Kaua'i Forest Bird Recovery Project

NEWSLETTEF

MOSQUITO TEAM Accomplishments

- Mosquito crew is the biggest it's ever been, with 8 new technicians
- Trials at the National Tropical Botanical Garden helped us inform male trapping efforts
- Thanks to your support, an Environmental Assessment was drafted and approved, enabling us to move forward with the Incompatible Insect Technique (IIT)
- The first pilot IIT trials on Kaua'i occurred this year, with landscape-level releases in sight for next year

BIRD TEAM ACCOMPLISHMENTS

- With 'akikiki numbers desperately low, we made the difficult decision this year to collect remaining individuals and eggs in hopes of rearing a captive population that will one day be re-released in the Alaka'i
- We continued monitoring puaiohi and other species, such as 'anianiau and Kaua'i 'amakihi, to assess whether our rodent control efforts are improving survival of forest birds
- We conducted the Hawai'i Forest Bird Survey, a quinquennial survey which helps generate forest bird population estimates and trends

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- I ola nā manu nahele so the native forest birds thrive
- Our birds are worth celebrating
- Meet the mosquito and bird crew

***AKIKIKI** ON THE BRINK OF EXTINCTION

During the 2023 field season, the 'akikiki crew- Brendan, Alex, Justin, Bow, Riley, MP, Tess, and Ben, in partnership with HI Division of Forestry and Wildlife, US Fish and Wildlife Office, Pacific Rim Conservation, Pacific Bird Conservation, and San Diego Zoo Wildlife Alliance, worked to bring the last of the remaining 'akikiki and their eggs into human care to protect them from disease and predators. This difficult decision was brought on by extreme declines in this species over the past decade, illustrated by the number of pairs at our Halepa'akai field site falling from 35 in 2015 to 0 in 2022. In fall 2021, we estimated there to be approximately 40 other individuals left in the Alaka'i Plateau, and throughout the 2023 field season, we located 16 breeding pairs.



Pākele - one of the last female 'akikiki remaining in the wild.

The team worked hard to collect eggs from the nests we were able to find. This process involved the set up of 40+ foot ladders supported in the canopy by a system of ropes and anchors to reach the top of 'ōhi'a nest trees. The eggs were then flown out of the field via helicopter and monitored at our remote aviculture facility in Kōke'e State Park until they could be flown to Keauhou Bird Conservation Center on the Island of Hawai'i. Unfortunately, many adult birds disappeared (likely died) before they nested (or before we could find their nest) and many nests failed before the eggs were old enough to safely collect. The reason for these failures included predation by rodents, abandonment due to the death of one or both nesting adults, and severe wind storms knocking nest cups out the tree canopy.

Of the 15 nests found this season, we were able to collect eggs from seven. This amounted to a total of 15 eggs being brought safely to Keauhou Bird Conservation Center, 11 of which have developed into healthy hatch-year birds at the facility.



A nest with an 'akikiki nestling and egg

***AKIKIKI** ON THE BRINK OF EXTINCTION

Additionally, over the course of the season we were able to collect four adult birds in mist nets. Devastatingly, the two birds that we caught during the breeding season died at the Maui Bird Conservation Center in the weeks following their transfer due to complications from avian pox, another mosquito-borne disease. However, the two adults we caught in fall 2023, along with a single adult collected in fall 2021, remain in good health. In total, via egg collections in 2018 and 2023, and adult collection efforts from 2021 to2023, we have over 50 'akikiki in human care, an increase of about 20% from the start of this year's collection. In the wild, we suspect there to be fewer than a handful of individuals remaining. In essence, we are witnessing the extinction of this species in the wild, due largely to mosquito-borne diseases, and we are relieved that there is an insurance population in human care.

GUEST PIECE by Graham Talaber

Such is the story of the little gray bird

I wonder what it feels like to be the last of a species. Does the 'akikiki realize anything is wrong? Or do they suffer from landscape amnesia and run on a 24-hour news cycle like the rest of us? It seems humans obsess/romanticize the concept of extinction through movies and tv shows- but in reality, the scenario quietly plays out all around us with little notice and with alarming frequency.

The last news article mentioning 'akikiki was published over a month ago. One might think that watching a species drop one by one to extinction would garner the attention of mainstream conservation media and some massive campaignbut that is not the case.



ʻakikiki, second to last known female in the wild. Photo Credit: Graham Talaber

The 'akikiki has always lived in the shadows of the rest of Hawai'i's forest birds. It doesn't have the cultural significance of the 'i'iwi or 'elepaio - for most modern humans it just isn't aesthetically intriguing enough to get excited about. I have little hope for the 'akikiki being remembered and celebrated on a large scale. Inevitably the posts/discussion will eventually slow down, and one day, even those that were once closest to it, will seldom think of the 'akikiki.

Such is the story of the little gray bird.



BIRD TEAM UPDATES

In addition to our 'akikiki efforts, the bird crew including our collaborating graduate students at Colorado State University (Cozette) and Auburn University (Katie), our new assistant (Gus), our Kupu (Olivia), and led by Tyler Winter- continued a study that began during the 2020 field season. This work consisted of monitoring puaiohi nest success in relation to rodent control efforts, maintaining our grid of rodent control traps, and capturing native birds to understand sex ratios and body condition on and off our areas of rodent management. This year, birds like 'anianiau were much harder to catch and we also documented more avian pox than in other years. Puaiohi appeared to have good nesting success at Mohihi but not at Halepa'akai.

We also conducted the Hawai'i Forest Bird Survey (HFBS) that occurs on Kaua'i every five years. The HFBS began in 1976 and consists of a series of 8minute point counts spread across the Alaka'i Plateau to monitor general population trends for birds. This effort, once analyzed, generates the population estimates for most of our native species. Preliminary data from this year's count on Kaua'i suggests declines across many of our forest bird species including 'i'iwi, 'akeke'e, 'akikiki, and 'anianiau. Acting on this information, we decided to begin human care efforts with 'anianiau to better understand this species and develop protocols to capture, transfer, and maintain this species in human care before they become even more rare and difficult to catch.

Young puaiohi Photo Credit: KFBRP Staff

ʻanianiau Photo Credit: Jim Denny

BIG WINS FOR MOSQUITO CONTROL IN 2023

After years of planning and anticipation, the Department of Land and Natural Resources (DLNR) and U.S. Fish and Wildlife Service (USFWS) officially proposed the use of the Incompatible Insect Technique (IIT) to reduce *Culex* mosquito populations within roughly 59,204 acres of critical habitat for the remaining honeycreepers and other forest birds in and around Kōke'e State Park and the Alaka'i Plateau on Kaua'i.

The two organizations cooperatively drafted a 300+ page Environmental Assessment (EA). The purpose of an EA is to outline details regarding the control technique, delineate the goals of the application, address any unintended impacts, and to evaluate strategies which would minimize said impacts. The draft EA was publicly released on June 23rd, and initiated a 31 day public comment period.

The first Wolbachia IIT mosquitoes released in Kōke'e. Courtesy of Hawai'i Department of Land and Natural Resources.



On July 11th, DLNR, USFWS, KFBRP and our Birds Not Mosquitoes partners held an open house on Kaua'i to receive comments and answer community questions regarding the prospective IIT treatments. USFWS issued their Finding of No Significant Impact (<u>FONSI</u>) on September 22nd, satisfying the federal regulatory requirements, but we still awaited the decision from the Hawaii Board of Land and Natural Resources (BLNR).

October was an exciting month for us here at KFBRP, as the <u>final EA</u> was prepared and sent to the BLNR. On October 13th, BLNR held an in-person board meeting which included Zoom attendees and a lot of testimony in support. Following the meeting, on October 16th, BLNR approved and issued a state FONSI, which concluded the regulatory process and enabled DLNR to proceed with IIT on Kaua'i.

We want to express our gratitude to all of you who contributed to this huge win for the forest birds by keeping up with our organization and for showing your support for the birds in your heart-felt testimonies. Without you, none of our efforts toward resisting extinction would be possible!

CATCH ME IF YOU CAN!

Trapping male mosquitoes to better understand movement and dispersal

Historically, mosquito trapping efforts have predominantly focused on the blood sucking, disease spreading female of the species. However, with the prospect of IIT "mosquito birth control" on the horizon, it was crucial for us to explore the best methods for capturing male *Culex* mosquitoes. We concentrated our trapping efforts at the National Tropical Botanical Garden (NTBG) from December 2022 until March 2023. With direction from our partners, our crew surveyed a randomized grid of sites most likely to host male *Culex* populations. Then, BG-Sentinel 2 traps equipped with different combinations of lures were placed for 1-2 weeks at a time. The lure types used were as follows: CO2, BG lure stick, floral lure stick, and a sound lure. Our trapping efforts yielded over 20,000 mosquitoes, of which 163 were male. Larval rearing has shown that *Culex* produces a 50:50 male to female ratio, thus the numbers of trapped female mosquitoes remained high. That said, we learned the varying success of using different lures to catch males, and were thus able to proceed with IIT efforts using BG-Sentinel 2 Traps with standard BG lure sticks.



Kupu Field Assitant, Talia, checking a BG CO2 trap



BG trap with CO2 and stinky stick lures, at one of our mosquito monitoring sites

MOVING FORWARD

While working hard to trap at NTBG, our crew has simultaneously been trapping mosquitoes throughout the Alaka'i. Gathering data from these areas where IIT treatments will be applied is critical because it gives us baseline information on current mosquito abundance which we will be able to compare to post-IIT data. As it stands, we have collected the most mosquitoes from Kawaikōi, followed by Halepa'akai and Upper-Upper Kawaikōi, with the fewest mosquitoes caught at Mohihi. Since mosquito abundance is seasonal and patchy, continuing to closely monitor these sites up until the Alaka'i-wide releases will be important to gain the most recent snapshot of what is going on with mosquito populations. In the fall of 2024, we will be ready to launch into landscape-level control over a 3,000-acre treatment plot within the Alaka'i. Treatments will occur twice per week, every week. This will be a huge victory for our forest birds,

as it is the first time a landscape-level approach will be taken to reduce mosquito populations and the diseases they burgeon. We enter this new year full of hope, with potential in sight in the efforts to resist

extinction.



Incompatible, non-biting, *Wolbachia* male mosquitoes released in Kōke'e this fall. Image courtesy of the Nature Conservancy.

WHAT IS IIT?

Incompatible Insect Technique (IIT) is a strategy of biological control used for vector suppression that has been used in 14 countries around the world. It relies on the fact that mosquitoes in Hawai'i carry a strain of naturally occurring, endosymbiotic bacteria called Wolbachia. When a female mosquito mates with a male that contains a different, incompatible strain of Wolbachia than that of her own, fertilization does not occur and her eggs are inviable. Therefore, by releasing male mosquitoes reared with a different Wolbachia strain in our forests, the wild population will decrease over generations. Thus, the mosquito-related diseases that are causing the decline of our forest birds should also decrease over time. Male mosquitoes do not bite so do not spread disease!



Find more information on the incompatible insect technique here: www.birdsnotmosquitoes.org/

RELEASES AND MONITORING

This fall marked the first non-pesticidal *Wolbachia* IIT male mosquito release for our Mark Release Recapture (MRR) study. The goal of this preliminary trial was to collect data on how far male, lab-reared IIT mosquitoes disperse through the forest and how long they survive. Specifically,

this trial will inform wide-scale, landscape-level IIT applications in the coming year. This was the first MRR in Kaua'i, following three MRR's conducted on Maui just a few months prior. The week before our big release, our team set out 60 mosquito traps over a 250m radius area in Kōke'e State Park. We released 22,000 non-

biting male mosquitoes from a single release point in the center of the trapping array. A screen-netted cage, referred to as

a "bug dorm," was utilized to hold a separate set of these *Wolbachia* males as the control group for the longevity trial. For the following nine days (roughly the amount of time in which a male mosquito

lives), the team checked each trap and collected any mosquitoes caught over 24 hour intervals. Mosquito captures were brought back to our lab where they were

meticulously counted, sexed, and identified. Lastly, they were sent to a lab where researchers determined whether they were an incompatible *Wolbachia* male or wild individual. Our second MRR trial was conducted in December; everything was the same except that we released the

biodegradable pods holding male mosquitoes from a helicopter to mimic the aerial release method we hope to use next



Field Associates Emma and Pearl, opening containers that contained the incompatible *Wolbachia* male mosquitoes.



Field Assistants Talia and Nicole with the bug dorm.



It takes a Village

By Julia Diegmann

Mahalo nui loa for all the support you have given this year to Kaua'i's beautiful nā manu nahele. Our birds are unique, stunningly beautiful, and among the rarest forest birds in the world.

a Ná Manu Naho a native forest birds the

This year has been exceptionally hard for us: we are currently witnessing the extinction in the wild of one of our precious endemic forest bird species, the 'akikiki. We estimate that there are fewer than 10 birds left in the wild and with their disappearance the forest has lost yet another species crucial for its health. In the meantime, invasive mosquitoes are now ever-present, spreading avian malaria and pox to the remaining forest birds.

The good news is, that with your help and support, we were able to:

- Bring many of the last 'akikiki under human care to prevent their complete extinction
- Film a documentary about the last 'akikiki in the wild
- Coordinate support and education for the passage of a State of Hawai'i and County of Kaua'i resolution celebrating honeycreepers
- Organize and host honeycreeper celebration events across the state in August of 2023
- Raise awareness about conservation actions, like mosquito control, to malama our forest birds
- Continue to control rats benefiting native forest birds on the Alaka'i Plateau
- Continue to conduct research vital to effective conservation of the "jewels of the rainforest"

Your support of these ongoing conservation actions is helping to make our forest a safe and healthy habitat again for our precious bird species.

Together, we are making a difference, resisting extinction, and bringing native bird songs back into our forests.

Our Birds are Worth Celebrating!



A day to celebrate our Hawaiian honeycreepers turned into a month-long statewide celebration. Over 2,000 haumana (students) and their kumu (teachers) championed passing a resolution to designate August 08, 2023, as a day to Celebrate Hawaiian Honeycreepers this past legislative session. We were so excited that we celebrated across the state during the whole month of August, highlighting the efforts of these haumana and acknowledging the relationships and conservation efforts to mālama the Hawaiian Honeycreepers. On Kaua'i, we showcased our documentary about the effort to save the 'akikiki at the Kaua'i Community College and then we tookover Kukui Grove Center for one day and transformed it into a space to learn about

conservation efforts on Kauaʻi, highlighting our beautiful honeycreepers. A big mahalo to the County of Kauaʻi, Kauaʻi Community College, Kauaʻi Society of Arts, Kukui Grove Center, Corteva Agriscience, and Keoki's Paradise for sponsoring these events!

Makahiki o nā manu nahele - Year of the forest birds 2024



Makahiki o Nā Manu Nahele - the Year of the Forest Birds. Get ready for Makahiki o Nā Manu Nahele – The year of the forest birds 2024 with even more celebrations!

We are looking forward to celebrating our forest birds statewide for the entire year of 2024. There will be events, initiatives, presentations, movie showings, opportunities to partner, some awesome new swag and much more.

Scan this QR Code for more information:



Get artsy and put a bird on it.

We are excited to work with the Kaua'i Society of Arts again this year to bring some beautiful bird art to the people of Kaua'i.

Save the date for next year's bird art exhibit at the KSA gallery at Kukui Grove Center from Nov 1st to Nov 8th of 2024. Find the exhibition guidelines <u>here!</u> You will find them on our website and we will share them on social media and through our mailing list!

Partner with us!

We would love to partner with you, your organization, school or business.

You can request informational materials and signs from us or support us by selling our stickers or other merchandise, please contact us for wholesale prices.

Would you like to host a fundraiser for us or have an event during Makahiki o Nā Manu Nahele 2024?

Please reach out to Julia@kauaiforestbirds.org for coordination. We are grateful for your ongoing support!



Crew team from left to right: Emma, Nicole, Jack, Kai, Corrina, Talia, Pearl, and Carolyn after a day of mosquito trapping. Not pictured: project leaders Cali, Bryn, and Allie

Mosquito monitoring in the Alakaʻi

PROJECTS

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INCOMPATIBLE INSECT TECHNIQUE

Incompatible Insect Technique (IIT) aims to reduce the population of disease-spreading southern house mosquitoes (*Culex quinquefasciatus*) by introducing "incompatible" lab-reared, nonbiting male mosquitoes into the wild mosquito population. When these males breed with wild females, fertilization does not occur. Male mosquitoes do not bite so do not spread more disease.

BIOLARVACIDES APPLICATION

The biolarvicides, *Bacillus thuringiensis israelensis* (Bti) and *Bacillus sphaericus* (Bs) kill only mosquito and midge larvae and do not affect other insects or vertebrates. KFBRP has completed a season of mosquito control using biolarvicides to target mosquitoes at their larval stage.

Mosquito Crew Leads

KAUA'I MOSQUITO RESEARCH COORDINATOR

Bryn re-joined KFBRP in March of 2023 as the Kaua'i Mosquito Research Coordinator in partnership with the American Bird Conservancy. Bryn is excited to be back with KFBRP and to work with our partners across the state to implement mosquito control that will help to save our precious forest birds from extinction. In her free time, she likes to ride horses, surf, sail, and accumulate new hobbies she can't afford.

KAUA'I MOSQUITO FIELD ASSOCIATE

A steward for environmental justice from a young age, Allie has committed herself to making a positive impact on her surroundings. With a Masters of Arts in Environmental Conservation Education from New York University, she has spent over 10 years teaching children about the wonders of the natural world. Allie has been with KFBRP since 2020, working mostly on the ongoing mosquito study. When not in the field she loves to snorkel, camp on the beach and craft.



POSTDOCTORAL FELLOW

Serena joined KFBRP in February 2023 as a Postdoctoral Fellow with the Pacific Cooperative Studies Unit at UH Mānoa, as part of ongoing mosquito control work. She has a Ph.D. in Entomology from the University of Wisconsin-Madison, where she investigated microbial communities associated with mosquito larval habitat in partnership with public health agencies in Madison and the Chicago suburbs. She is excited to put her vector biology training toward protecting biodiversity and forest function, and strengthening One Health (connected human, animal, and environmental health) in the face of climate change.

> Image of Project Leader Cali Crampton, Bryn, and Mele from The Nature Conservancy, released the first non-biting incompatible wolbachia male mosquitoes.

2023/2024 Crew





MOSQUITO FIELD CREW LEAD

A long-time resident of O'ahu, she graduated from the University of Hawai'i at Mānoa in 2013 and spent the first few years of her career working with endangered Hawaiian waterbirds, pueo, and on various invasive species control projects. More recently, she has been assisting with mosquito research on the Big Island and Maui, and is excited to be



continuing this work with KFBRP.

KFBRP FIELD ASSOCIATE

Carolyn grew up in New Jersey and graduated from Cornell University with a degree in Biology. Her interest in birds began after taking an avian care internship at a wild bird rehabilitation center. Since then she has completed field seasons monitoring several bird species, including piping plovers, California condors, and northern spotted owls. She spent last fall working for Save Our Shearwaters

on Kaua'i.

MOSQUITO FIELD ASSISTANT

Nicole grew up moving back and forth between Mexico and south Texas. Having had a passion for animals for as long as she can remember, she has always felt happiest surrounded by wildlife. From helping with her family's farm animals to interning at Gladys Porter Zoo's veterinary clinic for years, she has always had a desire to help animals in need. Most recently she aided TAMU's ornithology professor in research on avian malaria, which ultimately led her to her position in KFBRP.

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KFBRP FIELD ASSOCIATE

Kai grew up in Western Oregon and recently joined the mosquito team from northern New Mexico, where she worked for Valles Caldera National Preserve as a wildlife technician. She has experience working with fish, endangered salamanders and owls, insects, mountain lions, and more! She completed her Bachelor's degree in Biology at the University of New Mexico.

2023/2024 Crew

KFBRP PROGRAM AND DATA ASSISTANT

Emma majored in Geography and Sustainability Studies at the University of Texas, where she fell in love with biogeography and landscape ecology. Since then, she has done work in riparian habitat and urban stream conservation, flood planning for hurricane resilience, and soil and water research for geoarchaeology and climatic history investigations.



Talia S

MOSQUITO FIELD ASSOCIATE

Growing up in the heartland, Pearl's always been chasing rainbows. After graduating from Northland College in Ashland, Wisconsin, Pear worked for Isle Royale National Park and became fascinated by the dynamics of island ecosystems. She's passionate about climate resilience work and maintaining biological integrity.

KUPU AVIAN CONSERVATION FIELD ASSISTANT

Motivated by wildlife ecology and conservation, Talia has been pursuing positions in the field since graduating with a B.S. from U.C. Davis in 2021. She has worked with species as small as a House Mosquito to as large as a Black Bear, with species including Wood Ducks, Mule Deer, and Mountain Lions in

between.

KUPU AVIAN CONSERVATION FIELD ASSISTANT

Jack grew up in northern Idaho, where he developed a love for the natural world early on. He graduated with a degree in Biology from Cal Poly, San Luis Obispo in 2023. During his time as an undergraduate, he explored the immense diversity of plants and animals in California and discovered a passion

for birds.



2023 Bird Crew



Justin Hite



Tyler Winter



Bow Tyler



Cozette Romero



MP Chino



Katie Temple



2023 KFBRP Staff



2023 Bird Crew



Justin Hite



Tyler Winter



Bow Tyler



Riley Temkin



MP Chino



Katie Temple



2023 KFBRP Staff

New Bird Crew





KFBRP FIELD ASSISTANT

Gus grew up in the mountains of Colorado where he developed a strong love for the natural world, specifically the wildlife that inhabited it. He truly enjoys working with birds due to the plethora of species and behaviors they exhibit. In his past job working for Florida Fish and Wildlife Conservation Commission he had the opportunity to work with the endangered Florida Grasshopper Sparrow. The work was extremely rewarding and he began looking for other opportunities to work with endangered species and conserve their dwindling populations.

KFBRP FIELD ASSOCIATE

Brendan became unexpectedly captivated by birds in high school. He obtained a Bachelor's in Biology from Virginia Commonwealth University in Richmond, VA. He traveled to Panama with the university to study Prothonotary warblers in their winter homes in the mangroves. Since then, he has dedicated his life to the research and conservation of birds.





KFBRP AVICULTURAL TECHNICIAN

Having been born and raised in Colorado, Alex developed a love for the wilderness and wildlife at a young age. Most of her free time was spent hiking and exploring the Rocky Mountains. Her interest in avian conservation developed during her undergrad at Colorado State University – Pueblo, where she researched climate change consequences on an understudied passerine, the Cassin's Sparrow.

KUPU AVIAN CONSERVATION FIELD ASSISTANT

Riley developed his interest in avian ecology and conservation during his undergraduate studies at the University of California, Davis, where he worked as a Research Assistant aiding in projects studying seabird chick-rearing behavior and raptor ecology in agricultural settings. After graduating, he worked restoring coastal sagebrush habitat in his hometown of Los Angeles before his desire to once again work with birds led him to seabird research positions in Southern Alaska and the Farallon Islands off the coast of California.

NOT PICTURED: BEN SHINGLES AND TESS HEBEBRAND, AVICULTURAL SPECIALISTS