

PROGRESS REPORT

Quantifying Dispersal Behavior of Hawaiian Gallinules (*Gallinula chloropus sandvicensis*) to predict impacts of land use and climate change

October 2014 – August 2015

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Executive Summary: The authors received \$3000 from the Blake-Nuttall fund to support the 2015 summer field season studying the movement of the Hawaiian gallinule, an endangered, endemic wetland bird on the island of O`ahu, Hawai`i (USA). C. van Rees traveled to O`ahu on May 4, and remained there until July 22. During that time, 76 new individual birds were captured and banded, expanding a mark-recapture study started the previous year to approximately 183 individuals. Of these individuals, feather samples were taken from 75 birds for genetic analysis of population structure. van Rees and Reed started a collaboration with Dr. Eben Paxton (U.S. Geological Survey), who is constructing a network of automated telemetry towers to study the movement of two other waterbird species (Hawaiian stilt, *Himantopus mexicanus knudseni*, and Hawaiian coot, *Fulica alai*). They constructed a tower at a major Hawaiian gallinule habitat and deployed coded transmitters on 3 Hawaiian gallinules as part of a pilot study. The birds' movements are still being successfully detected using the tower and both state and federal agencies have tentatively committed funding to expanding the network of transmitter detection towers. On July 23, van Rees left Hawai`i and traveled to Anchorage, Alaska (USA) where he worked with research geneticist Dr. Sarah Sonsthagen (U.S. Geological Survey) to analyze feather samples collected in the field. All laboratory work was completed by August 11, and statistical analyses will be completed by August 28, when van Rees returns to Massachusetts. While in Hawai`i, van Rees mentored 3 undergraduate research assistants and two volunteer birdwatchers, including 3 women interested in pursuing careers in STEM fields and 3 individuals of Native Hawaiian descent.

Results narrative:

The following narrative is organized according to the objectives stated in our initial proposal in September 2014.

A. Continue capturing and banding Hawaiian gallinules on O`ahu and begin banding on Kaua`i

I (C. van Rees) captured and banded an additional 76 individuals on the island of O`ahu, but did not travel to Kaua`i. The principal reason for not meeting this objective is that it has become less important due to shifts in our study plan as my Ph.D dissertation research has matured. Because Kaua`i is not experiencing the rapid land use change and wetland loss that

O`ahu has, it is less relevant to our research on the effects of landscape change on wetland bird populations. Additionally, one of our colleagues, Dr. Jared Underwood (U.S. Fish and Wildlife Service) banded ~20 individuals there in spring 2015, and collected genetic samples which are available for our research purposes, so additional trapping on Kaua`i was not necessary. Of particular note is that though fewer birds were captured than in 2014, these birds were captured at 5 additional wetlands, more than doubling the number of habitats sampled. The number of sampled sites is more important for our research questions than the number of birds once the minimum of 5-10 birds has been captured at a given site.

B. Extensively survey wetlands on both islands to gather dispersal data on banded birds

Along with 3 undergraduate assistants, I surveyed all wetlands that were visited in the 2014 field season twice during 2015, and performed surveys at 9 additional wetland sites on the island, expanding the spatial breadth of our study. Perhaps more importantly, since September 2014, volunteer participation in our citizen-science project has increased, and over 100 resightings were submitted during the winter and spring seasons. One of these resightings included the first confirmed inter-wetland movement by a gallinule thus far in our study. The bird moved a distance of ~10 miles across heavily developed terrain, and we later confirmed its presence at the new location by capturing it in early July. Again, because Kaua`i is no longer a research priority, we surveyed wetlands only on O`ahu.

C. Tag and track select individuals using radio telemetry

Working with Dr. Paxton (USGS) and his assistants, I tagged 3 Hawaiian gallinules on O`ahu with coded radio transmitters. Rather than hand-tracking them as planned, we took advantage of a newly available resource provided by Dr. Paxton's funding from the Department of Defense; a growing network of automated telemetry towers. Dr. Paxton allowed my assistants and I to set up a tower at a major Hawaiian gallinule habitat, the James Campbell National Wildlife Refuge, and the tower has been logging detections of our transmitted birds throughout the summer. This successful pilot study is the primary motivation for our planned expansion of the automated telemetry project in summer 2016, when we hope to build additional towers and deploy transmitters on a larger portion of O`ahu's gallinule population.

D. Gather feather samples for genetic analyses

My assistants and I collected feather samples from 75 individuals at 9 different wetlands on the island during the 2015 field season. Our goal was at least 50 individuals at 10 wetlands. We did not meet our goal for number of wetlands due to permissions issues; the U.S. Marine Corps. required several months' notice to allow access to wetlands on their properties, and were not able to provide security clearance in time for the 2015 field season. This problem has been resolved

for the 2016 field season. 74 out of 75 feather samples were successfully genotyped at 13 microsatellite loci and two loci on the mitochondrial genome, allowing analysis of the spatial structuring of O`ahu's Hawaiian gallinule population and estimation of gene flow rates between wetlands. I will present our results at the Student Conservation Conference at the American Museum of Natural History in New York City in October 2015. Statistical analyses will be complete by late August 2015. This is nearly three months ahead of our submitted timeline, which slated data analysis for November 2015. Our results should be written and submitted by early spring 2016.

E. Enlarge and train a growing volunteer network for re-sighting banded birds

Throughout winter and spring 2014-15, I refined and improved the citizen science website for our gallinule tracking project (<http://sites.tufts.edu/hawaiianmoorhen/>) and communicated with volunteers on O`ahu. We received resighting information, including GPS coordinates submitted via our online sighting module and even pictures taken with volunteer's iPhones. I am currently working with Ian Davies to integrate our resighting database with eBird so that our data can be readily available to other researchers, and so that eBird users can contribute easily to our study. While on O`ahu, I trained 2 volunteer birdwatchers, both native Hawaiians, and was put into contact with Kupu, a Hawaiian non-profit similar to Americorps. I am currently in communication with one of their directors to place several underprivileged student volunteers with our project for the 2016 field season.

Outreach and broader impacts:

During summer 2015, I mentored 3 undergraduate students, all women, and one of Native Hawaiian descent, in the basic skills of field ornithology and ecology, including bird capture, handling, banding and measuring. These students also learned to measure various habitat variables pertaining to wetlands, to conduct point count surveys, and to identify common Hawaiian birds by sight and sound. Because I selected these students based on their interest in careers in ornithology, ecology, or conservation, I also provided career advice and contacts with future job prospects and/or academic programs. One mentee is already receiving tentative job offers from our collaborators at USGS. All three mentees will complete their bachelor's degrees in the spring, and one at Tufts University will continue to work with me on a related gallinule habitat use study in the fall as an independent project. Working with the Livable Hawaii Kai Hui, a nonprofit in the eastern Honolulu area, I wrote an op-ed piece that will be published in several local newspapers on the importance of studying birds and of citizen participation in conservation. Also working with the Hui, I was an invited speaker at their board of directors meeting, where I presented my research. In late July, I was featured in two additional episodes of the local access television program "Moanalua: East Oahu Communities Working Together". The episode that I filmed last year aired in late September 2014, and attracted the attention of many of the current

volunteers for our project. It can be viewed [here](#). The two new episodes should be airing later this fall. All three revolve around the implications and background of my research, the cultural and ecological importance of the Hawaiian gallinule and its wetland habitats, and how people can help participate in conservation research. Finally, I have begun working with Mardi Laprade, an elementary school teacher in Honolulu, in writing a series of children's books about Hawaiian gallinules. The first of these should be submitted to publishers by Summer 2016.

Funds expended:

100% of funding provided (\$3,000) was used to cover air travel (~\$1,100), housing (~\$1,600), and gasoline costs (~\$300). Funding for a rental vehicle and additional banding supplies was provided by graduate research fellowships I received through the Tufts Institute of the Environment and the Tufts Graduate School of Arts and Sciences. Funding for automated telemetry towers and related field equipment was provided by the U.S. Geological Survey and U.S. Fish and Wildlife Service.

Mahalo for your support!

