

# KAUAI FOREST BIRD RECOVERY PROJECT



# 2021 NEWSLETTER

## Join the Dunk Squad



Our efforts to diminish the *Culex* mosquito population in Koke'e State Park, the Alaka'i Swamp, and beyond, are in full swing. Every month our field technicians and volunteers can be seen around Koke'e with a smile on their face and a dip cup in their hands. Participating in "opportunistic dipping", we set out for every stagnant pool we can find. There is a lot of terrain to cover, and we need all hands on deck! Come spend the day in Koke'e and make a difference in the life of a forest bird.



## 2021 FIELD SEASON RECAP

During our 2021 field season, we spent considerable time on and off our rat trapping grids to help understand how our trapping efforts are helping the Puaiohi successfully nest. Rats kill a lot of birds, so making sure our rat traps are working effectively and safely is very important. We started a rodent lure study where we monitored traps with different lure types and flavors in order to understand which lures will be most effective at attracting rats, but not birds. We also put out cameras at many of our rat traps to see how animals interact with traps. Through these efforts, we now have a better idea of who is showing up at our traps, and how many rodents and what species are actually being killed. These data will help inform our future trapping efforts.

In 2021 we spent significant time with 'akeke'e finding nests, tracking birds, and making novel species observations. We found several 'akeke'e nests and even had our first ever recapture of an 'akeke'e that was first caught in 2018. We will continue our observations and research into the 2022 season and the inclusion of our new banded birds from 2017-2020 has been extremely rewarding with color banded individuals being resighted over multiple years. (continued on page 2)



Several Members of the 2021 KFBPR Field Team

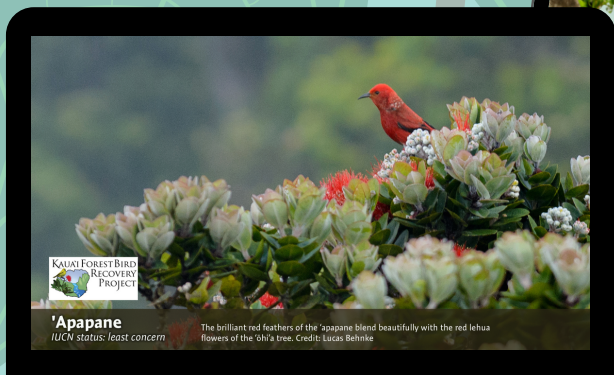
Field Season Recap continued...

To understand our bird population dynamics and help identify individual birds, we spent significant time mist netting birds on and off of our rat trapping grids. During this process, we collected all sorts of information on the birds' health and age, which helps inform the prevalence of malaria and survival rates, and bird population information.

Another major project was surveying mosquitoes at our main Halepa'akai field camp as well as along trails and roads in Koke'e. This was a year long project and will help us understand mosquito trends throughout the change in seasons across the plateau. We also worked with Kaua'i DOFAW to repair roads that access the habitat of the native birds in order to prevent ruts and potholes from becoming breeding grounds for mosquitoes. The data collected this year will help inform mosquito control in order to protect our birds from avian malaria. We have been able to make some small yet meaningful impacts to mosquito habitat while we wait for a longer term solution to mosquitos. (see "The Buzz", on page 6.)

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# EIGHT HAWAIIAN EXTINCTIONS ANNOUNCED IN 2021

By Phoebe Honscheid

On September 29, 2021, the world gave a last farewell to eight forest birds of Hawai'i, as hope for their survival finally ran out. The U.S. Fish and Wildlife Service proposed to declare these birds extinct, along with 15 other American species. Although the most recent Hawaiian bird to disappear had not been detected since 2004, extinction brings a sombre finality and resounding sense of loss. It also invites us to shift our focus to the species we still have with us and to ensure we never read their names alongside those we have already lost.

Included in the USFWS extinction list are four species endemic to Kaua'i: the Kaua'i 'akialoa, Kaua'i nukupu'u, Kaua'i 'ō'ō, and kāmā'o. The other Hawaiian birds are the Maui ākepa, Maui nukupu'u, kākāwahie, and po'ouli. Hawai'i has more species on the USFWS list than any other state. In fact, the Hawai'i Director of the Center for Biological Diversity, Maxx Phillips, says that "of all the species listed as endangered or threatened in the United States, nearly a third are Hawaiian." According to the American Bird Conservancy, 95 of Hawai'i's 142 birds have gone extinct since humans arrived on the islands. Only 17 of the 59 honeycreepers still fly through Hawaiian forests.

There is a reason why Hawai'i is known as the extinction capital of the world. Because the islands are so small and isolated, they have high rates of endemic birds with relatively small populations. Kaua'i has the most endemic birds of all the Hawaiian Islands, since it is the oldest. These birds co-evolved with native plants and animals, creating a balanced and secluded

ecosystem. When threats such as pigs, rats, cats, mosquitoes, and habitat loss are introduced, this equilibrium is disturbed, leaving the birds with nowhere to go and not enough time to adjust. Their solitary evolutionary history leaves them very susceptible to mosquito-borne diseases such as avian malaria. Endangered birds restricted their ranges to high elevations where it is too cold for mosquitoes to breed. However, as climate change continues, these safe havens from mosquitoes vanish.



Kaua'i 'ō'ō, Creator: John Gerrard Keulemans



## Eight Hawaiian Extinctions continued...

It is crucial that we act now to prevent future extinctions of the endangered Hawaiian endemics we share the land with today. The 'akikiki, 'akeke'e, and puaiohi are all critically endangered, each with ranges around 30 square miles or less in the Alaka'i Plateau. Current estimates suggest that there are fewer than 500 puaiohi and only 40-80 'akikiki individuals left in the wild. The 'akikiki, 'akeke'e, and 'i'iwi face threats from mosquitoes carrying avian malaria. While puaiohi may show resistance to this disease, they are particularly susceptible to rats, which predate on nestlings and compete for fruit.

Here at the Kaua'i Forest Bird Recovery Project, our mission is to increase and stabilize the populations of these endangered birds by removing invasive species, conducting research, monitoring nests, releasing captive-bred birds, and educating the public about their conservation. You can help us help the birds by donating, ordering us gear from our wishlist, and contacting us for volunteer opportunities. You can

make a direct impact by keeping your cats inside, cleaning your hiking boots to prevent the spread of Rapid 'Ōhi'a Death, and turning over outside objects to avoid attracting breeding mosquitoes to pools of water.

The extinction of these eight Hawaiian birds is heartbreaking for conservationists, bird lovers, and Hawai'i residents. But as long as people care about the birds there is hope. It is more important than ever to protect Kaua'i's beautiful and unique jewels of the forest so we can see them in the 'ōhi'a and hear their songs for many years to come.

KFBRP received a lot of press with regards to the extinction announcement, including the following article that can be read in Audubon Magazine by clicking on the link below.

***Wave of Hawaiian Bird Extinctions Stresses the Islands' Conservation Crisis*** - by Kim Rogers

# BIRDS NOT MOSQUITOS INITIATIVE



<https://www.birdsnotmosquitoes.org>

The "Birds, Not Mosquitoes" initiative (BNM), is a state-wide multi-agency collaboration addressing the need for mosquito control to avert the extinction of more bird species. The BNM partnership is currently focused on the potential for a bacterium to act as a mosquito birth control. This tool, also known as Incompatible Insect Technique (IIT), is one of several that biologists could use to reduce the impacts of invasive species. Given the urgency of preventing additional extinctions, KFBRP contributed a great deal of attention to participating in both the research and community-engagement subcommittees, sharing their data about mosquito trends on Kaua'i (see "The Buzz", page 6) and contributing to educational materials and talks. An Environmental Assessment for the IIT project on Kaua'i is scheduled for 2022.



# Shocking Drop in 'Akikiki Numbers Prompts Rescue Mission



Photo credit: Jim Denny

A main focus of our year was strategizing how to best prevent the extinction of 'akikiki, a Kaua'i endemic honeycreeper, in the wild. The increased presence of mosquitoes (see "The Buzz", page 6) caused a dramatic drop in numbers of 'akikiki in one of our study sites, where the population of more than 70 birds recorded in 2015 has declined to just five observed in 2021. Mosquitoes transmit avian malaria to our birds and the pesky critters can now be found in areas of Kaua'i which used to be mosquito-free, including this site that had previously been considered the bastion of the species. This trend prompted a rescue mission to extract up to five 'akikiki from this site, which apparently can no longer support this species, and add them to the conservation breeding flock at the breeding program on Maui at a facility managed by the San Diego Zoo Wildlife Alliance (SDZWZA).

During a 12-day trip in December characterized by pounding rain and blustery wind, the team successfully captured an 'akikiki born in Spring 2021, nicknamed Erica. She was carried by helicopter to Maui, where she is now in quarantine before joining the flock in the SDZWA facility. The team hopes to return to the site in 2022 to capture the rest of her family. In an ideal world, the best location for 'akikiki to thrive would be in their home forests. The interisland transfer of Halehaha's remaining 'akikiki is intended to be a temporary reprieve while biologists work to make the birds' forest habitat mosquito-free. We have previously worked with Ka 'Imi Na'auao O Hawai'i Nei Institute, a Kaua'i-based group that has provided blessings for the project's field work. Dawn Kawahara, the Institute's President, commented that the plan "seems to be aligned with what we know and promoting native Hawaiian thought regarding protecting and preserving all life."

The long term plan is to control mosquitoes across the Alaka'i Plateau using mosquito birth control (see "Birds Not Mosquitoes Initiative", page 4), reducing the impact of mosquito-borne diseases on 'akikiki and other honeycreeper species. With their forests in better condition, experts foresee a future when Halehaha's 'akikiki complete their interisland stay and return home to Kaua'i.



'Akikiki rescue mission



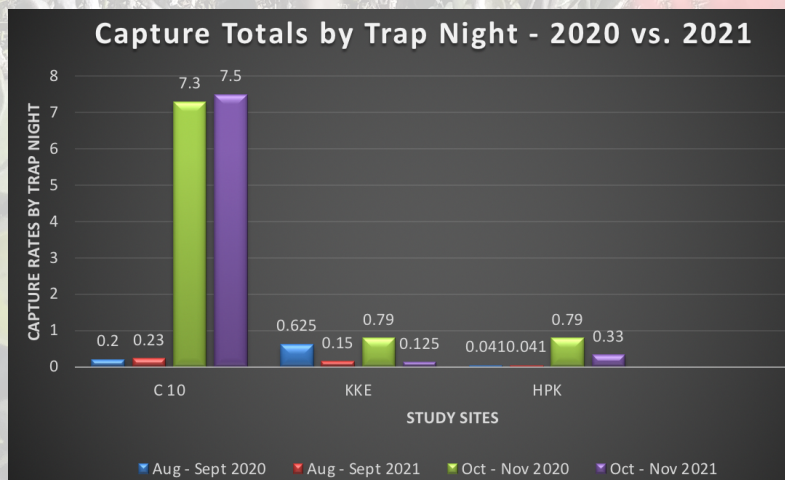
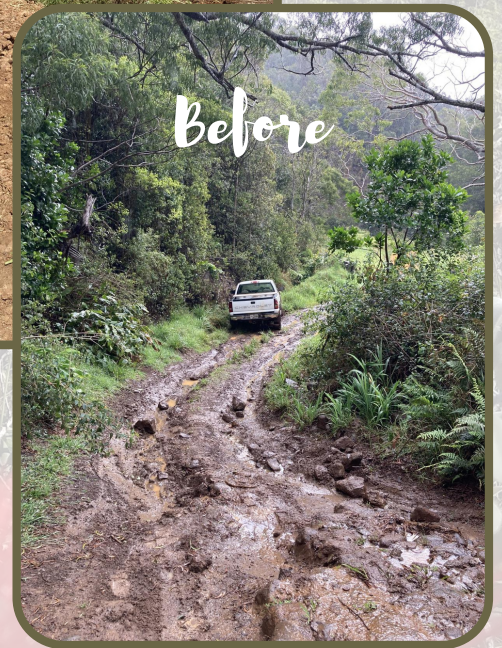
# THE BUZZ: UPDATES FROM THE FIELD

The buzz is louder than ever as our mosquito study continues to track and monitor populations of *Culex quinquefasciatus*, the vector of avian malaria. This year we extended our study period from four months to twelve, providing us with insight into seasonal fluctuations. We also decreased the number of study sites from six to three, concentrating on three definitive elevational gradients. Lastly, we increased the number of trap nights from three to six.

Overall, our capture rates coincide with elevation. As elevation increases, temperatures decrease, as do mosquito populations. Our findings followed suit, with the lowest elevation site, Camp 10, having the highest captures and HPK, our highest elevation site, having the fewest. We have caught record numbers at all our study sites. Last year, we collected 463 *Culex* mosquitoes in total, over the course of four months. In March 2021, we collected 464 mosquitoes from one site, Camp 10, over the course of six nights. This staggering increase in capture rates highlights the urgency of mosquito control on Kaua'i. One small bright spot is that fall 2021 captures were slightly lower than fall 2020 captures at KKE and HPK.



In response to these findings, we have increased our efforts to discover, identify, and eliminate mosquito larvae. Field technicians and volunteers can be seen throughout Koke'e, investigating potential larval habitat (see p1). In addition, with help from our government partners, we were able to fill many of the large potholes on Camp 10 Road, known to harbor larvae. The improvement of this road is a huge step in our eradication efforts.



As we dedicate more time and effort to the mosquito study on Kaua'i, we are also working closely with our associates on Maui and Hawai'i Island to standardize our study protocols. As a state, we will work together to compile a data set that will be used for the release of *Wolbachia* (see "Birds Not Mosquitos", page 4). This is an exciting time in the mosquito study as we get closer to implementing state-wide, landscape level mosquito mitigation.



# FOREST FRIDAYS

This year's outreach was mostly virtual again. In a great collaboration with the Kaua'i Invasive Species Committee, we produced a series of eight virtual "talk story" events with local experts to provide a unique opportunity to discover what is happening in the forest with regards to conservation, research, and cultural practices.

We started off with the questions "What does a healthy forest mean to you?" followed by "How do you connect with the forest?" and "How do we protect our forests for our children's future?", learning about how our native forest birds, seabirds, plants, and insects play an integral part for the health of our forests and what motivates our conservation experts and cultural practitioners to connect their research and activities with the forest.

Our third episode, "The skies are empty, and the forest is quiet: Is it too late to save our native forest birds?" was a very emotional one. During the well-attended event, KFBRP project leader Lisa "Cali" Crampton discussed the latest drop in numbers of the 'akikiki in Halehaha; University of Hawai'i Professor Emerita Sheila Conant shared her experiences from the 1970s, when our forests were still bustling with birds; Teya Penniman from American Bird Conservancy gave an update on the multi-agency "Birds, Not Mosquitoes" initiative (see page 4); and Kumu Kehaulani Kekua of Hālau Palaihiwa O Kaipuwai shared the Hawaiian cultural relationships with birds in the sacred environment of the forest and how traditional practices ensured cycles of life, health, and well-being.

We continued our series by shifting our focus to the importance of water for our forest in the episode Aia i hea ka Wai a Kane? How water, watersheds, and waterbirds connect to the forest, in which we discussed how healthy watersheds are the foundation of a healthy forest. With "What's the fate of our forests?" we aimed to not only look at the future of our forests, discussing effects like climate change, but also talk about the different types of forests we have here on Kaua'i and what makes them special.



Our October episode was a fun one, as we brought alive all the threats in the "Ghouls of the Forest". In this little skit, you met Kate, the Killer Cat, the Ruthless Rodent, and the Devilish Indifference - among others- as they threaten our native forest and you can find out how to get rid of them! This year's final episode, "Artists of the Forest" showcased local artists and their work. We discussed how the forest inspires them, supporting our projects by raising awareness.

On the agenda for next year is an episode highlighting the new generation of conservationists on Kaua'i and the work they do to protect our beautiful environment. Stay tuned for details. Information about upcoming events will be shared on our social media channels and through our mailing list!

All episodes of Forest Fridays can be found on our website and our YouTube Channel.



# THE UNSUNG HEROES OF KOKE'E

By Volker Poelzl, Dunk Squad Volunteer

Our forest birds are disappearing. The U.S. Fish and Wildlife Service recently declared eight Hawaiian forest bird species extinct, three of them from Kaua'i. And only a few days ago the Wildlife Service announced that it would finally propose a plan to protect the threatened 'i'iwi, our most iconic forest bird. It is among eight forest bird species on Kaua'i that can still be saved, some of whom we still see in the misty forests, such as the 'apapane, 'amakihi, and the ever-curious 'elepaio.

These birds are still sometimes heard in the 'ohia forests of Koke'e and the 'Alaka'i Plateau, but an eerie silence is beginning to creep into the ridges, ravines and valleys of our high mountain forests. Our forest birds are becoming fewer and fewer, and their songs are now rarely heard where they were once common. Much has to do with the loss of native forest habitat and introduced predators, but in recent years a new killer has arrived in our mountains, and it's a very small one: the southern house mosquito. It transmits avian malaria, a disease most forest birds have no defense against, and it is an effective killer.

Some of our most critically endangered forest birds such as the 'akikiki and 'akeke'e have now retreated to the highest ground on our island and have nowhere else to go. It is in these remote forests, where they are making their last stand against the deadly invasion of the blood-sucking insects. These little birds are the unsung heroes of Koke'e, as they quietly fight for survival against all odds, and as they fight for a small patch of forest to call their home and live in peace. Only a few hundred of them remain, and their populations continue to decline. That's why our forest birds need our help.

The Kaua'i Forest Bird Recovery Project has been helping our threatened and endangered native forest birds for over 15 years. Their latest efforts focus on fighting this invasion of mosquitoes that bring deadly diseases to our birds. The tireless team members are the other unsung heroes of Koke'e. They clamber through thick undergrowth across ravines and gulches to help our endangered birds and find effective ways



Photo: Lucas Behnke

to beat back the advancing mosquito invasion. Some of the less technical work includes hiking on trails and forest roads to find and treat puddles that have mosquito larvae, work that is fun and also easily done by volunteers. Field technician Allie Cabrera envisions a 'squad' of hiking volunteers helping out with these easy but time-consuming tasks. Her 'squad' is still very small at this point, but I am hopeful that more volunteers will join to help our embattled forest birds, so that perhaps one day our mauka forests will once again echo with the rich songs of abundant native birds. (see "Join the Dunk Squad" on page 1)

Contact the Kaua'i Forest Bird Recovery Project for more information about how you can help: [kauaiforestbirds.org](http://kauaiforestbirds.org); [info@kauaiforestbirds.org](mailto:info@kauaiforestbirds.org).



# NEW FACES

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## Phoebe Honscheid, KUPU Service Member

Phoebe's fondness for birds began early by watching the birds visit the feeder in her Ohio backyard. Once she began studying ecology and evolutionary biology at Cornell University, this love deepened into an admiration and curiosity for their evolution, plumage, behavior, and conservation.

She has worked on several projects as a field tech, studying fairywrens in Australia, hummingbirds in the Dominican Republic, shorebirds on the Gulf Coast, and most recently forest birds on the Hawaiian Islands. While working on a frugivory project on O'ahu, she was introduced to the beautiful but threatened Hawaiian ecosystem and fell in love with the landscapes and native birds. Phoebe joined KFBRP shortly after in hope of contributing directly to the survival of these endemic and endangered birds. When she isn't hiking in the Alaka'i, she loves to embroider, read, and go birding.

## Hannah Landwerlen, KUPU Service Member

Hannah graduated from Michigan State University with a degree in Fisheries and Wildlife and a minor in Environmental Sustainability. Working at Michigan State Bird Observatory's Burke Lake Banding Station sparked her passion for birds - before then she was unaware of the diversity and complexity of birds, or that she could build a career studying them. Hannah spent five fall seasons at Burke Lake - two as the lead bird bander. She also spent a fall season at Intermountain Bird Observatory as lead songbird bander, and camp manager. She has spent several breeding seasons with endangered species like the Florida Grasshopper Sparrow (*Ammodramus savannarum floridanus*), and the now delisted Kirtland's Warbler (*Setophaga kirtlandii*). Hannah is super excited to now be working on Kaua'i with the forest birds. In her spare time she enjoys roller derby, snorkeling, birding, and running.







# Publications

The Kaua'i Forest Bird Recovery Project and its partners have been very busy this year. Their hard work can be shown by the number of new publications that have gone to print, or are currently being prepared. These papers, presentations, and video conferences are cataloged and linked on our website, but we have provided a summary of a few them here in the newsletter. If you are interested in reading more of our publications, please visit the [publications page](#) on our website.

## **Application of Lidar for Critical Endangered Bird Species Conservation on the Island of**

**Kaua'i, Hawai'i** - Fricker, GA, LH Crampton, EM Gallerani, JM Hite, R Inman, and TW Gillespie.  
2021

The critically endangered 'akikiki and 'akeke'e nest in the canopy of 'ōhi'a trees in the remote Alaka'i Plateau. While the rugged terrain, steep topography, and lack of easy access protect the honeycreepers from habitat loss, these conditions make them notoriously difficult to monitor. Some regions are so hard to reach that even our KFBRP field crews have trouble surveying them for nests and birds. An inventive technology called lidar, or "light detection and ranging", helps us get around these physical barriers to conservation efforts. Lidar uses lasers to create 3D maps of a target region. This method has uses in forestry, geology, and astrophysics, but has not often been used to predict bird ranges in a forest. In this paper, we used lidar in the Alaka'i to collect data on forest topography and structure, including elevation, canopy height, canopy density, and slope. We analyzed forest metrics of known 'akikiki and 'akeke'e nests and sightings, then applied this data to unsurveyed regions of the Alaka'i to predict complete nesting and population ranges.

Our results show that there is 18 km<sup>2</sup> or less of suitable nesting habitat for 'akikiki and only 11 km<sup>2</sup> for 'akeke'e. 'Akikiki have a predicted potential range of 38 km<sup>2</sup> while 'akeke'e have a slightly larger range of 58 km<sup>2</sup>. The smaller nesting range in relation to the overall range of the 'akeke'e is likely because they tend to forage further beyond their territory than 'akikiki. Additionally, this study found that both species have reached their elevation limit on this island. Because there is no higher region on Kaua'i, these honeycreepers may need to be translocated to Maui or the Big Island for the species to persist. With the habitat suitability map we generated using lidar and the predicted range data, KFBRP researchers can now prioritize where to survey for 'akikiki and 'akeke'e. We can also determine the most important areas to place rat traps and fencing, as well as where to target birds for potential translocation.

Read the full paper at: <https://doi.org/10.1002/ecs2.3554/17076191>



**Field Trials to Test New Trap Technologies for Monitoring Culex Populations and the Efficacy of the Biopesticide Formulation Vectomax FG for the Control of Larval Culex Quinquefasciatus in the Alaka'i Plateau, Kaua'i, Hawai'i.** LaPointe, DA, TV Black, M Riney, KW Brinck, LH Crampton, JM Hite. 2020.

Mosquitoes carrying *Plasmodium reticulum*, which causes avian malaria, pose one of the largest threats toward our endangered Hawaiian honeycreepers. Because they evolved in isolation for millions of years, the 'akikiki and 'akeke'e are extremely susceptible to introduced diseases. As temperatures on Kaua'i rise, mosquitoes can breed at higher elevations, including the remaining ranges of these two birds. To reduce the number of fatalities from avian malaria, we must control the invasive mosquito population. This study set out to test the effectiveness of a certain biopesticide called Vectomax® FG that targets *Culex quinquefasciatus* mosquito larvae. Additionally, we tested different mosquito traps and lures to determine the most effective combination.

Our results showed that Vectomax® FG is extremely effective at controlling mosquito larvae and did not have negative effects on endemic damselfly larvae. In fact, in only two days, this biopesticide reduced the larval mosquito population by 95%. It is most effective when used against early instar larvae. We also found that BG Sentinel host seeking traps with a BG lure and pressurized CO2 caught the most *Culex* and *Aedes japonicus* mosquitoes. These traps function by attracting mosquitoes to an artificial blood meal, simulated by artificial flesh and the release of CO2. Our mosquito and volunteer crew is already using these results in the field by sprinkling Vectomax® FG into larval pools and setting up the most effective traps for adult mosquitoes. More research will have to be done to determine if using biopesticide on larval mosquitoes impacts the adult population. Our improved trapping techniques will be invaluable in helping control and research the mosquito population to prepare for the implementation of a long-term solution.

Read the full report at: <https://dspace.lib.hawaii.edu/handle/10790/5507>



Dunking for mosquito larvae in the Alaka'i



**Bird and Rat Carcass Persistence in a Hawaiian Rainforest Managed for Rodents Using Goodnature A24 Self-resetting Traps.** Kreuser, AM, AB Shiels, CA Lepczyk, and LH Crampton. 2021.

Good nature A-24 traps are a preferred method of rodent control in remote terrain because they require less frequent checks than other traps. Conversely, carcass persistence can be a challenge because carcasses are subject to decay and scavenging during longer intervals. Additionally, non-target mortality (birds) has been observed near the traps and carcass counts often do not match the counter tally. The goal of this study was to determine if we are underestimating target mortality (rats) and failing to detect non-target mortality (birds) at two field locations on Kaua'i (one fenced to restrict feral ungulates, and one unfenced).

Key findings include:

- Scavenger species that were monitored with the use of cameras placed on a subset of traps included: rodents, pigs, birds, cats, and deer. Pigs were most likely to interact with carcasses in the unfenced area and rodents were most likely to interact with carcasses in fenced areas. Scavenging of a whole carcass was rare, unless scavenged by a pig. Scavengers did not exhibit carcass preference based on taxa.
- The majority of ungulate interactions with carcasses were in gulch environments vs upland areas.
- Both target (rat) and non-target (bird) mortalities from the traps are more likely to go undetected in unfenced, pig-inhabited forests due to scavenging. In pig-free fenced forests, fewer carcasses were removed by scavengers, so detectability was higher.
- In a fenced forest, carcass counts would be underestimate by 12%. In unfenced gulches, carcass counts could be underestimated by as much as 62%.
- These results suggest that significant non-target mortality has not gone undetected in the fenced areas, but it is less likely that both target and non-target carcasses are being detected in unfenced areas.



Pig exploring a carcass at an A-24 trap

Read the full paper at:  
<https://www.reabic.net/journals/mbi/2021/IssueA24.aspx>