

KAUAI FOREST BIRD RECOVERY PROJECT



NEWSLETTER

PHOTO GALLERY



UPDATES FROM THE FIELD

by Tyler Winter

During our 2022 field season, we spent considerable time on and off our rat trapping grids to help understand how our trapping efforts are helping the puaiohi and our other forest birds. Rats impact all our birds, especially the puaiohi, so making sure our rat traps are working effectively and safely is very important.

We spent substantial effort with our collaborators from Auburn and Colorado State Universities to capture birds and find puaiohi nests to collect data about our birds and how they are surviving and living on the landscape, with respect to rat control. During this process, we collected all sorts of information on the birds' health, age and sex, which helps inform the prevalence of malaria and survival rates, and bird population information. We also put out cameras at many of our rat traps and tracking tunnels to see how animals interact with our trapping and monitoring effort. Through this sampling, we now have a better idea of who is showing up at our traps, how many rodents come to traps, and what species are on our landscape. These data will be analyzed in collaboration with our partners to help inform our future trapping efforts.

{Continued on page 2}

Updates from the field continued...

In 2022 we spent significant time finding 'akeke'e nests, observing individual birds, and making novel species observations. We found several 'akeke'e nests and had our second-ever recaptures, at two different sites, of 'akeke'e that were captured originally in the 2018 season. We also now have several color-banded individuals being resighted over multiple years.

Another major project was continued surveying of mosquitoes at our main Halepa'akai field camp and along trails and roads in Kōke'e State Park and the Nā Pali Forest Reserve. This year we were also able to run multiple mosquito survey trips at our Pali camp, Mohihi. Unfortunately, we captured mosquitoes and found larvae in pools there, albeit in smaller numbers than at our other sites. This camp has seen a less rapid decrease in bird populations and understanding where the forest bird populations have seemingly been more stable will help inform our future conservation efforts. Data collected in this project will help inform mosquito control in order to protect our birds from avian malaria.

THE STORY OF THE 'AKIKIKI

We were recently awarded a grant from the County of Kaua'i Office of Economic Development (Mahalo!!) to produce a documentary about the story of the 'akikiki, in which we will capture their behavior, song, and appearance while they are still in the wild. This will serve as an archive for scientists, conservationists, cultural practitioners and all of us to be able to remember and experience the 'akikiki in the wild. And here is where we need help:

We would like to show this documentary to as many people around the world as possible. Our goal is to raise awareness about the 'akikiki and their dire fate, and about all Hawaiian Honeycreepers and what is needed to help them. Funds raised through our [“Resist extinction” t-shirt campaign](#) will be used to host events on Kaua'i, in Hawai'i and hey, if we raise enough money even on the mainland! We would like to have in-person and virtual events and be able to tell the story of the 'akikiki to the world.

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KU'ULEI WONG

CONNECTING BIRDS, CULTURE, AND CONSERVATION

KFBRP Field Assistant Ku'ulei speaks with Roger Peet from "Justseeds Artists' Cooperative Endangered Species Mural" and reflects on her time spent with the native forest birds of Kaua'i

"Hawaii is known as the 'Extinction Capital of the World'"



WHAT DO YOU THINK THE WORLD SHOULD KNOW ABOUT THESE SPECIES/THE PLACE YOU'RE TRYING TO PROTECT?

Hawai'i is one of the most isolated archipelagos in the world. Similar to the Galápagos Islands, one single ancestor came to Hawai'i and eventually evolved into more than 142 different varieties of birds varying in bill shapes and feeding behaviors across the island chain. Unfortunately, more than two-thirds of all Hawaiian bird species have gone extinct since humans started to arrive on the islands, including entire families of honeyeaters.

Besides being known as a vacation destination, Hawai'i is also known as "The Extinction Capital of the World". These species are found nowhere else on the planet and their numbers are declining at a rapid rate due to habitat loss, avian diseases caused by mosquitos, introduction of invasive and predatory species. Because of adaptive radiation, the birds have co-evolved with the plants in the forest, they cannot successfully flourish without each other, which means when the birds go, our plants go, when our plants go it can be catastrophic to not only the biodiversity of this place but it can also affect our watersheds which is where a majority of our drinking water comes from. So to save them is not just saving the species but it's also saving the island and all of its precious resources. Not to mention they are such a significant part of Hawaiian culture and history. If you wish to truly know Hawai'i, learn from the birds; they connect us to our ancestors and ali'i (chiefs) of the past, and so much more. Every effort, even one as small as spraying alcohol on your shoes to reduce the spread of Rapid 'ōhi'a death (ROD) when entering these sacred spaces, to donating money or goods to your local conservation organization, every little bit makes a world of a difference. At the end of the day, conservation's ultimate goal is Aloha 'Āina, the love of the land.

WHAT'S THE HARDEST PART ABOUT WHAT YOU'RE TRYING TO DO?

As rewarding and beneficial as this job is, including my former job with San Diego Zoo Wildlife Alliance (SDZWA), it really does take an emotional toll on you. Working with these birds, you have the opportunity to know these individuals (birds), observe their likes and dislikes, where their favorite place to hang out is, who they associate with in the forest, etc. For example, working with the 'ālalā, I got to see them grow up from juveniles to adults, I got to witness their awkward "puberty" stages including how they learned and adapted to the world around them. From seeing them take their first flights in the forest and then being the one to bring their lifeless bodies out of the forest (for necropsy purposes), it's hard not to feel something. They have such a presence in the forest and when they're gone you're very much aware of the loud silence that echoes through the forest.



Additionally, even as amazing as these species are and how essential they are for our island's biodiversity, not everyone is on the same page or sees eye to eye. Sometimes we don't have the proper support that we need to help them and it's hard not to get frustrated and jaded in these moments. Especially when these species are so culturally significant to Hawai'i and her history, it just feels like another attack on our culture as a whole – as if our culture hasn't suffered enough. The public may view our jobs are just saving the birds, but it's a lot more than that; it's saving entire forests and ecosystems, it's saving our aquifers, it's saving us, the communities of people who claim to love Hawai'i. To love Hawai'i is to love all of its inhabitants, including the ones that were here before us. Extinction is forever and even with us working as hard as we do, the fight to end extinction continues to become bigger and scarier.

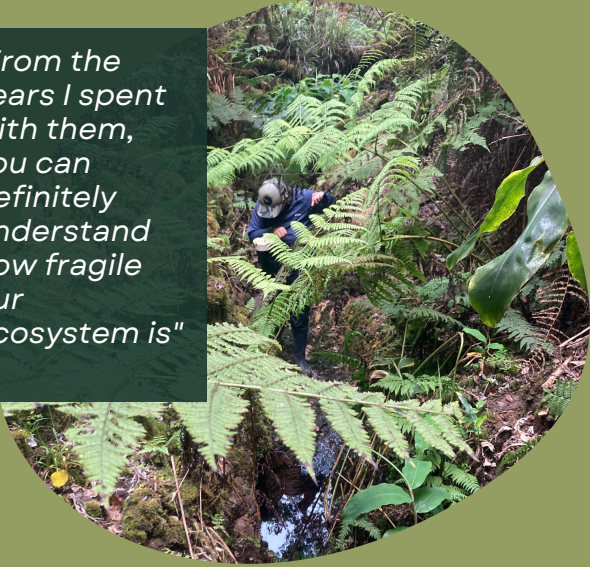


WHAT IS YOUR PERSONAL CONNECTION TO THIS WORK?

Growing up here on Kaua'i, I had the fortunate opportunity to see these birds in lower elevations near the public. My school would take classes up to Kōke'e to camp at the Discovery Center, learn about the native species from experts, even do volunteer work of eradicating invasive species such as kahlili ginger (*Hedydium gardnerianum*). One of our field trips up there I brought my little Aubodon Hawai'i bird book and Kōke'e expert, David Boynton, took my friend and I on a little detour to show us and teach us about some of the birds. Although he has passed on, I will never forget those moments he shared with us, his words and wisdom are still very much present in my mind today. He showed us a side of the forest that was full of life and beautiful and ultimately he played a very significant role in sparking the initial flame of learning about these native species and why I love them so much. As an adult, I walk in these same forests that once used to be so busy and full of life become silent ghost towns, where our native manu's songs are nothing more but a memory. It's absolutely heartbreaking. On another note, being a Kanaka Maoli, or native Hawaiian, working with these birds holds such a special place in my heart. In our culture, we have a variety of origin stories, such as the "Kumulipo" that talks about the beginning of time, the introduction of deities and gods, the birth of water and lands, then eventually the animals and people. It talks about the Big Bang theory in an indigenous perspective while also encompassing how everything from the beginning of time is related to us (Kānaka maoli), that also includes our native birds. So to me (and other Hawaiian people), I don't just view these birds simply as birds, but as kūpuna or ancestors. Traditionally, our native birds were held in high regard as they were the beings that could touch the heavens and come back down. Some known species of birds are actually considered "kinolau" or other forms of Akua or gods and they were highly respected in a spiritual and religious aspect. Coincidentally, once you ascend to a certain elevation in our forests, its considered "Wao Akua" or the "Realm of the gods"; this is currently where the majority of our native forest birds reside. Our Ali'i or chiefs incorporated feathers from birds as a way to show their rank and kapu (kapu can be considered as a spiritual/biological status) in Mahi'ole (helmets), 'Ahu'ula (Capes/cloaks), and lei (wearable garlands). With that said, our native birds connect us to our culture in a very religious and spiritual way. To be in the presence of our native birds, it means to be in the presence of our Akua and royalty. They remind me of a past where our 'āina (land) was rich and full of life, a time before western influences, a time when Hawaiian culture was thriving. Personally, every time I am in their presence I am so incredibly grateful, they inspire and teach me the proverbs my ancestors speak of and being in Wao Akua only makes these experiences so much more powerful.

CAN YOU DESCRIBE YOUR WORK TO PROTECT HAWAIIAN BIRDS (OR THIS INDIVIDUAL BIRD)?

"From the years I spent with them, you can definitely understand how fragile our ecosystem is"



My journey into helping native Hawaiian birds actually originated on the island of Hawai'i. I had the amazing opportunity of being a research assistant for SDZWA that conducted wildlife monitoring of the native Hawaiian crow, the 'Alalā, as they were reintroduced into the wild after being extinct in our forests since the 90's. Each bird was equipped with avian transmitters and bands that allowed us as researchers to identify, track, and take surveys of general and social behaviors. Understanding their behaviors and how they adapt to the environment allows us to aid in their overall success in survival. In addition, it also is an amazing opportunity to learn more about these technically extinct species or as I like to call them "dinosaurs".

From the years I spent with them, you can definitely understand how fragile our ecosystem is; everything relies on everything and when something is added or taken away from the forest there's a ripple effect everywhere else. That's the beauty and curse about adaptive radiation and biodiversity. With that in mind, when I moved back home to Kaua'i, I really wanted to keep a focus on our birds because in reality helping them means helping our plants, our aquifers, our ecosystems, and ultimately us as human beings. Currently, I'm assisting with mosquito research with the Kaua'i Forest Bird Recovery project. Mosquitos, specifically the *Culex quinquefasciatus* species, are primary carriers of diseases such as avian pox and avian malaria. Being that mosquitos were introduced to our islands during the arrival of European contacts, our birds who have had no prior resistance fell prey to these diseases, greatly reducing their numbers. All it takes is one bite and these birds die off in a matter of days, if that.

My research mostly consists of trapping and treating larval habitats. We have two types of traps that capture female mosquitos in two different life stages: 1) females searching for a blood meal 2) gravid females post-blood meal, ready to lay eggs. These mosquitoes are then collected, processed, and sent to a lab to test if the captured mosquitoes are infected and where on the landscape they pose the biggest threat to our birds. We have several trapping sites on Kaua'i: Kōke'e, Mōhihi, Halepa'akai; all focused around the Alaka'i Plateau, one of the last places that you can find these critically endangered birds.

On top of trapping we also treat infested larval habitats with a type of larvicide referred to as "dunk" or Bt (*Bacillus thuringiensis israelensis*). Bt is an organic compound that primarily consists of a naturally occurring bacteria that has spores that are toxic to mosquito larvae. This larvicide is completely non-toxic to humans as well as animals and pretty much everything else, except a hungry mosquito larva.

Larvae are primarily found in shady pools of standing water and being that Kaua'i is famous for our water and rainfall, these habitats are fairly common in wetter seasons. So while we're out in the field doing our trapping, we also take time to find these infested pools using a dipping method; if larvae are present we dunk these pools which ultimately kill off that generation of mosquitoes in a matter of 48 hours or less. Reducing the number of mosquitoes on the landscape provides the best support for our birds, disease-wise, and we're continually trying to find better and more efficient ways to stop the spread of these detrimental diseases.



2022/23 KUPU KREW



Mary Polly Chino

'Akikiki Field Tech/Logistics

From: Little Rock, Arkansas

Upon graduating she started to pursue a career where she could explore environmental science from an intersectional lense. This unexpectedly led her to working at KFBPR in February 2022 and since then she has enjoyed learning about and working with Kaua'i's native forest birds.

Olivia Snowden

Mosquito/Puaiohi Field Tech

From: Anapolis, Maryland

Following graduation, Olivia completed an internship with the herpetology department at the National Aquarium in Baltimore, and is now exploring her interest in bird research with KFBPR as of June 2022 and has been loving the rewarding work and amazing experiences that come with it.



Riley Temkin

Avian Conservation Field Assistant

From: Los Angeles, CA

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. Riley is excited to be a part of KFBPR and gain experience using applied methods to conserve endangered birds.



Mia Hope

Outreach/Logistics/Partial Tech

From: Denver, CO

She graduated in 2022. Bringing awareness and highlighting the community, current issues, and underrepresented groups in media led her to pursue a career in this field.

Connecting her love for the environment and her commitment to uphold her media vision led to her KUPU!

She looks forward to embracing the new environment, honoring and learning alongside the people and creatures of Hawai'i!



A BIRD NAMED CARROT

Marion Chino

Every year we look forward to the field season when the forest goes from a sleepy quiet to a lively chorus. During this time, we get to join the birds in their annual labor of nest building, egg laying, and chick raising. Over the years however, this excitement has been joined with some feelings of anxiety and unease as the forest has grown quieter and quieter each breeding season. This year especially we are feeling much pressure as the critically endangered 'akikiki, a Kua'i endemic honeycreeper, are expected to be extinct in the wild by the end of 2023. Pictured below is the decline of their territories in the Halepa'akai region of the Alaka'i Plateau – the only place in the world that 'akikiki inhabit. Given the sharp decrease in the 'akikiki population in recent years, federal and state wildlife agencies have decided to direct us to extract as many as possible of the remaining estimated 45 'akikiki left on Kua'i and move them to captivity until it is safe for them to be rereleased in the wild. We anticipate that landscape-level mosquito control will be available to suppress avian malaria on Kua'i in 2024 or 2025, so releases would occur sometime after that. The 'akikiki collection project has been underway since December 2021, when we caught an 'akikiki named "Erica", who now resides at San Diego Zoo Wildlife Alliance's Maui Bird Conservation Center (MBCC). After a hiatus for the breeding season, we set out to catch Erica's sibling, "Abby" and its father, a particularly special bird who the team has known over the years as "Carrot". First caught as a second-year bird in 2019, no one thought that he would be one of the last two known 'akikiki left in Halepa'akai by spring of 2022.

[continued on next page]



A BIRD NAMED CARROT

Marion Chino

When we met Carrot, he was one bird among many others. But the others were quickly disappearing. As he persevered in the seasons to come since our first meeting, so did we. We continued our yearly trek through the Alaka'i, mistnetting, banding, and looking for any sort of sign that there could still be hope for 'akikiki at Halepa'akai. But the 'akikiki population plummeted and hope began to diminish. While Carrot's continued presence was always a light in hard times, there was no denying that extinction was at our doorstep and it was time to make decisions no one wants to make. And so, in September of 2022 (after six and half of days of effort), Carrot was the first of the two remaining 'akikiki at Halepa'akai to be caught in one of our mistnets and flown in a helicopter to Maui, where he was taken by car to MBCC.

He spent a month there in quarantine before being transferred to a unit near the other 'akikiki (about 45 ageing 'akikiki reside at SDZWA facilities thanks to our successful egg collection partnership with them in 2015-2018). Unfortunately, a few days after he was moved into that new unit, we received the devastating news that Carrot had died due to either a pathogen or fungal infection. While this was a risk we knew we would have to take by sending 'akikiki into captivity, it is no less heart-breaking to lose a bird that provided hope to us over the years. Carrot's death serves as a reminder of what will happen to all the 'akikiki if we choose to do nothing to save them. And so, with his memory close to our hearts, we push forward into the season, saddened by the knowledge that we will no longer be greeted by a bird named Carrot.

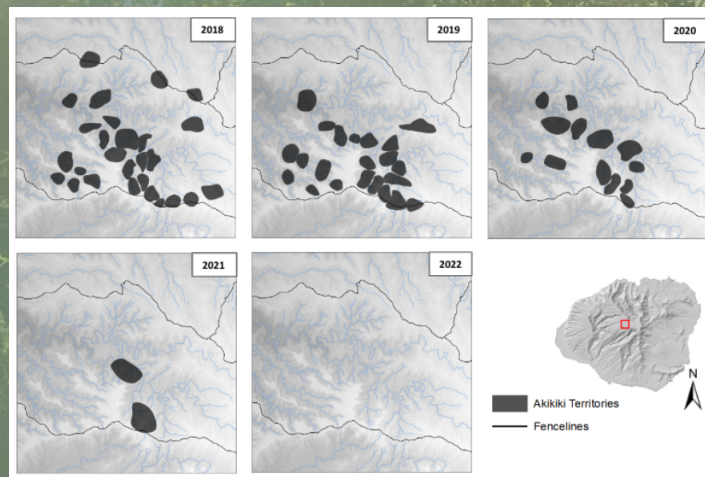
Saving Hawaii's Forest Birds (no date) fws.gov. US Fish and Wildlife Service.

Available at: <https://www.fws.gov/project/saving-hawaiiis-forest-birds> (Accessed: 2022). Paxton, E.H. et al. (2022) "Hawaiian forest bird conservation strategies for minimizing the risk of extinction: biological and biocultural considerations," HCSU Technical Report Series;103 [Preprint].

Available at: <https://doi.org/http://hdl.handle.net/10790/5386>.



Upside-down "Carrot"



Decline of 'akikiki territories in the Halepa'akai region of the Alaka'i Plateau

OUTREACH UPDATE

BY JULIA DIEGMANN

IT IS GOOD TO SEE YOU!

In-person outreach is back and we were so thrilled to be able to see you all again! We dusted off our tent and tables, cleaned our displays, and made sure to have some new merchandise (Check it out at the Alakoko Store in Lihu'e). Highlights included the Annual Visitor Industry Charity Walk (mahalo for all your donations and support) and the 7th Annual Harvest Festival, where we partnered with "Birds, Not Mosquitoes". We also participated in the Kōloa Plantation Days, the Kaua'i Chocolate and Coffee Festival, Arbor Day, Girls Scouts STEM Fest and 'Ōhi'a Love Fest. We hosted an educational workshop at Kipu Ranch Adventures to train their staff on the work we are doing and passing it along to their visitors. If you are interested in having your employees learn more about bird conservation on Kaua'i, feel free to reach out!

A new addition were our Kōke'e Museum Pop up events (Mahalo, Chris Faye), in collaboration with the Kaua'i Invasive Species Committee (KISC). We enjoyed hanging out in the meadow, talking about our birds with you and watching some 'apapane fly by. If you want to catch us in person some day, make sure to follow us on Instagram, Facebook and Twitter and subscribe to our newsletter with information about events and volunteer opportunities.



WHAT YOU CAN DO!

- ☐ Stay in Touch: @kauaiforestbirds
- ☐ Stop by to talk story
- ☐ Volunteer
- ☐ Make a donation
- ☐ Put up a "Mālama our forest birds" sign

VIRTUAL IS THE NEW BLACK!

We love our in-person outreach, but we also know virtual events offer opportunities for folks who are not on island, but still want to keep in touch with Kaua'i's forest birds. Therefore, we continued our virtual Forest Fridays in collaboration with KISC and produced four episodes this year! Topics included: "Is 'Ōhi'a Worth Saving?", "How much loss can our forest take? An update on Kaua'i Forest Bird Conservation", "What does the future hold for our forests?" and our recap of the past year: "What's Da Haps in the Forests of Kaua'i?". Check them out on YouTube!



EDUCATION SENSATION!

Speaking of YouTube: check out all the different videos we have added to our channel over the course of this year. Find a BBC interview with our project leader Dr. Lisa "Cali" Crampton, a presentation by field supervisor Justin Hite on the population decline and potential imminent extinction of the 'akikiki, or a cute, animated video by our friends from Kaua'i Dev about "Birds, Not Mosquitoes", all of which you can easily share with friends and family. We will continue to add educational and fun content to our channel, make sure to follow us and bookmark bit.ly/KFBRPvideos!

Apart from our online education, we are also in the middle of a statewide student advocacy project to celebrate Hawaiian Honeycreepers and raise awareness about the need to protect them! We are working together with a hui of bird experts, including our partners from the "Birds, Not Mosquitoes" initiative, to designate a Hawaiian Bird Day. The students will also learn about civics by reaching out to their legislators and submitting testimony for the 2023 session. If you are a teacher in Hawai'i and would like to participate in this effort, please reach out to julia@kauaiforestbirds.org for more details.

A RESOLUTION FOR THE BIRDS!

This year in September, the County Council of Kaua'i unanimously passed a resolution introduced by Luke Evslin and Mason Chock to support the use of *Wolbachia* as a form of "mosquito birth control" to suppress mosquito populations in the Alaka'i Plateau to help bring our native forest birds back from near extinction.

We are grateful to our Council Members Bernard Carvalho, Mason Chock, Felicia Cowden, Billy DeCosta, Luke Evslin, Arryl Kaneshiro and KipuKai Kuali'i for their support of our work and bird conservation on Kaua'i. Read the resolution [here](#).



NO TIME TO LOSE FOR OUR BIRDS

ALLIE CABRERA



Multiple native bird species on Kaua'i may go extinct in the next 1-5 years, primarily due to diseases carried by introduced mosquitoes. After a visit from the Department of Land and Natural Resources media team in the fall, news reports and articles quickly followed to inform about the devastating effects of avian malaria and the work we are doing to suppress the vector of the disease, *Culex quinquefasciatus*, aka the southern house mosquito. Check out this [video](#), explaining some of the preparatory work we have been doing before we will be ramping up our mosquito control efforts on Kaua'i! In addition to the many measures we use to control other invasive species in the forest, we will employ multiple tools to suppress invasive mosquitoes and protect our native birds. One is mosquito birth control or incompatible insect technique (IIT); one is physical removal of larval mosquito habitat; and the third is bacterial larval mosquito control using Bt, aka "Dunk", an organic control method targeting mosquito larvae.



We are working hard on the preliminary stages for the mosquito birth control: trapping male mosquitoes, planning for shipments and releases, hiring new staff (come and work with us!) and searching for larger office space. An Environmental Assessment is also in preparation for Kaua'i and will be released in the Spring of next year. When we are out in the field, our eyes are always scanning the landscape for potential larval habitat. After finding hundreds of larvae in ruts along the muddy terrain of Camp 10 Road, we worked with state partners to get them filled in. As one can conclude by its name, the southern house mosquito loves a man-made surface to lay its eggs on; one ounce of standing water is all it takes to harbor hundreds of larvae. Simple things like picking up trash can make a huge difference in the availability of suitable larval habitat. Tarps are another common item that we see out in Koke'e, they are great at holding water for mosquitoes to lay in but can easily be readjusted so that no pooling can occur.

AI for Photo Review

EVERYTHING YOU NEED TO KNOW ABOUT HOW WE USE AI FOR OUR PROJECT

- BY ROY GILB, GIS AND DATABASE MANAGEMENT



Zendo AI in action, identifying a puaiohi on our game camera



Timelapse software, showing a series of photos with cat interacting with a rat trap and saying hello

KFBRP and its partners have delved into the world of artificial intelligence (AI). One of the most daunting tasks in conservation science is the time-consuming and tedious process of manually reviewing thousands, and sometimes millions, of photos taken on game cameras. We faced that challenge this year: we had over one million photos to process after a months-long study on rat presence and species interactions with our automated rat traps in the Alaka'i. To tackle this task, we implemented an AI tool called Zendo, created by the company DeepAI.

Zendo works by using a small subset of your photos to “train” the algorithm to detect the different items in each image. This involved using a couple hundred images and manually drawing the boundaries around the most common species and items in our game camera photos. In our case, this list included rats, mice, cats, pigs, deer, humans, traps, and of course birds. Once the algorithm was all trained, we imported our whole set of photos, and it gave us a set of images with only the various species we wanted to study. This effectively cut down our review process from one million image to only thirty thousand. Additionally, it allowed us to filter and home in on any species we wanted to view. We then took the process one step further with a software called Timelapse. This program allowed for quick and easy photo review, using the important species metrics we gathered from the Zendo algorithm.

What would have taken a large team months to complete took a small team only a couple of weeks of part time reviewing. The results are not perfect, as the algorithm will sometime mis-identify species or miss them entirely. However, it is a huge step forward for our analysis and paves the way for more accessible insights about species interactions on the landscape. A huge mahalo to all the partners, students, interns, and volunteers that helped with this project!