

BIRD CONSERVATION

The Magazine of American Bird Conservancy

Spring 2015



Tributes and Troubles in the Bird Extinction Capital

Spring is in full swing with the heartening return of migratory birds. Tree Swallows and Chimney Swifts are among the earliest arrivals here in the Washington, D.C., area. Even so, I'm still thinking about the memorable 20th anniversary event we shared last January with some of our most steadfast friends and supporters.

Our guest speaker, Kenn Kaufman, a birding and bird conservation luminary, gave an overview of ABC that was wonderful, flattering, and moving. We bestowed awards on the National Fish and Wildlife Foundation (NFWF) for its almost incalculable impact on bird conservation in this hemisphere and to the Cornell Lab of Ornithology for its eBird program, which may be the greatest citizen science program of all time.

I also presented my personal "top ten best ABC moments" at our celebration. We have accomplished a lot in 20 years, and it was tough to choose only ten. But I did it, listing victories such as cancellation of bird-killing pesticides like monocrotophos, which was killing thousands of Swainson's Hawks in Argentina; our first international reserve project at El Carricito, Mexico (the first of a network now numbering more than 66 reserves); and persevering through a ten-year fight to get lighting changes on communications towers to reduce bird collisions.



Millerbird by Robby Kohley

My number one? The translocation of Millerbirds in the Northwestern Hawaiian Islands. During 2011–2012, in collaboration with several partners, ABC moved 50 Millerbirds from Nihoa Island over 625 miles by ship to establish a second population on Laysan Island. Every bird survived the journey, and the new population has more than tripled in size—a reassuring back-up population for this rare species.

That's not all we have done in Hawai'i—also known as the world's extinction capital. NFWF support has also enabled ABC and its partners to turn the tide for the declining Palila and restore habitat for a future new population of Maui Parrotbills. We have supported rat trapping to protect Kaua'i's forest birds; sought

better protection for Newell's Shearwaters and Hawaiian Petrels on Kaua'i and Hawai'i Island; worked to reduce the impacts of feral and free-ranging cats; and much more.

I am proud of what ABC has accomplished in Hawai'i, and as much as anything, proud of how we have done it. Consistently, our approach has been to forge partnerships that are respectful, collaborative, and that lead to more lasting conservation actions. That's a solid foundation for the next 20 years.

So, enough of patting ourselves on the back; it is time to move forward. Serious threats remain and there is much more to do. Most Hawaiian birds are in trouble and far greater private and public resources are urgently needed to reverse their declines.

Our Hawaiian birds can be saved, but only with a strong, collaborative, public-private effort. I ask all lovers of Hawai'i and its incredible birds: How can we bring much greater resources to bear? As the contents of this magazine will attest, we need your help.



A handwritten signature in black ink that reads "George".

George H. Fenwick
President, ABC



ABC is the Western Hemisphere's bird conservation specialist—the only organization with a single and steadfast commitment to achieving conservation results for native wild birds and their habitats throughout the Americas.

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Senior Editor: Libby Sander

VP of Communications: Clare Nielsen

Graphic Design: Gemma Radko

Editors: Chris Farmer, Jack Morrison, Hannah Nevins, George Wallace

For more information contact:

American Bird Conservancy
4249 Loudoun Avenue
P.O. Box 249
The Plains, VA 20198
540-253-5780

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Hawaiian Petrel on Maui. This was a grounded chick about to be released. Photo by Jay Penniman

Top photo: Maui 'Alauahio (Maui Creeper) by Hayataro Sakitsu

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Endangered Laysan Ducks Translocated to Kure Atoll

Twenty-eight endangered Laysan Ducks were successfully translocated from Midway Atoll National Wildlife Refuge to Kure Atoll State Wildlife Sanctuary, both within the Papahānaumokuākea Marine National Monument, in September 2014. Staff at Kure Atoll have confirmed that, as of February 2015, all of the birds were alive—a great step forward for this declining species.

A team of wildlife biologists from the Hawai'i Department of Land and Natural Resources (DLNR), U.S. Fish and Wildlife Service, U.S. Geological Survey, and the Hawai'i Wildlife Center captured and cared for the juvenile birds during the translocation to Kure aboard the U.S. Coast Guard cutter Kukui. The DLNR had eradicated rats on Kure in 1993 and conducted other necessary habitat restoration efforts before the ducks' arrival.

"This translocation by Dr. Michelle Reynolds and her team have made the future of the highly endangered Laysan Ducks much more secure. This complicated, multi-agency process went incredibly smoothly and is a great example of the conservation successes we can achieve through collaborative efforts in Hawai'i," said Chris Farmer, ABC's Hawai'i Program Director.

The Laysan Duck once occurred throughout the Hawaiian archipelago, but like other Hawaiian birds, it was extirpated

from most of the islands following the arrival of humans and the introduction of mammals. For 150 years, the duck's population was confined to one small remote atoll, Laysan Island, and declined to near-extinction following the introduction of rabbits there in 1905. Fortunately, after rabbits were eradicated the population rebounded to approximately 500 ducks.

To reduce the high extinction risk associated with small, single-island populations, Laysan Ducks were reintroduced to Midway Atoll in 2004–2005, and that population grew to some 500 ducks by 2010. However, the Tōhoku tsunami of 2011 hit Laysan and Midway hard, and Laysan Duck populations declined by approximately 40 percent. In addition, severe avian botulism outbreaks at Midway Atoll in 2011 and 2013 emphasized the urgency



U.S. Coast Guard Ensign Kane holds open the door of a transport box as John Klavitter (USFWS) places a duck inside its transport cage for translocation to Kure Atoll State Wildlife Sanctuary. Photo by Eric Dale/USFWS Volunteer, 2014

of restoring additional populations to reduce the risk of extinction.

A second translocation from the source population at Laysan Island has been proposed and will be started when circumstances allow.



Laysan Ducks by John Klavitter, USFWS

'Apapane by Jack Jeffrey



HELP ABC MAP A FUTURE FOR HAWAIIAN BIRDS

In the race to prevent any further bird extinctions in the Americas, there is simply no greater priority than the native birds in our nation's 50th state, Hawai'i. For some species, such as the Millerbird on Laysan Island, we are winning, but for others, such as the forest birds of Kaua'i, we must pick up the pace. ABC needs your help to keep these and other threatened Hawaiian birds on the map.

Will you join ABC and our partners in mapping a future for Hawaiian birds? Right now, ABC and a team of generous supporters are offering a dollar-for-dollar challenge match for these birds' protection. Each extra gift made for the challenge between now and June 30 will be matched, up to \$150,000.

Your extra support will make a real difference, helping ABC

bring back the stunning golden māmane trees of Mauna Kea for Palila; prepare habitat for the translocation of Maui Parrotbills to expand their range; and remove predators from the Alaka'i Plateau of Kaua'i for the 'Akikiki, 'Akeke'e, and Puaiohi.

We still have the opportunity to save Hawaiian birds, but their future is not assured without action!

Please donate today using the enclosed envelope or online at support.abcbirds.org/Hawaii. Thank you for your support!

Wind Energy in Hawaiian Islands Poses Additional Threat to Endangered Birds

ABC has been closely monitoring wind energy development throughout the Hawaiian Islands with growing concern. As in many other U.S. states, the industry's rush to build more and bigger turbines is often undertaken without a thorough assessment of the risks to ecologically important, federally protected birds in the surrounding areas.

Hawai'i's high energy costs also provide strong incentives to develop alternative energy resources. In response, the state has developed a Clean Energy Initiative that seeks to provide 40 percent of all energy from locally produced renewable energy sources, such as wind and solar.

Reports from 2014 showed that Nēnē (Hawaiian Goose) and Hawaiian Petrel ('Ua'u), both protected by the Endangered

Species Act (ESA), were among hundreds of birds killed by wind turbines on Maui and O'ahu over a seven-year period. Now, an even larger proposed project on Maui in the vicinity of the Nakula Natural Area Reserve may threaten the Hawaiian Petrel and Nēnē there.

Although it is illegal to kill an endangered or protected species under the ESA and the Migratory Bird Treaty Act (MBTA), wind energy facilities are allowed to operate under incidental take permits granted by the U.S. Fish and Wildlife Service (USFWS) under the ESA. No such permit is currently available under MBTA, and the law is seldom enforced. ABC has encouraged USFWS to consider placing a moratorium on wind energy development in the Hawaiian Islands, especially near important habitats for endangered



Kaheawa wind farm on Maui is one of the largest in Hawai'i. Photo from Wikipedia

birds found nowhere else, until a thorough assessment of its impacts can be conducted.

"Of all the states, Hawai'i has perhaps the greatest incentive to move toward renewable energy because conventional sources, such as oil and gas, have to be shipped in at great expense," said Michael Hutchins, Director of ABC's Bird Smart Wind Energy Campaign. "However, the archipelago's endangered birds do not need another major threat, so it is critical that wind energy facilities in Hawai'i are sited properly."

Mahalo (Thanks) to our Hawaiian Partners

ABC prides itself on collaborating with on-the-ground partners for greater conservation results in Hawai'i. The following groups represent some of the most committed, hard-working people and organizations in Hawaiian conservation—we are proud to work with them!

Center for Biological Diversity
Conservation Council for Hawai'i
Division of Forestry and Wildlife, Hawai'i
Department of Land and Natural Resources
Earthjustice
Hawai'i Cooperative Studies Unit,
University of Hawai'i - Hilo
Haleakalā National Park
Hawaiian Islands National Wildlife
Refuge, USFWS
Hawai'i Volcanoes National Park
Hui Ho'omalua i ka'Āina
Island Conservation

James Campbell National Wildlife
Refuge, USFWS
Kaua'i Albatross Network
Kaua'i Endangered Seabird Recovery
Project
Kaua'i Forest Bird Recovery Project
Kīlauea Field Station, Pacific Island
Ecosystems Research Center, USGS
Kīlauea Point National Wildlife Refuge,
USFWS
Maui Forest Bird Recovery Project
Maui Nui Seabird Recovery Project
Mauna Kea Forest Restoration Project

National Fish and Wildlife Foundation
Oikonos Ecosystem Knowledge
Pacific Cooperative Studies Unit,
University of Hawai'i - Mānoa
Pacific Islands Climate Change
Cooperative
Pacific Islands Fish and Wildlife Office,
USFWS
Pacific Rim Conservation
Papahānaumokuākea Marine
National Monument
San Diego Zoo Global
University of Hawai'i - Mānoa

Small Invaders, Big Problems



By Chris Farmer

One of the biggest problems facing Hawaii's endemic birds is invasive species: plants and animals from other areas of the globe whose populations dramatically increase in their new island home.

Miconia (a large tree), strawberry guava, and many other plants outcompete and replace Hawaii's native plants.

Grazing mammals degrade and destroy the forests. Cats and mongooses prey upon the birds. Even smaller, less noticeable invaders such as ants can have great impacts on native ecosystems, especially on seabirds.

No People, No Ants

The Hawaiian chain is one of the most isolated groups of islands in the world, and before people arrived there were no ants. Over the last two centuries roughly 57 ant species have become established on the various islands, and at least four ant species have had particularly profound effects on native insects, spiders, and the larger ecological communities.

The most troublesome species include the big-headed, tropical fire, Argentine, and yellow crazy ants. These ants are so successful because they eat a wide variety of plants and animals. They

form multi-queen nests and have multiple nests that form a single “supercolony,” resulting in very large numbers. They also display very low aggression within their species but high aggression to arthropods and other animals.

The Predator Problem

The problem is exacerbated by the lack of predators or parasites of ants that would be present in their original ranges to keep them in check.

Colonies can reach incredibly high densities on the islands. As a result, invasions by these ant species alter food webs, reduce native insect food available for birds, and decrease the abundance of native plants and their pollinators. They can eat plant seeds and reduce the number of native bees and moths that pollinate the native plants, thereby lowering the number of seeds produced.

Ants will also exclude pollinators from nectar sources such as 'ōhi'a blossoms, which also lowers the



Wedge-tailed Shearwater showing severe ant damage to the eye and bill. Photo by Sheldon Plentovich/USFWS.

number of seeds produced.
(See story on page 30.)

Ants and Seabirds

Seabirds in the Hawaiian Islands did not evolve with ants present, so they have no defenses against the invaders. Big-headed ants will chew, and tropical fire ants will sting birds' exposed fleshy parts. Yellow crazy ants spray formic acid and irritate exposed areas such as the eyes, bill, and feet.

The injuries to nesting seabirds can be extreme, including loss of webbing on their feet, malformed bills, difficulty breathing (due to injury to the nasal cavity), and inflamed eyes or overgrowth of skin around the eye that can lead to blindness. Adult birds will sometimes fly away to avoid the ants or abandon their nest sites completely, but if somehow they do persevere during incubation and hatch their eggs, the chicks are unable to escape and suffer countless attacks

INVASIVE ANTS: A Closer Look



Big-headed ants (*Pheidole megacephala*), originally from Africa, likely eliminated whole suites of insects and other arthropods at the turn of the 19th century.



Yellow crazy ants (*Anoplolepis gracilipes*) arrived in 1952 from the Old World tropics and have had large-scale effects similar to those of big-headed ants.



Wedge-tailed Shearwater chick with near total loss of the webbing on its feet from invasive ants. Photo by Sheldon Plentovich/USFWS.

by ants. These injuries translate into reduced fledgling success and in some cases cause abandonment and even permanent loss of the breeding colony.

Sheldon Plentovich, U.S. Fish and Wildlife Service's (USFWS) Coastal Program Coordinator, has spent many years studying the impacts of ants on seabirds. "The effects of ants can be catastrophic to the breeding seabirds and are going to become more common as these

highly invasive species spread," she said.

USFWS Taking Action

Plentovich is involved in several projects to eradicate ants from selected Hawaiian Islands. An important one is on Johnston Atoll, located in the Pacific Remote Islands Marine National Monument. This is the only rat-free area for about 750,000 square miles of the Pacific Ocean. As a result, the islands support huge numbers of breeding Red-tailed Tropicbirds, Sooty Terns, Red-footed Boobies, Wedge-tailed Shearwaters, Great Frigatebirds, and many other seabird species.

Unfortunately, Johnston was also home to a huge population of yellow crazy ants. Nests with 800 to 1,000 queens—more than three times the density in their native habitat—were producing huge numbers of ants, with widespread negative impacts on the seabirds.

USFWS established the "Crazy Ant Strike Team" on Johnston Atoll in

2010 to lead an aggressive effort to eradicate the yellow crazy ants. They have had great success, reducing ant abundance to less than five percent of the original population.

Achieving complete eradication has been complicated by Johnston's remote location, difficult terrain, and ant baits that have not been as effective here as at other sites. The committed team continues to test, modify, and deploy new baits and approaches that they hope will eventually remove the last yellow crazy ant queen.

Battling Yellow Crazy Ants Around O'ahu

Ant problems also exist on most of the approximately 15 small islets off the coast of O'ahu. While the smaller sizes of the islets means that eradication might be more feasible than on the larger islands, careful study needs to precede any management actions. When big-headed ants were removed from Mokuauia, for example, the population of the even more problematic yellow crazy ants exploded.

"We have to be careful when implementing ant control measures because the removal of one species leaves resources available for other invaders, including more harmful ant species," said Plentovich of her experiences on the offshore islands.

Yellow crazy ants are also a problem on O'ahu itself. These ants are reducing nesting success and causing significant abnormalities in Wedge-tailed Shearwater chicks at Kāne'ohe Bay. USFWS will conduct focused



Tropical fire ants (*Solenopsis geminata*) arrived in the late 1800s from the southeastern United States or Central America. They harvest seeds, but also prey upon invertebrates and smaller vertebrates, including bird nestlings.



Argentine ants (*Linepithema humile*), originally from South America, negatively impact native species in the relatively intact habitats of the mid and high elevations, which are critical for the remaining forest birds of Hawai'i.

control of yellow crazy ants at Kāne'ohe and Mokuauia during the upcoming shearwater breeding season to reduce impacts to the chicks.

Plentovich hopes that the ants' impacts can be curtailed. "I am optimistic we can control yellow crazy ants in these colonies and allow these seabirds to return to their preinvasion breeding levels," she said.

Unwelcome Arrivals

Unfortunately, new species continue to arrive in the state. The little fire ant arrived on the Big Island in 1999 and is damaging crops, promoting pest insects, and aggressively stinging people and pets. This ant species subsequently spread to Kaua'i, where a large infestation is being actively controlled by the state of Hawai'i.

The Kaua'i infestation is already a problem for all the birds breeding in this area. Continued ant control and containment is particularly important because other critical locations are nearby, including Kīlauea Point National Wildlife Refuge, a key seabird site and location of a predator-proof fence built to benefit nesting Hawaiian Petrels and Newell's Shearwaters. (This fence was constructed by Pacific Rim Conservation, ABC, and the U.S. Fish and Wildlife Service with National Fish and Wildlife Foundation support.)

Several little fire ant infestations have also been found on Maui and O'ahu. Although the ants are no longer detected at some smaller sites, populations in larger areas

have only been contained so far. New outbreaks continue to occur, with the latest being this January on Maui, indicating that the current quarantine and inspection measures are insufficient.

A Tipping Point?

The constant influx of invasive species—ants as well as all the other groups of organisms—is one of the most serious problems facing Hawai'i's native species. Gov. David Ige recognized this when he proclaimed Invasive Species Awareness Week on March 4. The state's legislature acknowledged this last year,

The constant influx of invasive species—ants as well as all the other groups of organisms—is one of the most serious problems facing Hawai'i's native species.

and said that invasive species are "the single greatest threat to Hawai'i's economy and natural environment and to the health and lifestyle of Hawai'i's people."

Even with this support, the Hawai'i Department of Agriculture is underfunded and does not have the resources necessary to inspect all the goods coming into the islands.



USFWS technician applying bait to yellow crazy ant colonies on Johnston Atoll. Photograph by USFWS.

Until more rigorous inspections of cargo, including shipments between the islands, can be undertaken, new invasive species may continue to take hold in Hawai'i, with devastating impacts on birds and native ecosystems in what is already our most endangered state.

However, with the recent arrival of such high-profile species as little fire ant causing public concern, and the increased awareness in the political sphere, we are hopeful that the state has reached a tipping point. In the near future, perhaps we will see dedication of resources necessary to adequately address the threat from invasive species to Hawai'i's unique and irreplaceable plants and animals.



Chris Farmer is ABC's Hawai'i Program Director and has been working with endangered birds and conservation for over 20 years. He has been studying the ecology of Hawaiian birds for the last 11 years, including leading translocations of Palila and Millerbirds. His research has also addressed the impacts of exotic predators and ungulates on native ecosystems, and forest restoration and recovery.



Bringing Back Kaua'i's Native Forest Birds:

An Interview with Lisa "Cali" Crampton of the Kaua'i Forest Bird Recovery Project

When Dr. Lisa "Cali" Crampton talks to schoolchildren about the plight of endangered forest birds, she has a small but mighty tool to demonstrate how few are left. She fills a jar half-full with 500 clay eggs only a bit larger than jelly beans—about the size of an 'Akikiki (Kaua'i Creeper) egg.

Of the eight native forest birds found on the island of Kaua'i, three are endangered, including the 'Akikiki, a pale gray

honeycreeper whose numbers have dwindled to fewer than 500. Through her work leading the Kaua'i Forest Bird Recovery Project, Dr. Crampton and her team of biologists conduct research and protect nesting areas for the 'Akikiki, 500 Puaiohi (Small Kaua'i Thrush), and 1,000 'Akeke'e (Kaua'i 'Ākepa) remaining.

We recently caught up with Dr. Crampton to learn more about her work to protect these endangered birds.

ABC: Working to save birds that have such small populations and face these kinds of threats would be challenging anywhere. But the geography of Kaua'i makes it especially tough. What is it like to work in the mountains of Kaua'i?

Cali Crampton (CC): The interior Alaka'i Plateau is riddled with steeply incised and sinuous streams, so it is very difficult to go in a straight line to your destination. It is also roadless, so to get anywhere, we hike or take



Puaiohi (Small Kaua'i Thrush) by Robby Kohley

a helicopter. It takes most of the day on foot to get to our furthest research camp—about 8 miles in 6 hours—because we have to go around the backs of the deepest valleys, instead of taking a direct route. During our predator control work, we lay out 50-by-100-meter grids, which sounds small, but is a serious undertaking when it can take the better part of an hour to go less than half a mile. We go out for eight to nine days, and two of those are spent hiking in and out. It is amazingly challenging terrain.

And did I mention the rain? The Alaka'i is a cloud forest near Mount Wai'ale'ale, one of the wettest spots on Earth. So camping in a remote camp tent with four people, in the cold—it is 4,000 feet elevation—and working with rare birds that you see only infrequently requires dedication.

ABC: These birds live in remote areas. How do you get local people to be enthusiastic about protecting birds and supporting your work?

CC: Birds were a huge part of Hawaiian cultural traditions. A lot of local people remember the days when they could see our native birds in Koke'e State Park, and realize that they don't see them there anymore. That makes them sad. We also do outreach events at local festivals and in local schools. Kids are the root of all change. If they get excited about conservation, their parents will get involved too.



'Akeke'e by Lucas Behnke

Birds were a huge part of Hawaiian cultural traditions.

A lot of local people remember the days when they could see our native birds in Koke'e State Park, and realize that they don't see them there anymore.

ABC: What can be done about avian disease spread by mosquitoes?

CC: Mosquito-borne diseases are tough. Mosquitoes and the disease agents are temperature-sensitive. So in the big scheme of things, climate change will increase mosquito hatching at higher elevations — and therefore the prevalence of malaria.

We measure the prevalence of malaria by taking a small blood sample from each bird we capture. We have found that for the honeycreepers, 'Akikiki and 'Akeke'e, the rates of malaria transmission and the numbers

of mosquito larvae present at all elevations has increased since the mid-1990s. Among Puaiohi, infected and non-infected birds have similar survival rates, suggesting they are more resistant to disease than the honeycreepers.

Recently there have been great advances to benefit human health by controlling mosquito-borne disease such as malaria and dengue fever, so some of those techniques could be applied to the forest bird situation. Another potential line of research is finding and breeding birds that have evolved resistance to the disease naturally.

ABC: You recently began a crowdfunding campaign called "Birds, Not Rats!" How did that go?

CC: We have raised more than \$27,000 — almost three times our original goal — and were able to purchase 100 high-tech, Goodnature traps to protect 125 acres of remote Alaka'i forest bird habitat from rats. More importantly, the high profile of the campaign in local, state, and even national outlets really spread the word about the damage rats do to native ecosystems.

ABC: Why focus on rats?

CC: Rats prey on birds while they are incubating eggs on their nests. Rats also eat seeds, flowers, bark, and fruits of native plants, hampering the plants' survival and reproduction. Last year ABC funded a project to measure rodent predation impacts by removing rats in an

area and comparing breeding success to another area without management. We found that we could make a difference in nest survival and this tool could be put to wider use.

ABC: The picture for Kaua'i's forest birds looks pretty bleak. Can they be saved?

CC: I wouldn't be doing this job if I weren't optimistic. We are really turning a corner in conservation on Kaua'i with the new rat traps, fencing, and other tools. Our data from the first ABC-funded study showed that we can improve nest success with trapping. Marm Kilpatrick, a biologist from the University of California at Santa Cruz, found that if we reduced mortality from other non-disease sources, we could increase the genetic diversity through higher population abundance, and this could foster disease resistance.

We are also, as an insurance policy, bringing in eggs of our two most endangered species, 'Akikiki and 'Akeke'e, to start a captive population (see sidebar). We have just started this effort, but have already found a dozen nests this year. Our goal is to bring in up to 20 eggs of each species.

ABC: What can people do to help the conservation of Hawaiian forest birds?

CC: Become aware of conservation issues, and the nuances of the



'Akikiki by Ben Nyberg

First 'Akikiki and 'Akeke'e Chicks Hatch in Captivity

The 'Akikiki/'Akeke'e captive propagation project is off to a successful start! Seven 'Akikiki and three 'Akeke'e chicks have hatched so far, and all appear to be doing well.



'Akikiki chicks by San Diego Zoo Global

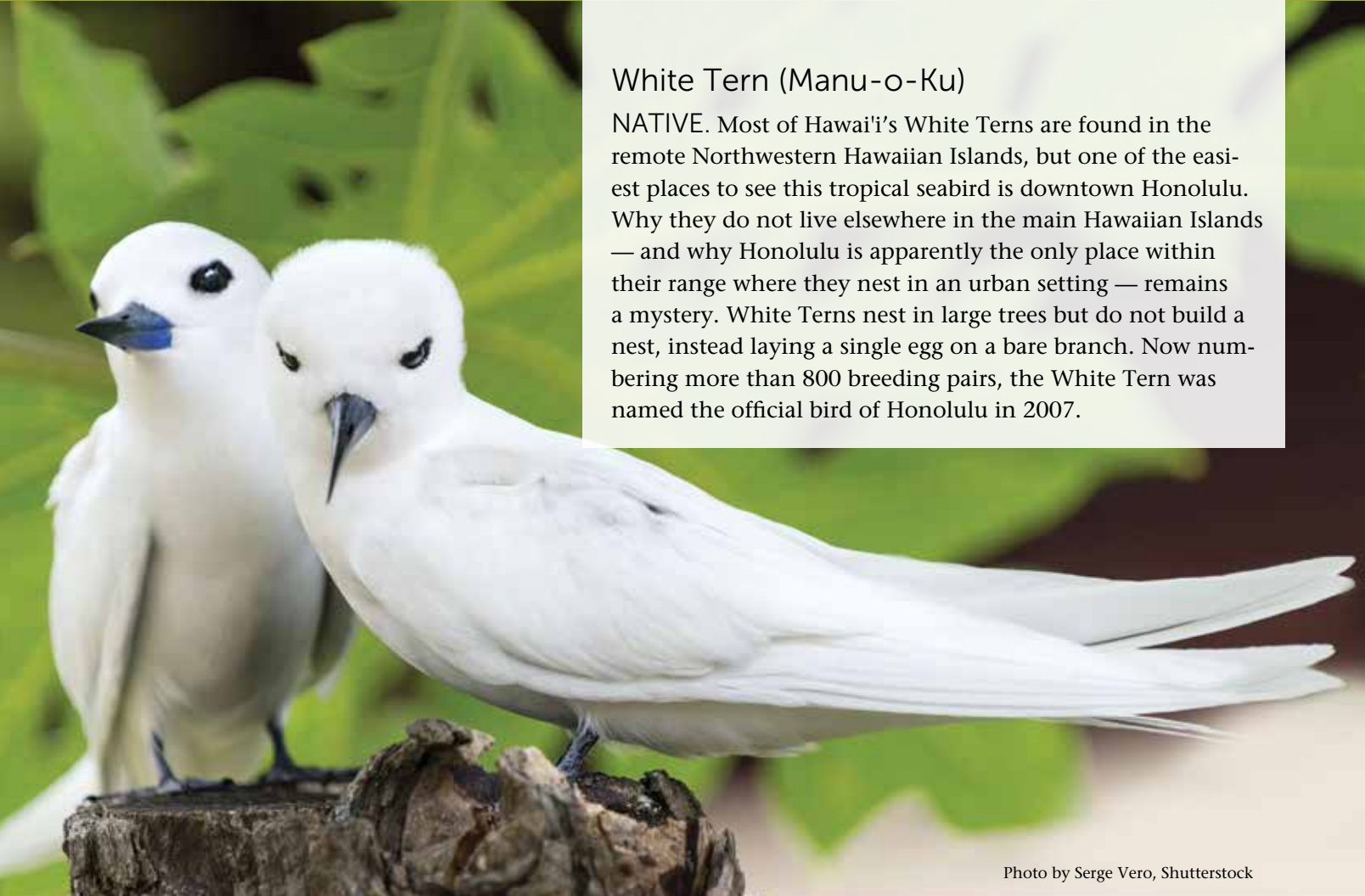
This effort to establish a captive population is being led by the Kaua'i Forest Bird Recovery Project, Hawai'i Department of Land and Natural Resources' Division of Forestry and Wildlife, San Diego Zoo Global, and the U.S. Fish and Wildlife Service.

issues. Then spread the word. If we want to see these beautiful forest birds when we hike the forests of Kaua'i in the future, then we need to build support for the conservation of these endangered species at the state and federal level.

If you're on Kaua'i, give us a few hours or a few days of your time. Getting volunteers out in the field can be challenging, but there are lots of things going on around our Hanapepe office we need help with. We even need a carpenter!



The Kaua'i Forest Bird Recovery Project is housed within the state of Hawai'i Division of Forestry and Wildlife (DOFAW) and the University of Hawai'i at Mānoa, in partnership with American Bird Conservancy and other organizations. Financial support comes largely from the U.S. Fish and Wildlife Service. For more information, visit kauaiforestbirds.org.



White Tern (Manu-o-Ku)

NATIVE. Most of Hawai'i's White Terns are found in the remote Northwestern Hawaiian Islands, but one of the easiest places to see this tropical seabird is downtown Honolulu. Why they do not live elsewhere in the main Hawaiian Islands — and why Honolulu is apparently the only place within their range where they nest in an urban setting — remains a mystery. White Terns nest in large trees but do not build a nest, instead laying a single egg on a bare branch. Now numbering more than 800 breeding pairs, the White Tern was named the official bird of Honolulu in 2007.

Photo by Serge Vero, Shutterstock

NATIVE OR NOT?

A Photo Essay



Red-crested Cardinal

INTRODUCED. The spectacular Red-crested Cardinal, or Brazilian Cardinal, is found throughout the main Hawaiian Islands. Native to northern Bolivia, southern Brazil, and northern Argentina, the bird was introduced by the Hui Manu Society during the late 1920s and early 1930s. Ironically, Hui Manu was a group of Honolulu citizens created to introduce colorful or sweet-singing songbirds to fill the void left by the disappearance of native birds from the populated lowlands.

Sandy Swanson, Shutterstock



Nutmeg Mannikin

INTRODUCED. Native to Asia, from India and Nepal to the Philippines and Indonesia, this small finch was brought to Hawai'i in 1866 by German physician and botanist William Hillebrand, who also introduced mynas to the islands.

By the late 1800s and early 1900s, when rice was widely cultivated in Hawai'i, these birds were considered pests, and thousands were killed on Kaua'i to protect crops. In 1992, more than 10,000 were culled from the area surrounding Lihue Airport on Kaua'i to reduce potential conflicts with aircraft.



Hawai'i 'Amakihi

NATIVE. Captain Cook took note of the Hawai'i 'Amakihi in 1779. Today, it is among the most widespread and numerous of the Hawaiian honeycreepers, occurring on several islands and numbering at least 800,000. The bird is especially common on Hawai'i Island, in a variety of habitats up to the tree line on volcanic peaks. While most honeycreepers are in decline, the Hawai'i 'Amakihi is a ray of hope: A growing population at lower elevations in the southeast of Hawai'i Island suggests a resistance to avian malaria that otherwise limits honeycreeper populations to habitats above 4,500 feet.

Hawai'i is full of colorful and striking birds. But many of them don't belong here: Brought from other countries in the 19th and early 20th centuries as pets or to control pests, more than 50 introduced bird species have now established populations. Many of them have had a devastating impact on the state's native birds.

Few people, even those who live in Hawai'i, know which species are native and which are not — in part because introduced birds dominate the developed areas where most people live, while natives are mostly restricted to the high, remote forests. Yet knowing the difference is key to mobilizing public support for the conservation of native birds.

Which are native and which are not?
This photo essay might surprise you!



Red-billed Leiothrix

INTRODUCED. The Red-billed Leiothrix arrived in Hawai'i in the early 20th century. Found in the Himalayas, from Nepal and northern India to southern China and Myanmar, they are popular cage birds. Hawai'i is one of the only places in the world with an established, introduced population. They may compete with native species for food, carry avian malaria, and disperse non-native plant seeds.



Hayataro Sakitsu

Hawai'i 'Elepaio

NATIVE. The Hawai'i 'Elepaio belongs to the monarch flycatcher family, which are found mostly in Southeast Asia, Australasia, and the western Pacific. While its range has contracted since the early 1900s, the Hawai'i 'Elepaio is still fairly common, especially at higher elevations. It currently numbers approximately 200,000 birds. 'Elepaio can be quite tame and were highly regarded by Hawaiian priests, who were said to be guided by the birds to trees suitable for canoe construction.



Dick Daniels

Japanese White-eye

INTRODUCED. The Hawai'i Board of Agriculture and Forestry first introduced white-eyes in 1929 to control pests. Native to China, Taiwan, and Japan, they spread throughout the main islands and may now be the most abundant bird species. Their migratory behavior probably aided their rapid spread: There are records of birds at sea between the main islands and at Johnston Atoll, nearly 750 miles southwest of Kaua'i. White-eyes are believed to carry avian malaria, and scientists hotly debate whether they compete with native forest birds.

NATIVE OR NOT?

'Akiapōlā'au

NATIVE. One of the most spectacular of the surviving honeycreepers, the “Aki” uses the lower part of its bill to hammer at bark like a woodpecker and a long, downward-curved upper bill to extract insects. Found only on Hawai'i Island in four distinct populations, the endangered 'Akiapōlā'au now numbers fewer than 2,000 birds. Land clearing, habitat degradation by non-native grazing mammals, and avian malaria are its most serious threats. But at the Hakalau Forest National Wildlife Refuge, fencing, pig removal, and intensive reforestation are helping the bird's population to rebound.



Jack Jeffrey

Photo by Jack Jeffrey



Hawaiian Stilt (Ae'o)

NATIVE. The Hawaiian Stilt is a subspecies of the Black-necked Stilt found across North and South America. In the late 19th century it was widespread in wetlands throughout the main islands. Hunting may have reduced stilt numbers until it was outlawed in the 1940s. Listed under the Endangered Species Act in 1970, stilt populations have since increased steadily due to wetland protection and control of non-native predators. More than 1,500 stilts now live across the Hawaiian islands.



'Ōma'o (Hawaiian Thrush)

NATIVE. Confined to Hawai'i Island, the 'Ōma'o is one of two surviving members of Hawai'i's native thrushes, all fruit eaters in the genus *Myadestes*, known generally as the solitaires. The other, the Puaiohi, persists on Kaua'i, but is endangered with a population of only approximately 500 birds.

The 'Ōma'o remains relatively common, numbering about 160,000 birds. Where it is declining, it is apparently due to habitat degradation that impacts important understory food plants — the most likely cause of the declines and extinctions of the other species.

Chesapeake Images, Shutterstock



Java Sparrow

INTRODUCED. Java Sparrows are popular cage birds from Java and Bali in Indonesia, where they are declining. Although there were rumors of their introduction to Hawai'i in the late 1800s, observers in the early 1900s noted that they had failed to become established. The large numbers seen now, especially on O'ahu, are the result of recent introductions. Java Sparrows have spread to all of the main islands, most recently colonizing Lāna'i in 2009. They are considered an agricultural pest and may be guilty of aiding in the spread of introduced weeds.

Dick Daniels



Erckel's Francolin

INTRODUCED. Several game bird species have been introduced to Hawai'i's dry, open habitats, and Erckel's Francolin is one of the most successful. Hundreds of these birds were introduced to each of the main islands during the 1950s and 1960s. Although slow to spread and become fully established, the partridge-like birds native to Sudan, Ethiopia, and Eritrea are now common and popular with hunters.

NATIVE OR NOT?

'Alalā (Hawaiian Crow)

NATIVE. Hawai'i's rarest bird is down to just 114 individuals, all in a captive breeding program. This highly social crow was never common, living only in moist forest on the slopes of the Hualālai and Mauna Loa volcanoes on Hawai'i Island. Over the past two centuries, destruction of habitat, and persecution by ranchers—along with non-native predators, avian malaria, and toxoplasmosis transmitted by feral cats—have taken their toll. Scientists are now working to prepare habitat for the eventual release of 'Alalā back into the wild.



Jack Jeffrey

Common Myna

INTRODUCED. Mynas were introduced to Hawai'i in 1866 to control cutworm moths, an agricultural pest. Native to India, the Himalayas, and the Middle East, the birds quickly spread throughout the main islands. No bird has been more vilified in Hawai'i than the myna. It has been described as noisy and quarrelsome, and accused of spreading invasive weeds, preying on seabird nests, competing with native 'Ō'ōs for nest cavities, and even setting buildings on fire with lighted cigarettes!



Photo by Super Prin, Shutterstock

The information in this article is largely derived from Robert and Peter Pyle's *The Birds of the Hawaiian Islands: Occurrence, History, Distribution, and Status* (<http://hbs.bishopmuseum.org/birds/rlp-monograph/>). This is a superb resource for information on Hawaiian birds, native and introduced alike.



KAUA'I



Laysan Albatross by Sophie Webb

Mōlī (Laysan Albatross) are a protected species that reproduce slowly — the birds are not ready to breed until eight or nine years old, and then they only lay one egg per year — so each bird is important. Feral cats on Kaua'i were recently implicated in the deaths of 22 Mōlī earlier in 2015. At Hanalei National Wildlife Refuge, managers say that of 263 documented cat kills there since 2011, 244 were waterbirds listed as protected under the Endangered Species Act. To reduce this threat, ABC participated in a county-initiated task force that included varied groups, endorsing its goal of “zero feral, abandoned, and stray cats on the island” within a decade.

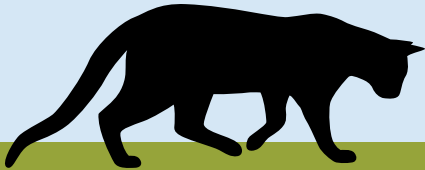


Monk Seal by Grant Sizemore, ABC



O'AHU

Direct predation is not the only risk from feral cats. Toxoplasmosis, a parasitic disease spread in cat feces, has proven fatal for some Hawaiian birds (and can infect all warm-blooded species, such as the endangered monk seal). On the state's most populous island, ABC is working with researchers from the University of Hawai'i at Mānoa to better understand the prevalence of this cat-spread parasite, the level of environmental contamination, and the severity of the risks to birds and other animals.



CATS ON HAWAI'I

Mapping the Threat

Centuries ago, European explorers and settlers brought cats to Hawai'i. They surely had no idea what the impacts would be. Free-roaming and feral cats have since contributed to tremendous declines of Hawai'i's native birds through predation and the transmission of harmful parasites. Cats are now common on all of the main Hawaiian Islands; population estimates suggest that up to hundreds of thousands of cats have invaded Hawai'i's natural areas. Here are a few of the places where feral cats are impacting Hawai'i.



Hawaiian Stilt by Bill Hubick



Hawaiian Coot by Jack Jeffrey

MAUI

The Hawaiian Coot — one of Hawai'i's endangered wetland birds with a state-wide population of only about 2,000 birds — can be a familiar sight in populated areas of Maui. But the species still faces threats from cats. Astoundingly, in late 2014, a news report revealed that an estimated 1,000 feral cats run at-large around Kanaha Pond State Wildlife Sanctuary and in Kanaha Beach Park on Maui, where the coot (as well as the endangered Hawaiian Black-necked Stilt) breed. Despite this clear conservation threat, some organizations purposely maintain feral cats roaming parks and neighborhoods through the program known as Trap, Neuter, Release.



Hawaiian Petrel by Trevor Joyce



Palila by Jack Jeffrey

BIG ISLAND

Feral cats remain a menace to birds even in Hawai'i's most remote areas. In 2012, scientists from the University of Hawai'i at Hilo, National Park Service, and U.S. Geological Survey documented the predation of endangered 'Ua'u (Hawaiian Petrel) nesting in a burrow on Mauna Loa using remote cameras. To protect birds from cats and other predators, ABC has partnered with the National Park Service and the National Fish and Wildlife Foundation to build a cat-proof fence that will enclose key nesting habitat in Hawai'i Volcanoes National Park.

Feral cats prey upon approximately 11 percent of all nests of the endangered Palila. Since 2009, ABC and the National Fish and Wildlife Foundation have supported predator control in core Palila habitat on Mauna Kea to reduce numbers of feral cats and mongooses.

Help us spread the word!

More information, including our public service announcement about cats and Hawaiian birds, can be found here: www.abcbirds.org/hawaiicats/

A white bird, likely a Hawaiian Petrel, is shown in flight against a dark, starry night sky. The Milky Way galaxy is visible as a bright, hazy band of light across the upper portion of the image. The bird is positioned in the upper right quadrant, with its wings spread wide. The overall scene conveys a sense of vastness and wanderlust.

WANDERING SOULS

Story of the 'U'au, or Hawaiian Petrel

By Hannah Nevins

On my first night searching for the Hawaiian Petrel, I am wrapped in a sleeping bag in a lava field at 9,500 feet, waiting. The Milky Way above me is a river of stars. As I watch for the nocturnal seabirds to arrive under cover of darkness between dusk and midnight, I wonder: Will they even appear?

“Bird!,” my research partner calls. I scurry as fast as I can over the lava rubble on the edge of Haleakalā Crater to a nest illuminated by a small piece of reflective tape. Cold rock resembling a barren moonscape might seem inhospitable, but the petrels have chosen this place — free from human harassment and, most importantly, protected from predators — to nest.

We are here to measure the movements of this chick-rearing adult and recover a solar-powered tag that has been on the bird for 15 days. We have to be quick: A bird disturbed for too long may fail to feed its chick. And for this population of rare birds to survive, each chick is precious.

The bird is quiet in my hand. Small and stout, with dark upper wings, a white forehead, and large, expressive eyes, it has just arrived from the sea. Its smell is distinctive: a mix of musk, ocean spray, and squid. Like their larger albatross cousins, Hawaiian Petrels fly thousands of miles to forage for food, which they distill into a nutritious slurry of fish and squid oil to feed their chicks.

I hold the petrel gingerly as my partner removes the small solar satellite transmitter, weighs the

bird—15 ounces—and releases it to return to its rocky crevice and chick.

Wailing Spirit Birds

Ancient Hawaiians described Hawaiian Petrels as wailing souls wandering the night, with distinctive calls — “ooh, aah ooh” — that inspired a short, simple Hawaiian name: 'Ua'u.

Recovery has been slow.

Because the birds lay only one egg each year and begin to breed at five-to-seven years, measureable population gains come only from long-term conservation commitments.

From coast to mountains on all eight of the main Hawaiian Islands, these ethereal sounds once filled the night sky.

“The earth is covered with the fledglings of the night breaking into dawn,” said the Hawaiian creation chant, the Kumulipo, more than 100 years ago. We can only guess at the past abundance

of 'Ua'u prior to the arrival of the first Polynesians, but it was likely in the hundreds of thousands to millions of birds.

Today, the 'Ua'u, or *Pterodroma sandwichensis*, is one of Hawai'i's most endangered seabirds. Numbering an estimated 10,000 breeding pairs and thought to be declining, the birds are now restricted to the highest peaks and most remote wet mountain forests on five islands. Facing a litany of threats in recent decades — from invasive plants and animals, power lines, lights, and habitat loss, to name a few — this elusive species has struggled to survive.

Recovery has been slow. Because the birds lay only one egg each year and begin to breed at five-to-seven years, measureable population gains come only from long-term conservation commitments.

Worldwide, petrels are in trouble. Twenty-four of the 35 *Pterodroma* species are listed as threatened by the International Union for Conservation of Nature. Even abundant species are often restricted to a single nesting island. Habitat loss and predation are the greatest threats, with only three of ten North Pacific species stable and protected.

But collaborative conservation efforts over the past few decades by scientists, private landowners, advocates, energy companies, and even resort owners may be slowly turning the tide. New research and tools (see sidebar on page 28) are telling us more about this charismatic seabird and helping us find ways to protect it.

Scientists who have dedicated their whole lives to studying a bird they rarely see on land now say with guarded optimism: If we stay the course, the endangered Hawaiian Petrel will make a comeback.

Threats on Land From Invasive Species

Although researchers have studied the Hawaiian Petrel for nearly 50 years, the bird is still something of a mystery. Because they forage at distant feeding areas and nest in remote underground burrows, scientists don't know the bird's absolute population size or the reproductive success of various colonies. Nor do they know the full impact of threats at sea from bycatch, climate change, and marine plastics.

On land, however, threats to the Hawaiian Petrel are all too evident.

Polynesian followed by European settlement over the past two centuries has transformed vast tracts of native bush into agricultural land and introduced non-native plants and animals. It wasn't until the late 1960s and early 1970s that scientists began to realize that the animals that accompanied human settlers were just as devastating as changes to the land.

Feral pigs, dogs, rats, and mongooses — weasel-like mammals originally brought to Hawai'i to control rats in the cane fields — have since resulted in the voracious predation of native land and sea birds. Invasive weeds such as strawberry guava and ginger, meanwhile, have overrun areas once covered in thick ferns that offered protection to birds, giving predators easy access to nests and chicks.

Free-roaming cats are a major challenge. "Of all the introduced predators, cats are by far the greatest threat to the viability of 'Ua'u breeding colonies," says André Raine of the Kaua'i

Endangered Seabird Recovery Project (KESRP). To identify the presence of invasive mammals like cats, Raine and his team use helicopters to reach remote mountaintop sites and place automatic cameras that can be left out for months at a time. These

"Of all the introduced predators, cats are by far the greatest threat to the viability of 'Ua'u breeding colonies."

André Raine, Kaua'i Endangered Seabird Recovery Project (KESRP)



cameras take a photo when an animal trips a motion detector. Raine's team has used camera traps at four sites to determine whether nesting birds are active and how many cats are present.

Optimism for the petrel's future is no easy feat for Raine, who has the sobering job of finding adult birds killed by cats outside of their nesting burrows. But there is reason for hope. "Having well-identified solutions to counter the threat of predators—and the buy-in from partners to deal with these issues—makes me cautiously optimistic for the recovery of this

species," Raine says. "We can now get started to reverse some of these trends."

In 2014, ABC and Pacific Rim Conservation, working with the U.S. Fish and Wildlife Service, built a predator-proof fence at Kilauea Point National Wildlife Refuge, and this year will begin introducing Hawaiian Petrel chicks to start a new colony there.

Obstacles To Recovery

Wind turbines, lighted structures, and power lines present other obstacles for the petrels.

Unaccustomed to large structures and lines in their habitat, petrels accidentally collide with them along their sea-to-land flyways.

Wind energy development is, however, a desirable development as the islands strive to increase their energy independence. Unlike the mainland, where everything can be brought in via rail or road, the islands are entirely dependent on fuel transported by ship. Wind they have plenty of — and there is pressure to implement these greener energy solutions quickly.

Light provides another challenge: Petrels and other nocturnal

LEFT: Hawaiian Petrel ('Ua'u) fledgling at its burrow. Later, a feral cat (RIGHT) was filmed entering that same burrow. Both photos courtesy of Haleakalā National Park



AMAZING JOURNEYS

All in Two Weeks' Work

By Josh Adams, Western Ecological Research Center,
U.S. Geological Survey (USGS)

Imagine traveling around an area equivalent to nearly twice that of the continental United States — just to find food for one nestling. Amazingly, for the Hawaiian Petrel, covering such a distance now appears routine.

Breeding petrels will venture thousands of miles from the Hawaiian Islands, where they nest, across the open Pacific Ocean. Because this vast expanse is difficult for landlubbers to conceive of, researchers at the USGS Western Ecological Research Center re-imagined the petrel's flight patterns, starting them out from Mexico City.

Under this scenario, the petrel leaves Mexico City on Day One, makes it to Los Angeles by Day Three, crosses the U.S.–Canada border in central Montana on Day Six, and visits Montreal on Day Eight. Then, it heads home by way of Philadelphia and Washington, D.C.

Four nights later, having flown more than 6,200 miles, the petrel returns to its lava burrow at 9,300 feet on the flanks of Haleakalā, Maui. There, it feeds its hungry chick a regurgitated meal of high-energy oil distilled from fish and squid captured along the tremendous 12-day journey.

After resting for eight hours, the adult petrel is off to sea again on another trip — part of a long-trip, short-trip cycle taken by the breeding pair in turns a dozen or so times each before the chick fledges.

Scientists at USGS guess that petrels have adapted this extreme approach to seek out food-rich waters in the north Pacific. Heading in a clockwise direction, petrels arc and glide effortlessly using winds and waves to aid their flying and save energy. The birds also accelerate home with the trade winds as they fly south, reaching speeds of some 30 miles per hour.



Hawaiian Petrels cover vast expanses in their foraging journeys. Although the birds actually nest in the Hawaiian Islands, this map reimagines a typical flight with Mexico City as home base. The route is overlaid on the familiar shape of North America to better illustrate the distances involved.

seabirds are attracted to street lights, lighted buildings, and hotel spotlights and become stunned, flying in circles until they land on the ground. Fledgling chicks are particularly at risk. Once grounded, they can be crushed by cars or eaten by predators.

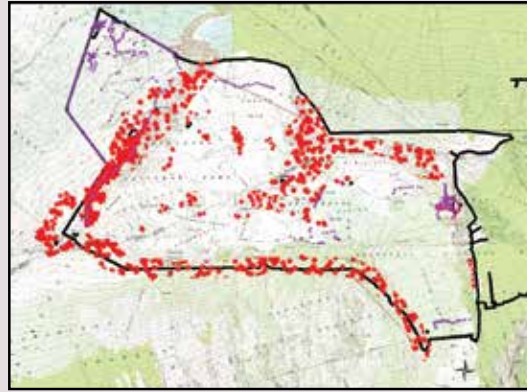
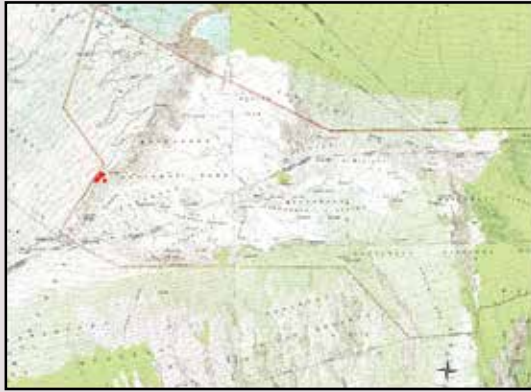
During the two-month breeding season, adult Hawaiian Petrels make repeated flights from land to sea, flying over miles of developed landscape to the same small underground nest site. Some might ask: Why don't the petrels change their routes to avoid these threats? The birds have a strong inclination to return to the same mate and burrow, year after year, and are unlikely to move because their human neighbors have altered their landscape.

Emerging from their underground burrows on their first flight from mountain nest to the sea, chicks are most vulnerable. Unable to perceive obstacles because their sensitivity to contrast is low — going from darkness into light — the young birds become disoriented. The momentary lapse in vision from bright lights, combined with power lines, is often fatal.

That's where the Kaua'i Humane Society's Save our Shearwaters Program comes in. During September through December, volunteers collect, rehabilitate, and safely release grounded shearwaters and petrels.

Based on this work, there is good and bad news. On the one hand, the volunteers are saving many

Good News: From 15 to 3,000+ Breeding Burrows



These maps contrast the number of petrel burrows (shown as red dots) at Haleakalā National Park in the 1960s and today. In 1966, there were 15 known burrows at Haleakalā; today's colony now has between 3,000 and 4,000 burrows. Predator control (including fencing) and habitat management have been behind this conservation success. Maps courtesy of Cathleen Bailey, Haleakalā National Park

birds. On the other, they are finding far fewer chicks, which indicates ongoing population declines on this island.

New Tools and Good News

Despite these dangers, there is one place where the petrels are now thriving: Maui's Haleakalā National Park. Progress has been hard-won, reports Cathleen Bailey, Supervisory Wildlife Biologist and the park's lead on the species, who has been studying the petrels for the last 20 years.

Based on the monitoring of more than 200 nests, Bailey says that numbers are heading in the right direction. In 1966, there were 15 known burrows at Haleakalā. Today's robust colony now has between 3,000 and 4,000 burrows (10,000 petrels). She credits a long-term commitment to fencing and other forms of predator control, begun in the late 1970s, with the population increase.

On Kaua'i, where there are only a few hundred known nest sites and numerous threats, the story is different. KESRP's approach is to protect sites where they have

Just as important as these tools is the growing commitment of landowners, utility companies, and resorts to find ways to reduce threats to the Hawaiian Petrel.

found nesting birds, and scout for new sites using technology such as camera traps and acoustic monitoring (see sidebar on page 28).

New tools are key: In 2015, KESRP will put out 30 camera traps and ten acoustic monitoring devices at each of four priority sites, and increase this effort at another site with 30 additional cameras. ABC and Pacific Rim Conservation, meanwhile, are combining predator-proof fencing, predator management, and translocation of chicks with "social attraction" (playback of petrel calls) to lure new breeders to the Kilauea Point National Wildlife Refuge.

Just as important as these tools is the growing commitment of landowners, utility companies, and resorts to find ways to reduce threats to the Hawaiian Petrel. The County of Maui is requiring shields on all streetlights that direct light downward. The Hawai'i Department of Land and Natural Resources (DLNR) is reaching out to hotels to ask them to modify their lighting. They also are working with cruise ships: "They call us when they get seabirds grounded on the ship," says Jay Penniman of the Maui Nui Seabird Recovery Project. "We've had migratory seabirds—Leach's Storm-Petrel, Sooty Shearwaters, and Black-winged Petrel—brought in."

A particularly important group is the Hawaiian Seabird Hui ("group" in Hawaiian). Each year, this gathering of resource managers and state, federal, and university officials who've taken on a stewardship role for the Hawaiian Petrel and its cousin, the threatened Newell's Shearwater ('A'o), meet to discuss the status of these seabirds and determine actions for the year to come.

New Tools to Help Conserve Hawaiian Birds

New tools and techniques are advancing the conservation of rare Hawaiian Petrels and Newell's Shearwaters, and many of them are being tested in Hawai'i. Here are a few:

Counting night-flying birds reliably and accurately is a big and challenging effort for observers. The first technological advance, in the 1980s, was the use of **marine radar** to detect birds as they flew to their burrows in the mountains.

Acoustic monitoring provides an improved method to monitor incoming birds and activity. Using a battery-operated, book-sized recorder with a small external microphone, automatic acoustic recording units measure the presence and absence of birds and their relative abundance. They also use custom-made rhythms to identify species-specific calls. With ABC's support, partners such as the Kaua'i Endangered Seabird Recovery Project and Conservation Metrics are deploying automatic song recorders in remote mountaintops for eight-to-ten-month coverage periods.

From Satellites to Statistics

In the past eight to 10 years, our ability to track individual bird movements and migratory paths has improved in astounding ways.

Satellite technology has opened up our understanding of the vast distances seabirds regularly travel. Satellite tags are expensive (\$3,500 each) and have limited use with small birds, such as those under seven ounces, that can't carry large packages.

Geolocators are among the smallest, longest-lasting tracking devices. These tags can be attached to a leg band

to record a year in the life of a bird, working through principles of navigation by measuring light level as a proxy for longitude (time of sunrise) and latitude (length of day) and provide approximate locations (within 100 miles or so) suitable for studies of long-distance migration. No satellite or cell connection is needed.

The downside is that the tagged bird must be recaptured to get the data, usually done when it returns to its nest site. For the smallest forest birds (less than 40 grams), conventional radio-telemetry is still the most effective for obtaining detailed tracking information. These tags can weigh less than a gram, but require tracking on foot and signals are limited in rugged terrain.

Other researchers have made use of **analytical tools** such as demographic models, geographical information systems (GIS), and statistical models. Jeff Troy of Texas State University and others used GIS-generated models of the lightscape around Kaua'i to predict where the greatest impacts on birds were occurring, so conservation and light mitigation measures could focus on these places.

Laboratory-based technology such as **stable isotope analysis** and **genetics** are allowing researchers to peer deep into the relatedness of populations. Recent isotope work by Julia Rowe of University of Hawai'i-Mānoa is investigating the nutrient cycles between the ocean and land.

A Better Mousetrap

Less high-tech but just as important, conservation gains are also coming from well-designed **rat traps**. ABC is supporting the use of Goodnature traps, new, automatically resetting traps for rats and mongooses. These traps use a carbon dioxide canister to make a humane kill and reset themselves up to 22 times before being rebaited. This has been a breakthrough for rat control around remote-nesting forest birds and seabird colonies, where access is difficult.

There is yet to be a technological solution to control feral cats, but **trail cameras** have been in widespread use for about five years and are now a relatively low-cost tool to measure the abundance and type of predators present, which helps in making decisions about appropriate control measures.



Satellite-tagged Hawaiian Petrel in burrow on Kaua'i, 2013.
Photo by André Raine



Megan Laut of the U.S. Fish and Wildlife Service currently coordinates the Hui in addition to her responsibility for 46 bird species listed under the Endangered Species Act in Hawai'i, Guam, the Marianas, and American Samoa.

Another threat is an overabundance of non-native rats that eat eggs and chicks. USFWS is reviewing information for programmatic support for aerial broadcast of rodenticides, similar to the scale that has been used for conservation purposes in New Zealand and recently on South Georgia.

Meanwhile, researchers continue to learn more about the Hawaiian Petrel and its conservation needs. Since 2006, Josh Adams of the U.S. Geological Survey has worked in tandem with other petrel biologists to gain the first information about the species'

remarkable foraging behavior and flight paths from nesting sites to feeding areas some 3,000 miles away (see sidebar on page 26).

A Future for the 'Ua'u?

Back at Haleakalā, we have accomplished our mission and are ready to return to civilization. As we hike out of the petrel colony, we see hundreds of cars in a stream of headlights stretching all the way up the great mountain, zig-zagging up switchbacks to see the famous sunrise over the crater rim. These people will never have the incredible experience of holding a seabird in their hands; in fact, I doubt that

any of them even know of this bird's existence.

Getting people to see and appreciate endangered Hawaiian seabirds is a major challenge. For most people, these are ghost birds, only heard occasionally at night at the right place.

It's nearly 5 a.m. by the time we drive back to the bunkhouse and dive into a dark-shuttered room to sleep. Visions of birds and starry skies fill my dreams. Does the 'Ua'u — the wandering soul of the sea, so elusive, yet so inspiring to those who know it — have a future? All signs point to a tentative, hopeful "yes."



Hannah Nevins is ABC's Seabird Program Director, based in Santa Cruz, California. She has spent more than 20 years studying seabird ecology in Alaska, Hawai'i, and Antarctica. Her previous research interests included quantifying the impacts of oil spills, disease and bycatch on seabirds in the California Current and working to conserve Sooty Shearwaters in New Zealand.

'Ōhi'a lehua: A Tree of Legendary Importance

By George E. Wallace

Native Hawaiian mythology tells the tale of two young lovers named 'Ōhi'a and Lehua. Pele, the goddess of volcanoes, was also in love with the handsome 'Ōhi'a. She approached him, but he refused her. In a jealous rage, Pele turned 'Ōhi'a into a tree. Lehua was devastated. The other gods, pitying Lehua for her loss, turned her into a flower of the 'Ōhi'a tree.

This is the story of *Metrosideros polymorpha*, also known as 'ōhi'a lehua, 'ōhi'a, or just lehua. The story is apt: the tree, with its iron-hard wood, is almost impossible to imagine without its signature spray of vibrant orange-red or yellow flowers with long, slender stamens.

'Ōhi'a is a prolific tree that grows in an amazing variety of forms. Whether a twisted shrub or a tall, straight tree, it occurs in every soil type. It is also one of the first plants to colonize new lava flows. Unlike many other Hawaiian plants, it can live in close proximity to toxic volcanic gases by closing the pores of its leaves.

In Hawai'i, 'ōhi'a is the most common native tree species in the main islands. It is also one of the most important trees for native Hawaiian birds such as 'Apapane and 'Ākohekohe, which get their food from nectar-producing flowers. Dozens of extinct species

would have fed frequently on 'ōhi'a, too.

In recent decades, other birds have also come to rely on 'ōhi'a. The 'Tiwi, with its sickle-shaped bill, is better adapted to lobelias and mints, but as these plants have become rare, 'Tiwi have turned more to 'ōhi'a. 'Apapane and 'Tiwi move up and down in elevation to take advantage of 'ōhi'a blooming at different times in different areas. Unfortunately, seeking out nectar sources at low elevations where malaria is prevalent can be risky — especially for birds like the 'Tiwi that are nomadic and highly vulnerable to avian malaria.

'Ōhi'a is so critical to the survival of Hawai'i's native birds that it is hard to imagine a vibrant avifauna without it. But the tree is increasingly threatened by plant diseases. 'Ōhi'a rust, imported to Hawai'i in decorative flower and foliage shipments from California, is established in Hawai'i and has the potential to devastate the state's one million acres of 'ōhi'a.



Hawai'i 'Amakihi on 'ōhi'a by Jack Jeffrey

Meanwhile, scientists have recently traced the deaths of 'ōhi'a trees in the Puna district of Hawai'i Island to an aggressive fungus, *Ceratocystis*, also known as "Rapid 'Ōhi'a Death."

Hawai'i's native birds face an uncertain future if disease overcomes the legendary 'ōhi'a. So, it is essential that state and federal agencies increase the resources available to understand and deal with these disease threats, while at the same time ramping up currently inadequate biosecurity measures to prevent new diseases from getting to Hawai'i in the first place.

We can do nothing less. The birds of Hawai'i require it.



George Wallace has been active in bird research and conservation for nearly 30 years. He served as leader of ABC's International Division during 2002-2009 before shifting over to lead the Oceans and Islands Division, which focuses on the conservation of birds of oceanic islands, especially Hawai'i, and seabirds.

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