KAUA'I FOREST BIRD RECOVERY PROJECT

2024 Annual Newsletter

ucas Behnke

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Lucas Behnke

2024 In Review

Bird ID Challenge! Each page of this issue has the color palette of one of Kaua'i's forest birds, look at the bottom right for the answer!

The Kaua'i Forest Bird Recovery Project has rapidly expanded to encompass two teams, bird and mosquito, supported by a core staff of five. The bird team and the core staff continue to occupy "HQ", the Hanapēpē office, while the mosquito team in April moved into new digs on Kaumakani Avenue (GNR).

For the bird team, the breeding season focused on occupancy surveys combined with point count surveys and automatic recording unit (ARU) deployments across a wide swath of the landscape for 'akeke'e, and in four streams (two with rat control and two without) for puaiohi. The goal of the 'akeke'e project was to refine the range of this species and assess how habitat management affects 'akeke'e distribution. We also kept our eyes open for 'akikiki and were thrilled to resight up to five 'akikiki, including "Queen" Pakele and a new 'akikiki ("Liko") which hatched this year. The primary goal of the puaiohi project was to compare 2024 occupancy on these four streams to occupancy almost a decade ago and assess puaiohi trends. Secondarily, we were hoping to assess the impacts of rat control on puaiohi occupancy. The puaiohi team also assessed nest survival on and off rat-grid on two of these streams. The bird team also expanded our Mohihi rat trapping grid and maintained it and the Halepa'akai grid. Finally, in fall 2024, they focused on capturing adult 'anianiau to build insurance flocks of this rapidly declining species in human care. Read more about these studies on <u>pages 6 and 7.</u>





Little bird on moss, Little bird on moss, food, on the search for hidden food, on the search for hidden food, gray ghost in the mist. gray ghost in the mist. Jennifer Jackson

John Gerrard Keulemans

1863

2024 In Review cont...

The mosquito team spent the spring moving into their new quarters, lowlevel monitoring the three proposed IIT treatment sites and a reference site, and gearing up for two proposed mosquito control projects, aerial application of the biolarvicide Bti and release of incompatible male mosquitoes (IIT). From June-August 2024, we conducted Bti applications in upper Koaie Canyon, site of the highest mosquito densities on the Alaka'i Plateau, coupled with monitoring in this area and a reference site. This project resumed in early December 2024 and will continue throughout spring 2025. We expanded our pre-IIT monitoring of the proposed IIT sites on the southern Plateau to ~90 mosquito traps in October 2024, with a concurrent increase in traps in the reference area to almost 40 traps. This effort is coupled with oviposition monitoring (small tubs in which female mosquitoes can lay eggs) as another index of mosquito suppression; IIT treatment should lead to fewer eggs and lower hatch rates. These efforts are described on pages <u>9, 10, and 11</u>.

Meanwhile, to celebrate Makahiki o nā Manu Nāhele (Year of the Forest Birds), we doubled, if not tripled our outreach efforts. We participated in the making and showing of a new film about forest bird declines and mosquito control efforts, "Vanishing Voices"; visited numerous classrooms and attended a score of festivals; conducted dozens of interviews; and produced "Wings and Woodlands", an "art-full" celebration of our birds in November.



For the bird team, 2025 will be focused on nest searching and monitoring for 'akeke'e, 'anianiau, and puaohi, with egg collections to boost conservation breeding flocks for the first two species. Additionally, we will continue occupancy surveys for puaiohi to monitor trends and expand the Halepa'akai rat grid. The mosquito team in 2025 is excited to finally roll out IIT mosquito control starting in February, while continuing monitoring and Bti applications. We have declared 2025 the "Year of Action"; stay tuned for details!



Celebrating Makahiki o nā Manu Nāhele – The Year of the Forest Birds 2024 By Julia Diegmann

This year, we joined in the statewide Makahiki o nā Manu Nāhele, or Year of the Forest Birds, to honor Hawai'i's unique and endangered native birds. The year-long celebration, proclaimed by Governor Green and Mayor Kawakami, brought events and educational activities across the state to raise awareness about the plight of our native birds and inspire collective action to protect them.

Kaua'i was proud to host several key events, including the Bird Art Exhibit in November, which displayed stunning art pieces created by our talented community members. We also celebrated the release of "Pau: The Last Song of the Kaua'i 'ō'ō", a moving children's book that educates young readers about the impact of extinction. Another significant moment was the premiere of *Vanishing Voices: Saving Our Hawaiian Forest Birds*, a documentary shedding light on the urgent need for conservation efforts to protect these irreplaceable species.

We extend a heartfelt mahalo to everyone who supported these efforts. From generous donations to the invaluable work of volunteers, your help made this year of conversations and learning possible. Together, we are building a stronger community dedicated to preserving our forest birds for future generations.

Looking ahead, we invite you to stay engaged! Follow us on social media and sign up or our mailing list for updates and upcoming events. Start planning your next masterpiece for our 2025 Bird Art Exhibit, and keep the spirit of aloha alive as we continue to celebrate and protect Hawai'is forest birds. Mahalo nui loa for a wonderful year!

Link to online resources and information about Hawai'i's native birds: https://dlnr.hawaii.gov/dofaw/manu/ Link to KFBRP Webiste: Kauaiforestbirds.org



Kaua'i 'amakihi Around 9,000 Birds Photograph by Lucas Behnke

RE IST

Governor Green's Proclamation of Makahiki o Nā Manu Nahele. From left to right: Susan Scott, Dr. Lisa "Cali" Crampton, Representative Ichiyama, Governor Green, and Dave Smith

ESIST

Pau – The last Song of the Kaua'i 'ō'ō – Author reading event at the Līhu'e Public Library.

Safeguarding the 'Anianiau: A Proactive Approach to Preventing Malaria-Driven Extinction

by Nicole Suckow

This fall, KFBRP and partners with DOFAW, Pacific Rim Conservation, and San Diego Zoo Wildlife Alliance brought 11 'anianiau into human care as a safeguard, or "insurance population", to release back into the wild when the threat of malaria is diminished. The species is experiencing drastic declines, but proactive measures are being taken while there are still enough individuals in the wild; this ensures that it is easier to capture birds, and removing individuals is less likely to hinder the wild population. The team captured these birds from mid-September to mid-November with the help of many volunteers, and these 'anianiau now reside at Honolulu Zoo (10) and MBCC on Maui (one) adding to the captive population of 2 additional birds. Ideally, some 'anianiau brought into human care will breed as well, but there is still scarce literature on breeding biology and behavior of this species, so regardless, we will learn a lot from the captive population.

To collect these birds, the bird crew went on four trips- three in the Alaka'i Wilderness Area, and one in Kōke'e State Park. We set up mist nets in areas where there was previously noted 'anianiau activity, and either waited for them to fly in passively, or used playback recordings of 'anianiau vocalizations to lure them in. After extracting the bird, we recorded key information such as weight and age, and an aviculturist administered prophylactic anti-malaria and anti-fungal medication and monitor them before bringing the birds out to make sure we collect birds that would acclimate to captivity. Birds that seemed overstressed or behaved abnormally were color banded (to distinguish between individuals of the same species) and released. This spring, we will begin egg collections and continue to build the captive population of 'anianiau. We will also study their nesting and foraging behavior, and improve our husbandry techniques.

*All capture, handling, and transport done with proper permits





'anianiau Around 3,500 Birds Photo by Leon Berard

Down in deep canyons, a nest among ferns and moss, where the creek babbles. -Jennifer Jackson

From Data to Action: Modeling a Path to Save Kaua'i's Puaiohi by Sam Bosio

The endangered puaiohi, the only remaining Kaua'i native thrush, has long been cherished by those lucky enough to encounter it for its sweet song, spicy attitude, and key role in the island's forest ecosystems. It is the only extant native Kaua'i bird that eats fruit and disperses seeds, cementing its value to forest regeneration and biodiversity. As a cavity nester in canyon walls or large tree holes, it is often heard defending its nest before being seen, repeating its grumpy buzzing call. Just like human parents, it will stand up to animals of any size in its territory while its kids are around. Unfortunately, this strategy is not always effective against rats that climb up to nests to eat eggs and hatchlings, or against mosquitoes that may infect puaiohi with avian malaria. To ensure the survival of Kaua'i's beloved thrush we dedicated a massive effort to search for nests and adults on the move this year. We slogged up and down streams through dense uluhe and invasive blackberry in the Alaka'i to survey more than 80 locations for puaiohi occupancy and monitor almost two dozen nests. This data produced a model predicting where puaiohi are likely nesting and measured the effects of current rat trapping on puaiohi nest survival. With baited breath and still scraping the mud off our clothes, we visualized the model that would tell us whether the past ten years of rat trapping have made a difference. Gradually coming into focus, the models suggested that puaiohi are more likely to be found and their chicks more likely to fledge inside areas with rat traps.

Encouraged by our findings, we are currently doubling the density of our rat traps and expanding into more puaiohi habitat as well. This means an increase from 325 to 710 traps in the Alaka'i Swamp. We killed over 150 invasive rodents this year, and expect even more in the next. While we are focusing on puaiohi nest survival, rat trapping protects not only forest birds but native snail and plant species as well, allowing the forest to thrive.

puaiohi Around 500 Birds Photo by Lucas Behnke

lustin Hite

Continuing Catastrophic Declines in Avifauna on Kaua'i Prompt New Conservation Actions

by Dr. Lisa "Cali" Crampton

Hawai'i is home to one of the world's most unique and threatened avifaunas. Climate change is exacerbating upslope expansion of introduced avian diseases, eliminating high-elevation refugia from mosquito-borne pathogens. The situation on Kaua'i Island (maximum elevation ~1500m) is particularly dire because no disease-free habitat for its eight forest bird species remains. Forest bird population trends on Kaua'i are documented through surveys that were first conducted in 1981 and performed approximately every five years since 2000; the most recent survey was in 2023. During these surveys, we use a method called "distance sampling" at fixed stations along regular routes, or "transects" to estimate species' densities in two strata: the "interior" or highest elevation part of their remaining range on the southeastern Alaka'i Plateau, vs. the "exterior" or lower elevation part of their current range, which includes Kōke'e State Park and front country trails like the Pihea and Awa'awapuhi trails. Densities of each native and non-native species (# birds/hectare) in these strata are multiplied by the current range (in hectares) of each species to produce population size estimates (# birds per species). We used occurrence data from independent surveys to estimate ranges of each species in 2023, most of which had contracted dramatically since the last survey in 2018.

Although steep declines in several native bird species were documented in 2012, populations appeared stable between 2012 and 2018. However, the 2023 surveys elucidated further population declines and range contractions in four native species, including the functional extinction of the endangered 'akikiki (Oreomystis bairdi) in the wild, which wasn't even detected on any surveys. The endangered 'akeke'e and the threatened 'i'iwi continued to decline to ~750 and 150 individuals, respectively. A new concerning plummet in the endemic 'anianiau population was observed. This species fell from 8703 individuals in 2018 to approximately 3500 birds in 2023, with a concurrent 63% range contraction from 11,385 to 4,258 ha. 'Apapane and Kaua'i 'elepaio decreased in the exterior of their range but increased slightly in the interior, so the overall decline was quite moderate. If you have noticed that all these species have all been harder to detect in the Kōke'e area lately, you are quite correct! Meanwhile, after earlier declines, Kaua'i 'amakihi appears to have stabilized in the last decade at around 9000 birds.



Jennifer Jackson

Hidden behind leaves, just a broken silhouette, opening leaf buds. -Jennifer Jackson

> 'akeke'e fewer than 100 Birds Photo by Lucas Behnke



In 2024, we conducted occupancy surveys for 'akeke'e across the range we presumed they occupied as recently as 2018, also documenting other species. This effort encompassed more than 225 survey points. Alarmingly, 'akeke'e were detected at only a handful of points. They were absent from areas in which they were detected as recently as October 2023. In total about 10 'akeke'e territories were detected, suggesting that there are actually fewer than 100 or even 50 'akeke'e remaining on Kaua'i. This discrepancy with the 2023 surveys likely represents both a difference in survey methodologies AND a very real and recent decline.

As a result of the 2023 and 2024 surveys, state and federal agencies have launched an effort to create an *ex situ* insurance population of 'anianiau (see pg 6) and add to the existing conservation flock of 'akeke'e in 2025. Meanwhile, mosquito control using bacterial larvicide and the Incompatible Insect Technology will be implemented over portions of the species' ranges in 2024 and 2025. The above survey data were used in conjunction with maps of mosquito densities generated by KFBRP surveys to identify areas where the greatest number of birds can be protected with mosquito control.

Building a Foundation for Future Malaria Control on Kaua'i by Carolyn Doyle

Page 9



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Protecting Kaua'i's Native Forest Birds Using Mosquito Control: A Critical Mission by Lucho Gomez

Hawai'i once hosted 142 native bird species, but today, 95 are extinct, and only 26 forest species remain across the islands. Kaua'i's forests, vital to the island's ecosystem, now hold just eight native forest bird species, six of which exist nowhere else. Alarmingly, three of these species are critically endangered, and all struggle to survive in the island's remote mountain areas. New data suggest that without large-scale conservation efforts, several of Kaua'i's remaining forest bird species will vanish within decades— possibly as soon as this year. We at KFBRP are working tirelessly to prevent this fate.

Human-driven factors like climate change, disease, introduced species, and habitat loss have each played a part, with one major culprit accelerating the devastation: mosquitoes, which transmit diseases to the birds. Mosquitoes, first introduced by a whaling ship in 1826, spread quickly in Hawai'i's favorable climate, carrying avian diseases to which native Hawaiian forest birds have no immunity. For many species, a single mosquito bite can be fatal. To combat these threats, KFBRP has focused on methods such as predator control, habitat restoration, and advanced mosquito management techniques, including Bti and IIT.

From Small Beginnings

At first, just a few, a handful with a dream in view, to guard the Alaka'i. The 'akeke'e and puaiohi, the 'elepaio and 'amakihi, the 'apapane and 'i'iwi , the 'anianiau and the last 'akikiki, all waiting with breathes held as mosquito wings near, threatening to silence songs we hold dear.

More and more people have joined the fight, a team of nearly twenty, bringing hope and light. To save fragile lives from mosquito-borne pain, below helicopter rotors bacteria falls like rain, a silent warrior to aid in the bird's plight, preventing the mosquito larvae from ever taking flight.

> In 2025, new hope will soar high, incompatible mosquitoes will fill the sky, so no new pests will hatch or spread, pushing extinction's shadow far ahead. With honor, we tread on sacred ground, trapping mosquitos where moss is found. We are their guardians, brave and bold, of stories waiting to unfold. -Allison Cabrera + Chat GPT



'apapane Around 95,000 Birds on Kauai Photo by Lucas Behnke

Protecting Kaua'i's Native Forest Birds Using Mosquito Control: A Critical Mission cont.

Bti, or *Bacillus thuringiesis israelensis*, is a bacteria species first discovered in 1976 that targets mosquito and black fly larvae, leaving other species unharmed. Used globally to suppress mosquitoes for over 30 years, *Bti* produces toxins that kill mosquito larvae before they mature, and KFBRP, in partnership with the Department of Fish and Wildlife and Airborne Aviation, has been applying it over 1100 acres mosquito larvae habitat on Kaua'i's Alaka'i Plateau to protect these vulnerable birds. Although sunlight can degrade *Bti*, it remains a safe and viable option for mosquito control on Kaua'i as research has shown that *Bti* is nontoxic to mammals including humans.

KFBRP will start using the Incompatible Insect Technique (IIT), which is based on another natural bacterium, *Wolbachia*, to further curb mosquito populations in early 2025. *Wolbachia* is a common intracellular bacterium that is found in most insects, including all mosquito species in Hawai'i, and it plays an important role in mediating fertilization. If sperm and eggs have different strains of *Wolbachia*, the females' eggs don't hatch. We will be releasing male mosquitoes that carry a different strain of *Wolbachia* than wild females on Kaua'i, and thus after they mate the females' eggs will fail to hatch. This will lead to mosquito population declines and reduced avian disease transmission. This method, already used around the globe to prevent human diseases and by the Maui Forest Bird Recovery Project, is safe for birds and humans since male mosquitoes don't bite, and with lifespans of only 6-10 days, they present a targeted, environmentally friendly approach. KFBRP will implement IIT over 3000 acres on the southern Alaka'i Plateau for the foreseeable future.

Link to forest user page: https://dlnr.hawaii.gov/kauaiforestusers/

Learn more here: <u>https://kauaiforestbirds.org/mosquito-control/</u> and <u>https://</u> www.birdsnotmosquitoes.org/



The vocal talent, crimson bird on scarlet blooms, wing beats fill the air. -Jennifer Jackson



NEW STAFF!

Nicole Suckow



Avian Research COORDINATOR

Nicole has been passionate about wildlife conservation from a young age, but began focusing more on birds during her undergraduate and got her MS in Natural Resources and Environmental Sciences studying grassland birds. Nicole joined KFBRP in June 2024 and is eager to play a role in the conservation of the forest birds on Kaua'i.

Sterling Bird

Mosquito FIELD ASSISTANT

Having grown up on Kaua'i, Sterling Bird is passionate about giving back to the island that she calls home. She spent her early twenties focused on traveling and videography while working any job that would allow her to keep exploring. When she is not in the mountains for work, she is surfing, making films, or lying in the sand on a warm day.



Lucho Gomez

Mosquito FIELD ASSOCIATE

Lucho was born and raised in the mountains of Colombia, South America until his family relocated to the U.S. He's always had a passion for animals and wildlife conservation. He graduated cum laude from Northwood Business School in West Palm Beach Florida and created two successful businesses in education and solar energy. When he's not in the mountains with the team he can be found volunteering and working at Kaua'i Animal Education Farm, as well as surfing, camping, and riding horses.

> A flash of scarlet, probing within a flower, pollen on feathers. -Jennifer Jackson

'i'iwi around 150 Birds on Kaua'i Photo by Lucas Behnke



Juliana Salehi

Mosquito FIELD ASSOCIATE

Juliana was raised in Baltimore, Maryland before going to school at the University of Hawai'i at Mānoa on Oahu. There, she studied Tropical Agriculture and the Environment and worked in several entomology labs rearing a wide variety of insects from mosquitos, to moths, to parasitoid wasps. After graduating, she worked at the Hawai'i Department of Agriculture Biocontrol Section where she helped maintain records of invertebrate introductions to the islands and learned about the importance of conservation work!



Jennifer Jackson

Mosquito FIELD ASSOCIATE

Growing up in Utah, Jenny first learned about Hawaiian birds from a book as a child. She has since worked with animals around the world from tiny leaf litter invertebrates, endangered Florida grasshopper sparrows, and monkeys in the Amazon rainforest. She is concurrently a graduate student at Northern Arizona University investigating the interactions between the forest birds, mosquitos, and avian malaria.

Sarah Simpson

Program and Data Assistant

Sarah grew up in Phoenix, Arizona, and developed a strong connection to the natural world at an early age. She earned a Bachelor of Science in Ecology, Behavior, and Evolution from UCLA. Sarah's passion for fieldwork was ignited during a transformative field course in Peru, where she gained hands-on experience working in diverse ecosystems. Now, as a Program & Data Assistant with the Kaua'i Forest Bird Recovery Project, Sarah applies her knowledge to support research, data collection, and mosquito control efforts aimed at recovering the island's native bird populations.

Kaua'i 'elepaio Around 36,000 Birds Photo by Mitch Walters

Pearl Gerace

KUPU Mosquito Research and Control Assistant

Pearl grew up in California where she developed a passion for wildlife and the great outdoors. She later graduated from Oregon State University with a degree in Wildlife and Conservation Science. Since then, she has been able to travel while working seasonal field jobs, living in many places including Wyoming, Colorado, Alaska, and now Hawai'i!

Edwin Millard

Mosquito FIELD ASSOCIATE

Edwin Millard was born and raised in Connecticut, and later moved to California where he earned associate's degrees and a bachelor's degree from Humboldt State University. After graduation he performed snorkel surveys and eDNA collections for salmon monitoring in northern California, and then for USGS-PIERC conducting mosquito distribution research in the Kīpahulu Valley on the island of Maui. Afterwards, he worked as the Nest Survey Coordinator at a remote field camp in the country of Eswatini coordinating bird banding efforts and collecting nesting data for a wide variety of species.



KUPU Conservation Research Assistant Growing up in Panama City Beach, Florida, Joanna found a love for wildlife and environmental conservation at a young age. Pursuing her passion, she graduated with a Wildlife Biology degree from Colorado State University in 2024. During the pursuit of her degree, she promoted sustainable recreation as a Park Ranger and gained hands-on experience in wildlife rehabilitation.

Congratulations on Promotions!!

Allison Cabrera: Mosquito Research and Control Coordinator Corrina Carnes: Mosquito Field Supervisor Carolyn Doyle: Mosquito Crew Lead MP Chino: Mosquito Crew Lead Riley Temkin: Field and Data Technician



NEW MERCH!

لاهua'i 'ō'ō extinct since 1987 الالustration by John Gerrard Keulemans

This Year, we also were involved in two exciting projects! The release of a children's book on the now extinct Kaua'i 'ō'ō with filled with beautiful art and a stunning Aloha shirt from Tori Richard celebrating our native birds.





MACKENZIE JOY + TONY PIEDRA

MAKANDTEA.COM

From the cocreators of One Tiny Treefrog: A Countdown to Survival, Mackenzie Joy and Tony Piedra, this book discusses the extinction of the Kaua'i 'ō'ō and the haunting recordings of the last birds.

The Pau books are available for sale at our Hanapēpē office and at the Alakoko Store <u>https://www.alakoko.com/pau-book-the-</u> <u>last-song-of-the-kauai-oo.html</u>

> The New Jewel's of the Rainforest Print from Tori Richard

Created in collaboration with Kaua'i Forest Bird Recovery Project to celebrate the Makahiki o nā Manu Nāhele. This beautiful shirt comes in two colors. Proceeds from sales support KFBRP.

The Tori Richards shirts are online or at Tori Richards location statewide <u>https://toririchard.com/products/jewels-of-the-rainforest-short-sleeve-shirt</u>









A heartfelt mahalo to everyone who supported the Kaua'i Forest Bird Recovery Project this year. Your generosity and dedication have been instrumental in protecting Kaua'i's native birds and their fragile habitats. Together, we're making a difference in the fight to save these treasured species.

As we reflect on this year's efforts, we're deeply grateful for the community's unwavering commitment to conservation. Here's to continuing this important work in the year ahead—together, we can keep our forests alive with the songs of Kaua'i's native birds. Me ke aloha,

The Kaua'i Forest Bird Recovery Project Team

