected with malaria prior to being moved to Nakula. These kiwikiu were captured in Hanawā Natural Area Reserve (NAR) above 6000ft, above the elevation range where most malaria infections were thought to occur. While malaria infections from high elevations are not unknown, the large percentage of positive cases was alarming.

Between December 2019 and October 2020, MFBRP conducted “rapid assessment” surveys of the kiwikiu population throughout large portions of their range. These surveys provided a snapshot of occupancy and age/sex of birds detected. We followed the spot-mapping method wherein surveyors search an area, observing

and attempting to identify all individuals occupying that area.

In conjunction with these surveys, we collected mosquitoes and took blood samples from all bird species to learn more about disease abundance and mosquito population distribution. Mosquito-borne diseases are considered the most devastating factor contributing to the decline of Hawaiian honeycreeper populations. The mosquito, *Culex quinquefasciatus*, vector for the avian malaria parasite, was introduced to the Hawaiian Islands. This introduced disease has restricted native forest bird populations to elevations above those at which both disease and mosquitoes cannot consistently survive. Due to climate change, disease and mosquito abundance is changing across the landscape, even at higher elevations.

We surveyed five sites for kiwikiu, collectively ranging in elevation from 5000–7000ft and containing native forest dominated by ‘ōhi‘a. The sites included the last three historic po‘oūli home ranges (HR1, HR2, and HR3) and Frisbee Meadows (FSB) within Hanawā NAR and The Nature Conservancy’s Waikamoi Preserve west of the Ko‘olau Gap. Effort was not consistent among sites. Disease studies were done at these locations as well as sites outside of the kiwikiu range (see page 4-5).

In the sites where relatively high densities of kiwikiu were previously recorded, Waikamoi, HR3, and FSB (5500–6800ft), we observed similar densities in 2020. However, below 5500ft it was much more difficult to detect individuals, which may indicate reduced densities. The observations in these three sites demonstrate that some areas continue to contain relatively high densities of kiwikiu; however, these areas stood in contrast to other areas surveyed. HR1 and HR2 (5000-6800ft) had not been surveyed since 2004 but observations from that time indicated possibly lower densities of kiwikiu. In 2020, we detected two individuals in HR1 and no observed individuals in HR2. The contrast between the eastern (HR1 and HR2) and western (FSB and HR3) Hanawā sites is intriguing. The change in topography and watershed patterns may influence mosquito densities among these areas. In HR2, the forest floor is often saturated and holds small pools and boggy areas possibly suitable for mosquito breeding. Although it is early in our investigation of mosquito abundance in these areas, capture rates of mosquitoes was greater in HR2 compared to HR3 in fall 2020.

These assessments illuminated patterns in the distribution of kiwikiu: there appears to be a decrease in density below 5500ft in Hanawā NAR and some areas contain noticeably higher densities of kiwikiu than others. Not long ago kiwikiu was considered stable at ~500 individuals within a 50km² range. In 2017, they were estimated at ~157 individuals within 30km². If the species is only thriving in small pockets, their effective range may be much smaller. Most concerning is birds within the highest density areas and highest elevations are becoming infected with malaria and the viability of the populations in these areas is unknown.

We will continue this work in 2021 surveying eastern and western Waikamoi and again in Hanawā NAR to inform decision-making on kiwikiu recovery and mosquito control.



Photos top to bottom: Young female Kiwikiu in HR1, Juvenile ‘iwi, Maui ‘Alauahio, View from Hanawā NAR.

Forest Restoration Update



Habitat restoration will continue in Nakula as time and funding allow. Fortunately, the forest in Nakula is returning. Our current efforts are focused on diversifying outplanted species and controlling erosion. In 2020, we installed 30 coir rolls in Nakula to help prevent erosion. These have been used on West Maui and other sites in Kahikinui for erosion control. We installed the coirs in massive erosion scars on ridge tops that were likely caused by feral animal trails that led to the loss of topsoil. Once soil builds up behind the coirs, we can plant native species, which will further prevent erosion. We previously tried to plant trees in these scars, but growth has been stagnant and the on-going erosion has exposed their roots. We hope the coirs will help the planted and wild seedlings grow. In addition to the coir installation, we planted 3,279 native trees.

Other notable field trips of 2020: Nakula point counts and bird banding, disease study trips across East Maui (sites ranging from 69-7300 ft).

Combating Mosquito-borne diseases Hawaiian forest birds are under threat of extinction if drastic efforts are not made to reverse the current population declines caused by mosquitoes and avian malaria. Efforts are ongoing to address the threat of avian malaria at the landscape scale. Mosquitoes, like most insects, carry a bacterium called *Wolbachia*, which is known for its ability to affect the reproductive success of its hosts. Mating between male and female mosquitoes with different and incompatible *Wolbachia* strains won't produce viable eggs. A mainland-based research lab has successfully infected and reared male mosquitoes with a strain of *Wolbachia* different from that found in the wild in Hawai'i and shown that mating between the infected males and wild-type females do not produce offspring. Sustained releases of large numbers of males infected with incompatible *Wolbachia* should suppress wild mosquito populations and curtail the transmission of avian malaria. *Wolbachia* insect control programs have successfully reduced local *Aedes* mosquito populations worldwide for human health gains. MFBRP is participating in the interagency partnership called Birds, Not Mosquitoes to ensure the project is informed by the best-available science and to inform and engage the broader community. More information can be found: <http://dlnr.hawaii.gov/mosquito> and [this video](#).



Mahalo!

Unfortunately, due to COVID19, we were not able to host volunteers for most of the year. But we did have assistance from our Pacific Internship Programs for Exploring Science (PIPES) intern, Kaitlyn Evans, volunteer Chuck Pezzillo for Grasslands Camp repairs, and from partners at Mauna Kahalawai Watershed Partnership (Willy Carter, John Comcowich, Taylor Fernandez, Kainoa Marchello, Andrei Stanescu). Mahalo for your help!

Mahalo to everyone who has supported us this past year. We know it's a difficult time. We appreciate the emails, messages on social media, letters, and donations. Thanks for participating in Give Aloha in September and Giving Tuesday in November. We look forward to interacting more in 2021.

Presentations & Publications:

Maui Forest Bird Working Group. 2020. [Report on 2019 Kiwikiu Translocation](#). In review as a PCSU report.

Wang Alex X, Paxton E.H, Mounce H.L, Hart P.J. 2020. [Divergent movement patterns of adult and juvenile 'Akohekohe, an endangered Hawaiian Honeycreeper](#). Journal of Field Ornithology.

Project Support & Partnerships



Combating Mosquito-borne diseases

MFBRP and partners are collecting mosquitoes to compare relative abundances and genomics of *Culex* mosquitoes and the prevalence of avian malaria across the upper and lower bounds of East Maui. This information will be combined with similar sampling in other areas across Hawai'i to be used to inform the design and implementation of mosquito control using *Wolbachia*. This will also provide critical information on habitat suitability and disease risk for native birds.

[MFBRP Events](#)

Mahalo Maui Brewing Co. for continued support of Pint Nights.

[MMCAT Trainings Now Online!](#)

We trap mosquitoes using modified Center for Disease Control and Prevention light traps baited with CO₂ and gravid traps baited with fetid water. The traps use a battery-powered fan that pushes the mosquitoes into a net trap. The CO₂ traps target female mosquitoes looking to collect a blood meal and the gravid traps are meant to attract females looking to lay eggs. Only female mosquitoes bite and spread the disease.

Assistance with mosquito trapping has come from a variety of partners. We thank them for their help with this immensely important project: Mike Opgenorth (Kahanu Garden and Preserve), Scott Fisher (Nu'u Refuge-Hawaiian Islands Land Trust), Alan and Summer Bradbury (Garden of Eden), Bryon Stevens (DLNR-NEPM), Ronnie Styles (Coconut Glen's), Kaleolani Cullen and Andy Bieber (Kahikinui community), Erin Johnson and Betsy Black (Maui Invasive Species Committee), KJ Passaro (DLNR-DOFAW), Lindsay Moore (Haleakalā National Park). Samples are being analyzed by the U.S. Geological Survey: *mahalo* to Dennis LaPointe and Renee Bellingier. Many more are helping across the Islands.

Voice of the Sea Saving the Kiwikiu Part 2

Funded by the Disney Conservation Fund, two episodes about the Kiwikiu release and recovery have been aired on the program, [Voice of the Sea](#). Filming occurred during the release in 2019 but interviews were done via Zoom during 2020. A special [Hanauma Bay Lecture Series Talk-Story Zoominar](#) was also recorded on the second episode. Check it out: [Saving the Kiwikiu Part 1](#) and [Saving the Kiwikiu Part 2](#).



Maui Forest Bird Recovery Project

MFBRP Logo and Store Updates

MFBRP has a new logo updated by Geoffrey Moore of Silver Moon Art & Design. He also redesigned our outreach boards and brochure. We can't wait to have events again to show them off! We have some new items for [sale on our website](#). We have a few of our previous logo shirts that are discounted. There are new stickers designed by Geoffrey Moore and MFBRP's Zach Pezzillo. A few years ago the Wild Republic 'I'iwi plush toy with sound was retired. We asked them to remake it and we now have these lovely plush birds. Contact us if you would like to purchase individually or in bulk for your business.



The Mauna Kahalawai (West Maui) Surveys were completed by 29 people. *Maui Forest Bird Recovery Project*: Laura Berthold, Zach Pezzillo, Chris Warren, *Maui Nui Seabird Recovery Project*: Martin Frye, *Mauna Kahalawai Watershed Partnership*: Kyle Alreck, Chris Brosius, Willy Carter, Jill LaBram, Kainoa Marchello, Marcus Richter, Andrei Stanescu, *The Nature Conservancy*: Alison Cohan, Kekoa Gurat, Keoki Kanakaokai, Caleb Wittenmyer, *Natural Resources Data Solutions*: Sam Aruch, *Plant Extinction and Prevention Program*: Hank Oppenheimer, *Pu'u Kukui Watershed Preserve*: Hookahi Alves, Kaimana Casco-Deleon, Herb Coyle, Pōmaika'i Kaniaupio-Crozier, Kainoa Pestana, *Maui Bird Conservation Center*: Malie Nahoolewa, Jessie Wagner, and *State of Hawai'i Department of Land and Natural Resources Division of Forestry and Wildlife*: Lainie Berry. Four volunteers participated: Tess Hebebrand, Erin Johnson, Michelle Smith, Palani Wright.