‘ELEPAIO

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Using ArcGIS as a Conservation Tool for Wedge-tailed Shearwaters (*Ardenna pacifica*) on O‘ahu, Hawai‘i

By Jennifer Urmston, M.S., Hawai‘i Pacific University

Abstract

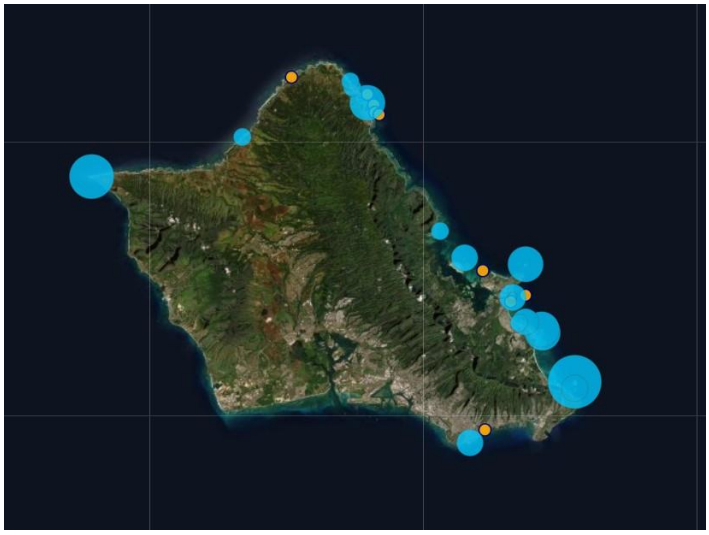
The following is a project summary by U.S. Fish and Wildlife Directorate Fellow, Jennifer Urmston. This project was conducted in the Summer of 2020 and was based in Honolulu, Hawai‘i. The objective of this project was to centralize data for wedge-tailed shearwater, ‘Ua‘u kani, breeding colonies on O‘ahu and to create educational outreach materials. This was accomplished by creating two ArcGIS products; a web map and a story map. These products provide background information on ‘Ua‘u kani and site-specific information regarding population trends, threats, and conservation measures. The web map and story map can be used as tools to guide future conservation of ‘Ua‘u kani on O‘ahu.

‘Ua‘u kani on O‘ahu

The ‘Ua‘u kani, or wedge-tailed shearwater (*Ardenna pacifica*) is an iconic and abundant species throughout the Hawaiian Islands, with populations on O‘ahu exceeding 40,000 breeding pairs. However, the continued success of breeding populations is not guaranteed. Climate change, urbanization, and invasive species pose threats to seabirds globally that could lead to a reduction in food supply, loss of suitable habitat, and increased predation (Dias et al., 2019). Similar species such as the Newell's shearwater (*Puffinus newelli* or ‘A‘o) have seen dramatic population declines and are now listed as endangered by the IUCN (Raine et al., 2017). In order to prevent future declines to ‘Ua‘u kani populations, it is important to know where nesting colonies are located, the threats these colonies face, and the conservation measures being used to address these threats. Summarizing this information can be challenging because colonies on O‘ahu are managed by different entities including federal and state government agencies, non-profits, and academic institutions. By partnering with the groups responsible for monitoring ‘Ua‘u kani colonies, we created two ArcGIS products; a web map that displays information specific to each colony and a story map to provide outreach materials about ‘Ua‘u kani. Our objective was to provide useful materials for the general public, researchers, managers, and developers that will guide future conservation of ‘Ua‘u kani on O‘ahu .

Web Map

ArcGIS web maps are a versatile tool that have been used to display information such as traffic patterns, active wildfires, and more recently, prevalence of Covid-19 cases (*https://livingatlas.arcgis.com/en/browse/#d=2*).



ArcGIS web map displaying known and suspected ‘Ua‘u kani breeding colonies.

We used a web map as an interactive platform to display all of the known ‘Ua‘u kani breeding colonies on O‘ahu.

Prior to this project, no comprehensive map or list of ʻUaʻu kani breeding colonies was available to the public. Colonies are represented by a blue circle, where the size of the circle is relative to the population and small yellow circles indicate suspected breeding colonies, where breeding has not been confirmed, but is highly likely. Each colony features a pop-up window when the circle is clicked on, which includes information such as the jurisdiction, breeding pair estimates, invasive species, and conservation efforts.

The web map also features several GIS layers that have conservation implications for ʻUaʻu kani. One concern is stranding due to attraction to artificial light, also known as "fallout".

To address this, we included the layers: nighttime irradiance, major roads, and fallout hotspots. Fallout hotspots are identified on the map in the most problematic areas, but users can predict other areas where fallout may occur by overlaying the nighttime irradiance layer and the colony points. Stranded shearwaters are commonly found in brightly lit areas near the colony, particularly on roads with many streetlights (Friswold et al., 2020).

Another concern for ʻUaʻu kani on Oʻahu is loss of habitat due to urbanization and development. While many birds nest on offshore islets, there are several colonies on the coast that are threatened by human disturbance. Since ʻUaʻu kani nest in underground burrows, many colonies go unnoticed, and can be unintentionally destroyed during construction.

To give users a sense of where ʻUaʻu kani may be nesting, we included the layer "Possible Nesting Area" which includes habitat types that ʻUaʻu kani are known to nest in, within a 100-meter distance of the coastline. This map also includes layers for the Oʻahu coastline and elevation contours, which may help users with visualizing ʻUaʻu kani distribution on Oʻahu.

Story Map

Our second product was an ArcGIS story map which aimed to teach members of the general public about the life cycle of ʻUaʻu kani and the threats they face on Oʻahu. Information about the timing of different life stages of the ʻUaʻu kani helps users to predict when and where to expect nesting adults, eggs, chicks, and fledglings. Next we provide an overview of threats ʻUaʻu kani face on land including light pollution, habitat destruction, and invasive predators. Furthermore, there is an introduction to the web map with a layer-by-layer tutorial that guides users on how to effectively utilize the map. Finally, we offer suggestions for how to help protect ʻUaʻu kani such as reducing unnecessary lighting, keeping pets indoors during breeding season, and planning construction activities to avoid disturbance to nesting birds.

A wedge-tailed shearwater, ʻUaʻu kani, resting on Popoiʻa Island, Kailua, Oʻahu, photo credit Travis Catero.

Conclusion

As climate change and urbanization continue to pose new challenges for Hawaiian seabirds, it is important to find innovative conservation solutions.

The accessibility and dynamic nature of ArcGIS web maps and story maps make them excellent tools for tracking seabird colony trends. This story map provides a background on ʻUaʻu kani on Oʻahu, an introduction to the web map, and suggestions for ways to help protect the birds.

The web map can be used by researchers or rehabbers interested in fallout patterns, by developers attempting to avoid interfering with nesting birds, or anyone who is interested in the threats and conservation concerns regarding ʻUaʻu kani colonies on Oʻahu. These products can be used to guide conservation of ʻUaʻu kani on Oʻahu and may be updated as new information is made available.

To access the Web Map and Story Map please visit the following links:

Web Map: *https://arcg.is/1fqTOP0*
Story Map: *https://arcg.is/5LbuS*

References

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Seeking Nominations for 2022 Board of Directors

HAS members: would you like to serve on the Hawaii Audubon Society's Board of Directors? Board members are volunteers who attend meetings, vote on decisions, conduct business, participate in a wide variety of discussions and learning experiences, lead field trips and educational activities, work on projects and committees, and advocate and support the HAS mission to foster an ethic of stewardship for Hawaiʻi's natural resources. Nominating Committee members are John Harrison, Colleen Soares, and Elizabeth Kumabe-Maynard.

Please email a letter of interest to the Nominating Committee at hiaudsoc@gmail.com prior to the next HAS Board meeting on Sep 20. The HAS Bylaws require that "to be nominated, a person must have been a member of the Society for at least five (5) continuous years prior to the date of election, be a Hawaiʻi resident, attended at least one Board meeting and one field trip and must have given written consent. The five-year membership requirement may be set aside on a case-by-case basis if approved by the Board of Directors."

Prospective nominees should attend the next Board meeting on Sep 20 at 850 Richards Street, Suite 505, Honolulu, at 6:30 pm so you can meet the Board and the Board can meet you. The Nominating Committee will submit its recommendations to the HAS Board of Directors at the next meeting.

Lawsuit Aims to Protect Threatened Iconic Hawaiian Forest Bird

Magnificent ʻIʻiwi Needs Critical Habitat, Recovery Plan

The following article is a press release, which was first published on *https://biologicaldiversity.org/w/news/press-releases/lawsuit-aims-to-protect-threatened-iconic-hawaiian-forest-bird-2021-03-03/* on March 3, 2021.

HONOLULU - The Center for Biological Diversity today (Mar. 3, 2021) sued the U.S. Fish and Wildlife Service for failing to designate critical habitat and develop a recovery plan for the threatened ʻiʻiwi, the best known of Hawaiʻi's imperiled honeycreepers.

ʻIʻiwi are medium-sized Hawaiian forest birds known for their iconic bright red plumage, black wings and distinctive long, curved bill. Because of the extensive threats of mosquito-borne diseases, rapid ʻōhiʻa death — an invasive fungal disease that is killing ʻōhiʻa trees at an alarming rate — and climate change, the Service listed the ʻiʻiwi as threatened on Sept. 20, 2017.

The Endangered Species Act required the agency to designate critical habitat with its listing determination and develop a recovery plan for the bird. Yet the Service has failed to do so.

"The beautiful ʻiʻiwi needs our help and it needs it now," said Maxx Phillips, the Center's Hawaiʻi director and staff attorney. "The U.S. Fish and Wildlife Service's foot-dragging is unacceptable. Without the protections provided by critical habitat and a valid recovery plan, ʻiʻiwi will continue down a heartbreaking path towards extinction."

The ʻiʻiwi was once one of the most abundant native forest birds across Hawaiʻi. Unfortunately, it now persists on only three islands, with the population on Kauaʻi likely to go extinct within 30 years.

Like many native Hawaiian forest birds, ʻiʻiwi have an extremely low resistance to avian malaria, with an average 95% mortality rate. The combination of low resistance and high mortality means that nearly every ʻiʻiwi that comes into contact with avian malaria dies from the disease.

Since mosquitoes can't live at higher elevations because of cooler temperatures, ʻiʻiwi have survived in higher-elevation forests. But as the impacts of global climate change continue to accelerate, temperatures at higher

elevations in Hawai‘i are increasing at an unforeseen rate. This warming allows mosquitoes to expand their range into higher elevations, bringing with them avian malaria and avian pox. Additionally, the virus that causes avian malaria survives better in warmer temperatures, meaning warmer high elevation habitats will no longer be safe refuges from the disease.

'I'iwi - Vestiaria coccinea, photo credit Dan Clark/US Fish and Wildlife Service.

“The future looks grim for ‘i‘iwi if we don’t act now,” Phillips said. “These rare birds deserve protected habitat and a valid plan to guide their recovery and prevent them from vanishing forever. In particular, we have to restore forests at higher elevations on the Big Island to give ‘i‘iwi space to move uphill and do whatever we can to control mosquitoes on all the islands.”

The lawsuit was filed in U.S. District Court for the District of Hawaii.

Background

Listing the ‘i‘iwi as threatened in 2017 was just the first step in ensuring its survival and recovery. Species without designated critical habitat are half as likely to move toward recovery as species with critical habitat. Without protections for its critical habitat, the ‘i‘iwi will continue to lose what little disease-free forest habitat remains. Additionally, species with timely recovery plans for two or more years are far more likely to improve than those without. Alongside the devastating impacts of mosquitoes and climate change, rapid ‘ōhi‘a death is further threatening the ‘i‘iwi’s survival. ‘I‘iwi depend on the ‘ōhi‘a for nesting and foraging, surviving primarily on the nectar from lehua blossoms. Though originally limited to the island of Hawai‘i, as of June 2020, rapid ‘ōhi‘a death has spread to Kaua‘i, Maui and O‘ahu. Since there is no effective means of containing the disease, ‘ōhi‘a forest death poses a significant risk to the continued survival of the ‘i‘iwi.

Hawaiian forest birds, one of the most imperiled groups of birds in the world, are in crisis. Some 68% of Hawai‘i’s known endemic bird species have already gone extinct because of habitat loss, disease and invasive predators. Of the remaining 37 surviving endemic species, 33 are currently listed under the Endangered Species Act, although nine of these have not been observed recently and are thought by scientists to be extinct. Introduced mosquitoes and the diseases they carry are primary causes of the loss of all these birds.

END

HAS Annual Meeting & Members Dinner 2021

This year’s main event is currently planned for Wednesday, November 17.

The theme will be

*“**80 Years of the Hawaii Audubon Society**”.*

HAS Board Secretary Susan Scott will give a presentation based on selected scanned documents and photos from the past. We also plan to give out awards to especially deserving members of the community.

Due to the ongoing pandemic, this event will be held virtually.

Please check the HAS website closer to the date as well as the Nov/Dec ‘Elepaio for more details.

We very much appreciate a donation of any amount!

World Albatross Day

This year's World Albatross Day (WAD) was celebrated on June 19 under the motto, "Ensuring Albatross-friendly Fisheries". Thousands of albatrosses are dying every year as a result of fishing operations. These magnificent birds get caught on hooks, become entangled in nets and collide with trawl cables, leading to death by drowning or injury. Solutions are available to address this conservation crisis. WAD 2021 aimed both to draw attention to the problem and to highlight best-practice solutions, such as the use of bird-scaring lines in both longline and trawl fisheries, line weighting and night setting or use of hook-shielding devices by longliners and management of offal discharge by trawlers. For more information, go to *https://www.acap.aq/world-albatross-day/wad2021-ensuring-albatross-friendly-fisheries*

It marked the twentieth anniversary of the signing of the Agreement on the Conservation of Albatrosses and Petrels (ACAP). ACAP is an international agreement which strives to conserve albatrosses and petrels and coordinates international activities to reduce threats to their populations. It currently has 13 member countries and lists 31 species, made up of 22 albatrosses, seven petrels and two shearwaters, most of which have a global threatened status: *https://www.acap.aq/en/resources/acap-species*

Currently, the US is not part of the Agreement. Earlier this year, a bipartisan Albatross and Petrel Conservation Act was introduced that would implement this international conservation agreement: *https://www.acap.aq/latest-news/3233-the-usa-makes-a-new-attempt-to-become-a-party-to-the-albatross-and-petrel-agreement*

Freeman Seabird Preserve

Annual Active Nest Count 2021

The 13th Annual Wedge-tailed Shearwater active nest (defined as an adult bird sitting on an egg) count was conducted on July 14. Led by Hawai'i Pacific University (HPU) Professor David Hyrenbach, Ph.D., the count participants included HAS Board members, habitat restoration volunteers, representatives from Oikonos (*https://oikonos.org*), and HPU. This year's count showed 407 active nests. Over half (220) of these nests were found on the upper terrace of the Preserve, where habitat restoration projects (native plantings and introduction of a variety of rock, tile and ceramic burrows) have been ongoing since 2009.

There has been an increase in active nests at FSP every year, with 358 active nests in 2020 and 318 in 2019.

Kolea Count Update

by Susan Scott, Kolea Count project manager

Nowhere else in the world do migratory shorebirds live in harmony with humans the way our Kōlea have learned to do. (Bravo, Kōlea.) Researchers, however, have little data about the birds' numbers, locations, and comings and goings. Now, thanks to hundreds of Hawai'i's devoted plover lovers, our 2020 trial of counting and monitoring Kōlea was successful, and we're continuing the study long-term You can help our extraordinary shorebirds by participating in the ongoing project at *www.koleacount.org*.

Pilot study numbers in brief:

- 611: number of people who made entries
- 4,196: number of bird observations reported
- O'ahu: island with the most reports
- 167: Number of Kōlea with given names (Sir Lancelot, Bob, etc.)

To find out about pilot study numbers in detail: Go to *www.koleacount.org/news* to see graphs of counts by months, islands, zip codes and more.

Special thanks to volunteer, Dr. Brad Schultz, for organizing the spreadsheet into such a comprehensive (and attractive) analysis, and for counting hundreds of Kōlea on O'ahu while visiting.

Hui Manu-o-Kū Update

by Rich Downs

Amazing what a little piece of ribbon can do! The Hui Manu-o-Kū partners with the Dept. of Land and Natural Resources/Division of Forestry and Wildlife to place blue ribbons on trees where white terns are actively nesting to protect this special population of terns that for decades now

has been breeding in the greater Honolulu area.

The **blue ribbon project** was started a couple years ago after discovering that some amount of breeding takes place year-round now on Oʻahu. Scheduling necessary work in the community around the nesting activity of the growing population of terns on our island was becoming less and less feasible. So the idea was hatched to flag trees with nesting activity so we, the humans who share this space with them, can do what needs to be done while minimizing risk to the terns.

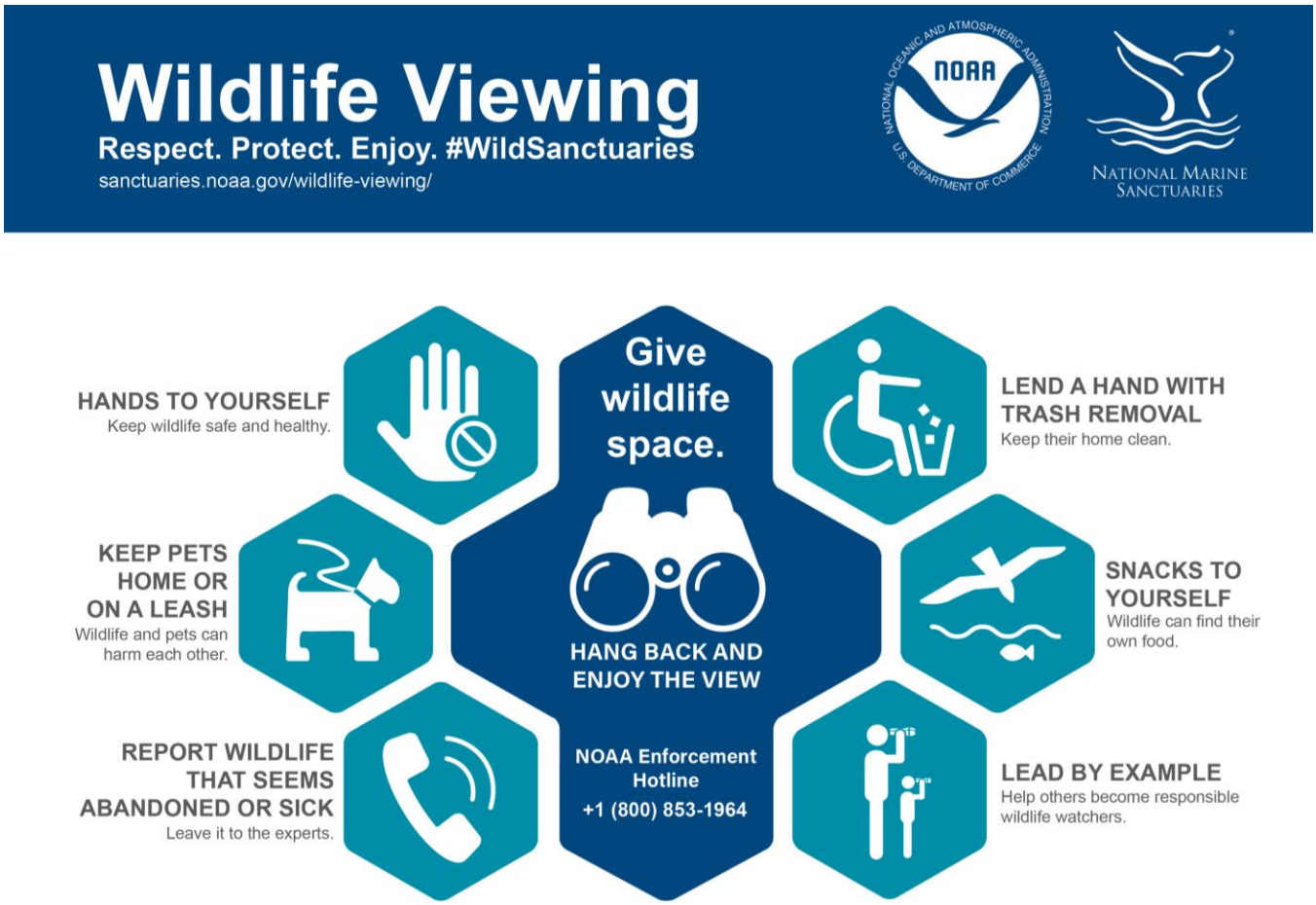
Photo credit Rich Downs

The message the blue ribbons is intended to communicate to anyone working in a tree with nesting terns is for them to do what they need to do, but to be careful of the terns nesting there. With the help of its partners and volunteers the Hui Manu-o-Kū is finding ways for the remarkable story of the white terns of Oʻahu to continue to be a story of terns and people not just living but thriving together. To learn about opportunities to volunteer with the Hui Manu-o-Kū call or text the Manu-o-Kū Hotline (808-379-7555) or email them at huimanuoku@gmail.com.

View Wildlife Responsibly!

As travel restrictions implemented by COVID-19 ease in most parts of the world, National Parks and Wildlife Sanctuaries are being overcrowded by people excited to get back out again.

The National Oceanic and Atmospheric Administration (NOAA) developed guidelines for "Responsible Wildlife Viewing" to educate the public to prevent human/wildlife conflict while promoting positive and memorable experiences. The graphic below and more information on how to view wildlife the correct way can be found on *sanctuaries.noaa.gov/wildlife-viewing.*



Hawaii Audubon Society Membership/Donation Form

The mission of the Hawaii Audubon Society (HAS) is to foster community values that result in the protection and restoration of native wildlife and ecosystems and conservation of natural resources through education, science and advocacy in Hawai‘i and the Pacific. Founded in 1939, HAS is an independent non-profit 501(c)(3) organization and does not receive dues paid to the National Audubon Society. Thank you for supporting your local Hawaii Audubon Society.

☐$25 Hawaii Audubon Society Regular Member
☐$15 Hawaii Audubon Society Student Member
☐$40 Hawaii Audubon Society Family Membership
☐$100 Hawaii Audubon Society Supporting Member

International Membership:
☐$28 Canada & Mexico
☐$33 Other

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Donations are tax-deductible and greatly appreciated.

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Email: hiaudsoc@gmail.com *http://www.hawaiiaudubon.org* Phone: (808) 528-1432

Mahalo for your concern and commitment to protecting Hawai‘i’s native wildlife and ecosystems.

Announcements

Welcome Home to Shorebirds
Paikō Lagoon Wildlife Sanctuary

September 18, 2021, 8 am, meet on Kuli‘ou‘ou Road

Enjoy fall at Paikō! Let’s welcome our unique and beautiful migratory shorebirds as they return from their extensive travel to enjoy the Hawaiian Islands for the fall and winter months.

RSVP: MermaidsHI@aol.com
Leader: Alice Roberts

Manu Minute

Each week, Hawai‘i Public Radio (HPR) features a different Hawai‘i bird and its song and talks about its environment and conservation. Manu Minute is a collaboration between HPR and LOHE (Listening Observatory for Hawaiian Ecosystems) Bioacoustics Lab at the University of Hawai‘i at Hilo:
https://www.hawaiipublicradio.org/podcast/manu-minute

‘Elepaio Submissions

We are accepting submissions for the ‘Elepaio. Please send us your scientific articles, short stories, poems, observations, and photos! For submission guidelines go to: *https://www.hawaiiaudubon.org/elepaio-submission-guidelines*

Keep Cats SAFE INDOORS!

Keep them and the birds safe.

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While shopping at any Foodland, Foodland Farms, or Sack N Save in September, please consider making a donation to HAS. A portion (up to $249) will be matched by Foodland Hawaii. Use your Maika‘i Card and tell the cashier our **Organization ID Code: 77189.**

Amazon Smile

Also, support HAS year-round through Amazon’s Smile program. Amazon will donate 0.05% of your purchase.

Go to *http://smile.amazon.com/ch/99-6006829* and designate Hawaii Audubon Society as your charity.

MAHALO FOR YOUR SUPPORT!