PACIFIC RIM CONSERVATION
RESTORING BIODIVERSITY

ANNUAL REPORT

2017

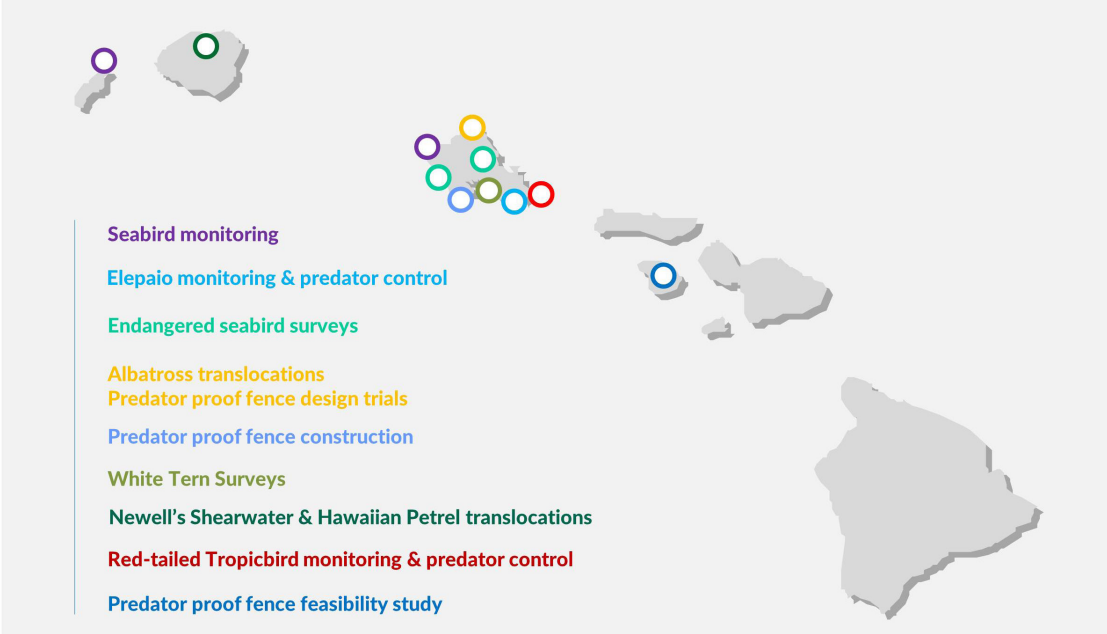
Pacific Rim Conservation was founded in 2006, and our mission is to maintain and restore native bird diversity, populations, and habitats in Hawaii and across the Pacific region. We work together with local communities, government agencies, and other conservation organizations to achieve our goals. Throughout all of our work, we strive to use a science-based approach to management, using research to improve our methods and inform future conservation actions.

In the following pages we summarize our project results for 2017. We could not achieve these goals without our fantastic partners, generous funders, and dedicated volunteers. We thank everyone who has been involved in our work the past year.

Aloha and Mahalo,

Lindsay Young
Executive Director

Eric VanderWerf
Director of Science







PACIFIC RIM CONSERVATION 2017 YEAR IN REVIEW

BIRDS

22 number of bird species we worked with

200+ wild birds banded as part of our research

We translocated **4 species** of Hawaiian seabirds this year to create new, safe breeding colonies: **Black-footed and Laysan Albatross, Hawaiian Petrel and Newell's Shearwater.**

Our work is science based.

In 2017 we wrote:

3 Scientific journal publications

5 Management plans

Many project reports

ECOSYSTEMS

3200 ft

Length of predator- proof fencing built in 2017 to protect native ecosystems. This fence will protect endangered waterbirds Oahu.

65 Acres

of predator eradications & control

18 Acres

of habitat restored by removing weeds and replacing them with native plants

PEOPLE

We are small, but mighty. We accomplish our work with highly trained staff, a dedicated group of volunteers and great partners

5 Full-time **&** **5** seasonal staff

2000 hours donated by our amazing volunteers

It's important to involve the next generation.

In 2017 **300+** K-12 students visited our conservation sites & we visited the classes of 400 more.

10 number of public presentations

20+ number of media articles

NO NET LOSS: JAMES CAMPBELL NATIONAL WILDLIFE REFUGE SEABIRD TRANSLOCATION

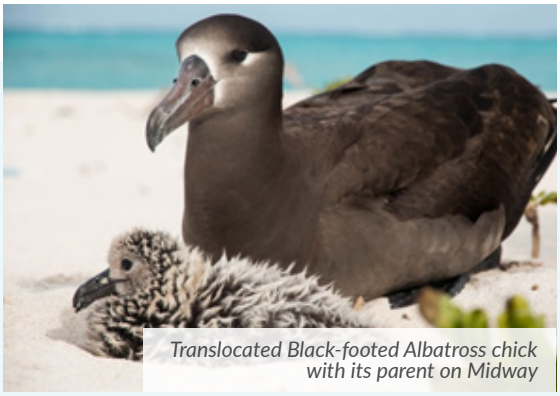
Project website: www.islandarks.org

PARTNERS: U.S. Fish and Wildlife Service, U.S. Navy, James Campbell National Wildlife Refuge (JCNWR), Midway Atoll National Wildlife Refuge, Papahanaumokuakea Marine National Monument, and Hawaii Department of Land and Natural Resources.

The goals of the No Net Loss initiative are twofold: 1) to protect as much seabird nesting habitat in the main islands as is being lost in the Northwestern Hawaiian Islands because of the effects of climate change, and 2) to establish new breeding colonies of seabird species that are safe from sea level rise and non-native predators. We do this by building predator exclusion fences, removing invasive predators, and then attracting or translocating birds into these protected areas. We currently are focusing these efforts at James Campbell National Wildlife Refuge (JCNWR) on Oahu, and have begun working on four priority species that are most vulnerable to sea level rise: Black-footed and Laysan Albatrosses, Bonin Petrel, and Tristram's Storm Petrel, all of which have a high proportion of their global population nesting in a few locations that are less than 2 meters above sea level. In 2016, we completed a 1,150-meter-long predator exclusion fence enclosing 16 acres at JCNWR. While 16 acres may seem small, it represents 75% of the nesting area of Tern Island in the Northwestern Hawaiian Islands which is home to more than 240,000 breeding pairs of seabirds.

From 2015- 2017, we translocated 50 Laysan Albatross chicks (raised from eggs) from the Pacific Missile Range Facility on Kauai (learn more here), where albatross nest close to a runway and are an aircraft collision hazard. A total of 46 Laysan Albatross chicks successfully fledged as a result of this program and we expect them to begin returning in 2018 or 2019. 2017 also marked the beginning of Black-footed Albatross translocations and in Feburary 2017, 15 chicks were flown to JCNWR from Midway Atoll National Wildlife Refuge and raised by hand until fledging in early July.

To help boost these incipient colonies, we used a social attraction program involving 10 albatross decoys of each species and a solar powered sound system broadcasting albatross courtship calls. While no wild Black-footed Albatrosses visited the site, more than 300 Laysan Albatrosses visited in 2017 and in December 2017, the first wild Laysan Albatross nest was recorded on the refuge.



Translocated Black-footed Albatross chick with its parent on Midway

First Laysan Albatross nest at James Campbell National Wildlife Refuge.

The predator exclusion fence at JCNWR was completed in October 2016 and protects 16 acres of seabird nesting habitat.

Adult Laysan Albatrosses attracted to decoys and speakers broadcasting albatross courtship calls at JCNWR.

NIHOKU ECOSYSTEM RESTORATION PROJECT

Project website: www.nihoku.org

PARTNERS: Kauai Endangered Seabird Recovery Project, U.S. Fish and Wildlife Service, American Bird Conservancy, Hawaii Department of Land and Natural Resources, National Fish and Wildlife Foundation, and National Tropical Botanical Garden.

2017 Nihoku restoration area

Artificial burrows used for the translocation

Translocated Newell's Shearwater chick

Translocated Hawaiian petrel chicks

Created in 2012 and located at Kilauea Point National Wildlife Refuge on Kauai, the Nihoku Ecosystem Restoration Project's mission is to establish the first fully protected colony of Newell's Shearwaters and Hawaiian Petrels in Hawaii. These are Hawaii's only endemic seabird species and are both listed under the Endangered Species Act of 1973. Causes of their declines include habitat degradation, invasive plants, predation by feral cats, pigs, rats, and introduced Barn Owls, and collisions with power lines and structures exacerbated by light attraction.

To create a protected colony of these species, we built a 2400 foot-long predator-proof fence enclosing approximately eight acres at Nihoku in late 2014, and we eradicated all mammalian predators shortly afterwards. In 2015 and 2016, we cleared non-native vegetation from 25% of the fenced area (~2 acres) and planted more than 10,000 native plants representing 30 species to begin restoring the habitat.

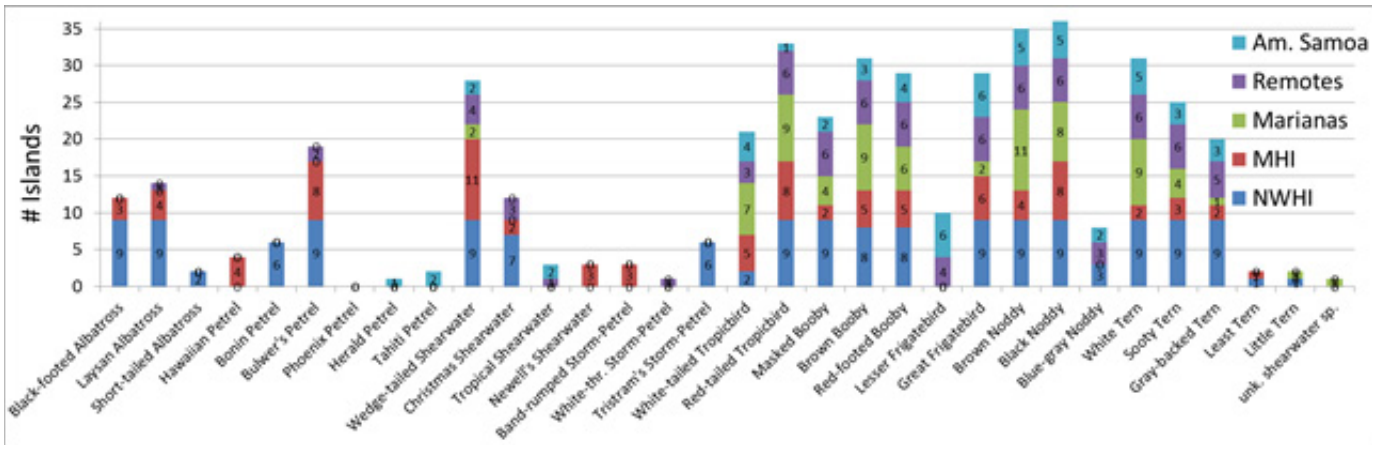
From 2012-2017, potential source colonies of Newell's Shearwaters and Hawaiian Petrels were located by the Kauai Endangered Seabird Recovery Project at locations around Kaua`i. In 2017, 18 Newell's Shearwaters and 20 Hawaiian Petrels were translocated into the site and 100% of them fledged. Since translocatione began in 2015, 75 listed seabirds have fledged from this site.

Celebrating a successful translocation season

US TROPICAL PACIFIC SEABIRD MONITORING ASSESSMENT

PARTNERS: US Fish and Wildlife Service, National Park Service, American Samoa Department of Marine and Wildlife Resources

We partnered with the USFWS migratory birds office to conduct a gap analysis of seabird monitoring in the US Tropical Pacific (USTP). The USTP is a globally important area for seabirds, supporting breeding populations of at least 31 seabird species in five geographic regions: the Main Hawaiian Islands (MHI), the Northwestern Hawaiian Islands (NWHI), the Mariana Islands (MI), American Samoa (AS), and Pacific Remote Islands Marine National Monument (Remotes). In order to better understand seabird monitoring in the USTP, identify gaps in geographic and species coverages, and provide strategic guidance, an electronic questionnaire was distributed to resource managers and biologists in the USTP. It included questions about species present at each site and various aspects of the monitoring activities, including what types of data are being or have been collected for each species. We used the resulting information to summarize monitoring activities in the USTP and to identify gaps in geographic and species coverages.



Seabird species present it the USTP and # of islands on which they occur in each region.

A three day workshop with seabird managers working in the USTP was held in July 2017 to discuss the results, monitoring needs, and to begin standardizing methods.

We also travelled to American Samoa in November 2017 in order to meet with staff from the National Park Service and American Samoa Department of Marine and Wildlife Resources to help build capacity. The goals of the visit were to: 1) gather information about American Samoa to complete the gap report, visit several of the highest priority sites, with the appropriate managers, in order to better understand the challenges and needs related to monitoring seabirds at each site; and 3) develop monitoring methods for the monitoring manual, particularly for rare petrels.

Two reports will be produced from this project: 1) A Summary and gap report of seabird monitoring in the USTP, and 2) a seabird monitoring manual that includes specific methods and recommendations for various sites and monitoring scenarios. The documents will be finalized in early 2018 and be made publically available on the PRC website as well as on the USFWS website.

HONOULIULI PREDATOR EXCLUSION FENCE

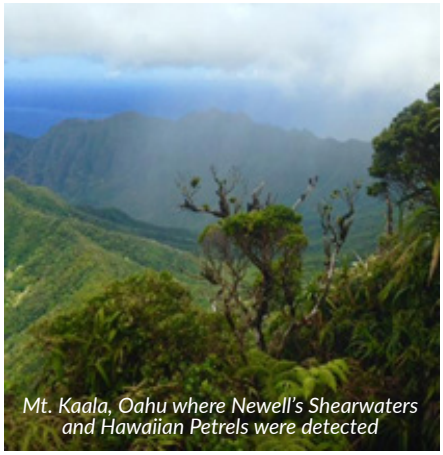
PARTNERS: US Fish and Wildlife Service and Pono Pacific Land Management

Honouliuli wetland

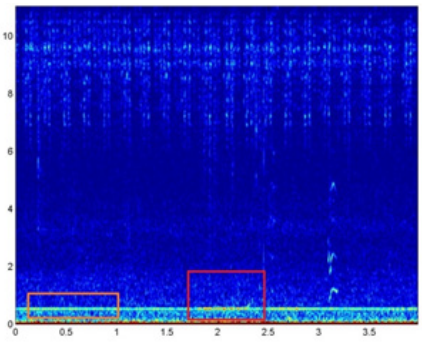
Completed section of predator exclusion fencing

In September, we began work with Pono Pacific on the construction of a 1km long predator exclusion fence at Honouliuli National Wildlife Refuge on the edge of Pearl Harbor to protect endangered waterbirds from predation by non-native predators. The fence follows the designs used at James Campbell NWR, with stainless steel mesh and hood and treated wooden posts for support. Once the fence is complete in early 2018, predators will be removed from the inside. Upon completion, this will be the first predator exclusion fence to protect waterbirds in the state of Hawaii.

OAHU ENDANGERED SEABIRD SURVEYS



Mt. Kaala, Oahu where Newell's Shearwaters and Hawaiian Petrels were detected



Sound spectrogram showing a Hawaiian Petrel call detected at the site (red box) and the low frequency hum of the Kaala station (orange box).

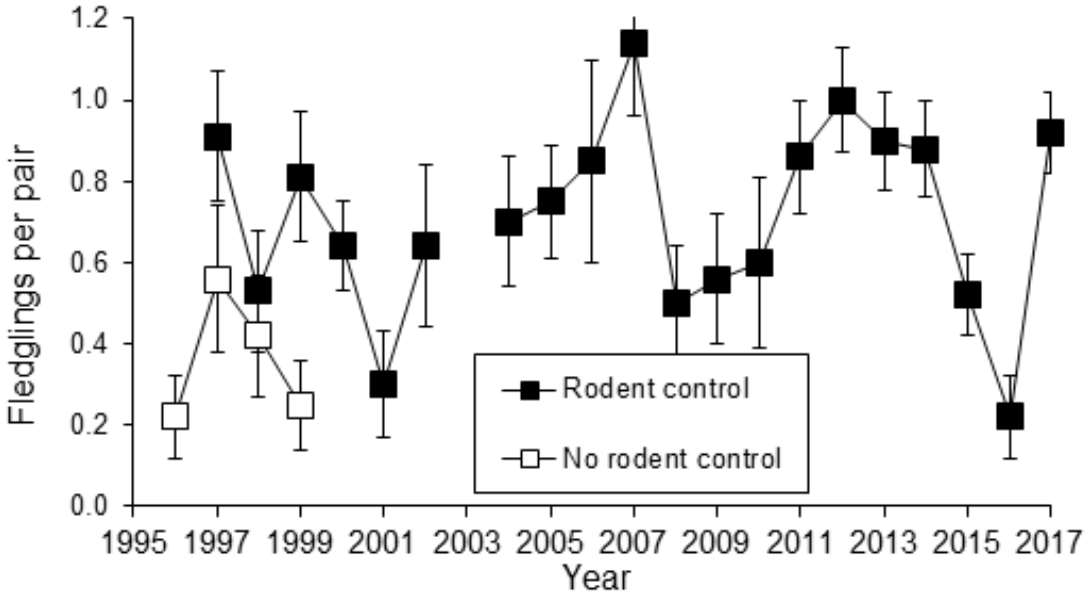
Hawaii's only two endemic seabirds, the Newell's shearwater (Puffinus newelli; NESH) and Hawaiian petrel (Pterodroma sandwichensis; HAPE) are listed as threatened and endangered, respectively, under the US Endangered Species Act. Threats to both species include light attraction and fallout, collisions with power lines and other structures, predation by non-native animals, and habitat degradation. Both species were assumed to be locally extinct on the island of Oahu, despite limited survey effort and fossil evidence indicating that extensive colonies existed post-human contact. From 2016-2017, we deployed 16 automated acoustic recording units across Oahu locations determined t be potentially suitable by habitat modelling. We also used historical bird observations to identify possible remnant breeding locations. More than 4,730 recording hours were obtained from ten recording units. NESH were detected at two sites, one on the leeward slopes of Mount Kaala at 1100m, and another in the Koolau Range at 650m elevation. HAPE were detected at 1100m on the windward slope of Mount Kaala at 1300m elevation. All three sites were in largely intact native forest on steep slopes. Birds were heard on multiple nights in several months of the breeding season, with up to 18 calls detected in a single night. These observations indicate that, at a minimum, both species are regularly prospecting on Oahu, and could potentially be breeding on the island. If breeding, these individuals would represent a missing link in the population connectivity of both species, and thus protecting any remnant populations would be of high conservation value given their recent catastrophic population declines.

OAHU ELEPAIO MONITORING AND RAT CONTROL

A female Oahu Elepaio feeding two nestlings.

Automated pneumatic rat traps made by the Goodnature company from New Zealand were used to increase the rate of rat trapping.

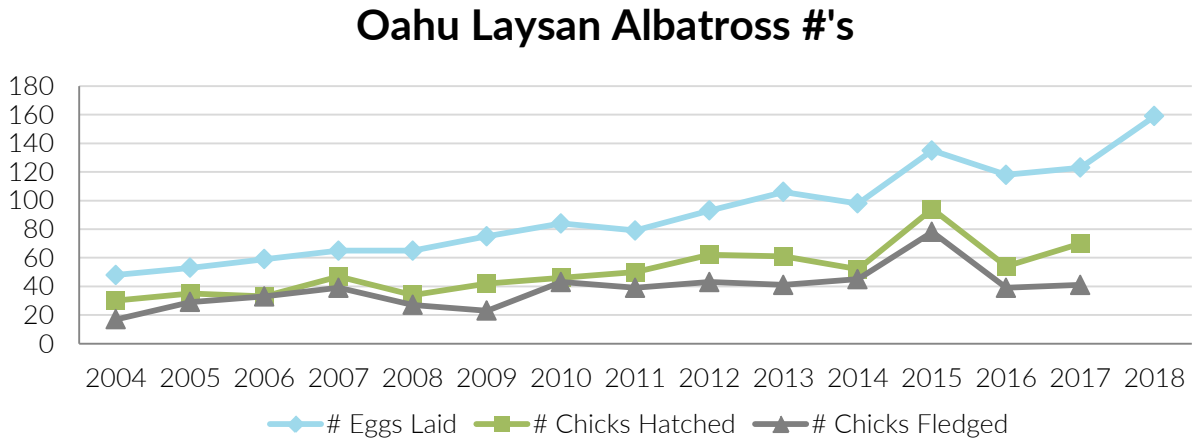
For the 22nd year in a row, in 2017 we again controlled rats in southeastern Oahu and monitored nesting success of the endangered Oahu Elepaio. Predation by invasive black rats is the primary threat to this endemic bird, and rat control is an effective method for increasing nest success and survival of female Oahu Elepaio. We controlled rats in 23 elepaio territories in Wailupe Valley using snap traps and automated pneumatic traps made by the Goodnature company. The rat control program again was effective at reducing rat abundance, and elepaio pairs raised an average of 0.94 fledglings per pair, above the long-term average of 0.73. In 2017 we also resumed rat control and elepaio monitoring in Pia Valley, adjacent to Wailupe, after a hiatus of 10 years, using a crowd-funding campaign. The number of elepaio in Pia Valley had declined in the interim, but hopefully their numbers will start to rebound with the resumption of management.



Rat control has been an effective method of increasing reproduction of Oahu Elepaio, but even with rat control the 2016 breeding season was the worst ever, probably because very dry conditions associated with an El Nino weather pattern caused low abundance of insect prey.

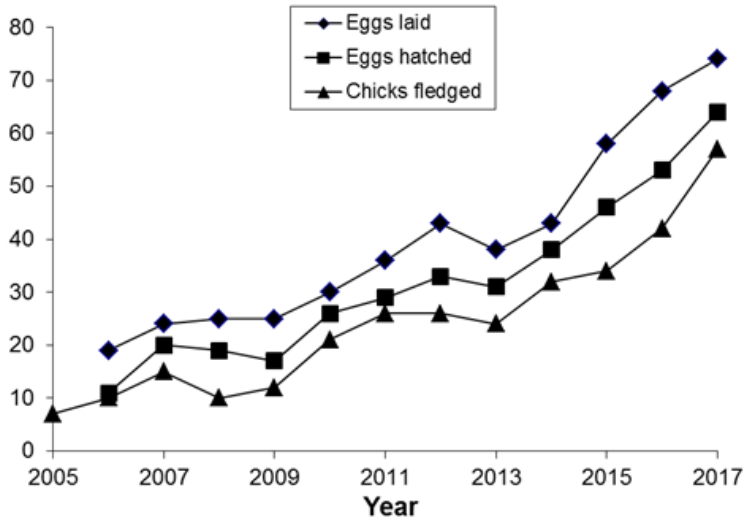
LAYSAN ALBATROSS MONITORING

2017 marked the 14th year in which we have monitored Laysan Albatrosses across Oahu, and it was a below average year in terms of reproductive success, much like 2016. However, the number of birds attempting to nest at Kaena Point has been increasing each year, and larger numbers of chicks are now returning as adults and continue to bolster the population. The number of Laysan Albatrosses nesting at Kaena Point rebounded slightly in 2017, following a sharp drop in numbers in 2016 caused by an act of vandalism in which at least 17 breeding adults were killed. The 2018 breeding season, which starts in late 2017, promises to be a good year, with a large increase in the number of breeding pairs. This is the second largest increase we have seen in a single year, after a dramatic increase in number of breeding pairs in 2015 related to the strong El Nino conditions. In El Nino years, the transition zone chlorophyll front (TZCF) moves closer to Hawaii and reduces the commuting time for breeding albatrosses to reach their preferred foraging rounds (they forage at the TZCF). At the end of 2017, we banded our 1400th albatross on Oahu, and estimate the population to be in excess of 500 individuals.



EFFECTS OF PREDATOR CONTROL ON REPRODUCTIVE SUCCESS OF RED-TAILED TROPICBIRDS

For the 12th year in a row, we controlled predators to protect a nesting colony of Red-tailed Tropicbirds in southeastern Oahu. We used a variety of traps to remove mongooses and rats and we monitored nesting success of tropicbirds. This management has been highly effective and has allowed this small, struggling colony to flourish and grow. It is now the third largest Red-tailed Tropicbird colony in the main Hawaiian Islands and may serve as a source of birds to recolonize other sites on Oahu. It also has become valuable as a study site for this species because it is so easily accessible. For the past two years we have worked with partners from the US Geological Survey Southwest Fisheries Science Center and San Jose State University to track Red-tailed Tropicbirds at sea to better understand their foraging behavior and marine habitat use.



Predator control has allowed a struggling colony of Red-tailed Tropicbirds in southeaster Oahu to flourish and increase over the past 12 years.

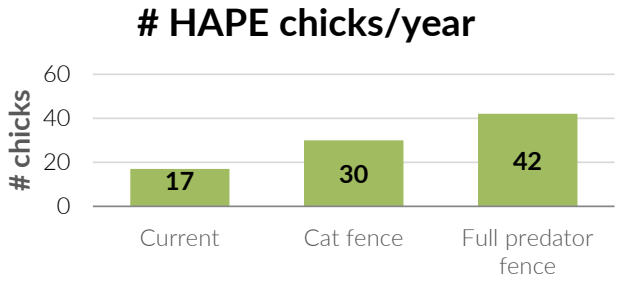
LANAI PREDATOR EXCLUSION FENCE ASSESSMENTS

PARTNERS: Pulama Lānaʻi, Kauai Endangered Seabird Recovery Project, Pono Pacific

The purpose of this project was to identify, visit, and assess the conservation fencing potential for two seabird breeding locations of Hawaiian Petrels (HAPE; Hiʻi unit) and Wedge-tailed Shearwater (WTSH; Hulopoʻe unit) on the island of Lānaʻi. A comparison the relative feasibility, cost, and expected species benefits of full predator-proof fencing, cat-proof/rodent-resistant fencing with continued rodent control inside the fenced area and predator control through trapping (existing strategy) was also conducted to facilitate decision making.. The Hiʻi unit is a large montane site in which the fence would be built along the ridgelines, and protect a minimum of 75 active HAPE burrows. The Hulopoʻe fence would be a peninsula-style fence (i.e. with open coastal ends) to protect 1600 Wedge-tailed Shearwater pairs.

When a cost-benefit analysis was done and the financial costs were spread amongst a 30 year period, the a predator proof fence at Hiʻi broke even (i.e. comparable to existing management costs) after 22 years whereas a cat fence did not break even within the 30 year timeframe due to the increased annual management costs of perpetually controlling rodents . At Hulopoʻe, a predator proof fence broke even after 28 years and a cat fence after 30 years. The increased break-even time at this site was due to ongoing annual biosecurity costs associated with the peninsula-style fence design. Biologically, a full predator fence was expected to more than double HAPE reproductive success (from 0.22 to 0.56) and a cat-proof fence would increase reproductive success from 0.22 to 0.4 resulting anywhere from 13 to 25 additional petrels fledglings produced at Hiʻi each year. At Hulopoʻe, a full predator fence could potentially increase WTSH reproductive success from 0.37 to 0.56, and a cat fence could increase reproductive success from 0.37 to 0.47 resulting anywhere from 160 to 304 additional fledglings each year. The numbers used to conduct these analyses were based on predation and reproductive success rates calculated on Lānaʻi and in the published literature along with the known seabird colony sizes at each location.

As a result of the differences in biological outcomes of the two strategies, as well as the long term costs associated with them, full predator fencing and eradication was recommended for both sites. While this requires a larger initial investment, it will likely be less expensive, and be much more biologically effective over time compared to perpetual predator control. Once constructed, these fences would secure a total of 142 acres of habitat and protect a substantial number of nesting seabirds in addition to several listed plants that also are susceptible to predation.



RESEARCH

We continue to actively collect data on all of our projects with the goal of publishing in the peer reviewed literature. Current research projects not already mentioned above and being written up for publication include:

- *The Nihoku Ecosystem Restoration Project: A case study in predator proof fencing, ecosystem restoration and seabird translocation.*
- *Translocations of Newell's Shearwaters and Hawaiian Petrels to create a new colony*
- *Evidence of current populations of Newell's Shearwaters and Hawaiian Petrels on Oahu, Hawaii*
- *Designing predator proof fences for Hawaii: Results of a survey of sanctuaries in New Zealand and Hawaii and ground testing of new fence designs*
- *Results of mammalian eradications within three predator exclusion fences in Hawaii*
- *Demography, survival, and at-sea habitat use of Laysan Albatross*

Recent peer reviewed publications

Bakker, V.J., Finkelstein, M.E., Doak, D.F., VanderWerf, E.A., Young, L.C., Arata, J., Sievert, P.R. and Vanderlip, C. 2017. The albatross of assessing and managing risk for long- lived pelagic seabirds. Biological Conservation. 217: 83-95.

Clatterbuck, C.A., Young, L.C., VanderWerf, E.A., Naiman, A.D., Bower, G.C. and Shaffer, S.A. 2017. Data loggers in artificial eggs reveal that egg-turning behavior varies on multiple ecological scales in seabirds. The Auk. 134: 432-442.

VanderWerf, E.A., R.E. David, P. Donaldson, R. May, H.D. Pratt, P. Pyle, and L. Tanino. 2017. Hawaiian Islands bird checklist – 2017. 'Elepaio 77(5):33-42.

FINANCIAL INFORMATION

DIRECT REVENUE

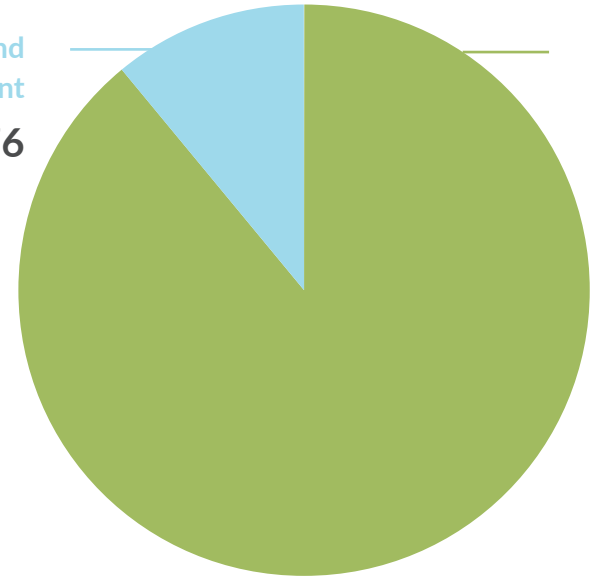
$952,738.87

DIRECT EXPENSES

$893,307.43

Operations and development

$99,208.76



Conservation programs

$853,530.11

FINANCIAL HEALTH

Assets	$223,669.63
Liabilities	$18,568.14
Net Assets	$205,101.49

FUNDERS

National Fish and Wildlife Foundation

U.S. Fish & Wildlife Service

the David & Lucile Packard Foundation

Pūlama Lānaʻi

Forestry and Wildlife Hawaii

American Bird Conservancy

Earthjustice

Kauaʻi Island Utility Cooperative

Atherton Family Foundation

Harold K.L. Castle Foundation

HEI Hawaiian Electric Industries, Inc.

SUPPORTERS:

Aaron Hebshi
Anonymous
Arim Choi
Byron Chin
Carol Titcomb
Cathy Granholm
Chauncey Ching
Chelsea Wagner
Cherie Kalohi
Coral King
David Fitzpatrick
Deborah Zysman
Diane Ohata
Dick May
Doris & Kenneth Nagatani
Edward Hollidge
Elizabeth Doherty
Emily McCarren
Erik Kloninger
Eunjoo Jang
Fast Enterprises
General Contractors Association of Hawaii
Graham Cuddy
Hugo DeVries
Jackie Smith
Jhamandas Watumull Fund
Jody Smith
Joely Brady
John and Becky Faunce
Julie Murphy
Karen Shishido
Kathy Shimata
Kelly Stewart
Kimberly Williams
Kristen Smith
Krystle Smith
Les Force
Lisa Powell
Louise Barnfield
Lynn Kitakawa
Malama Learning Center
Marilynne Keyser
Mary McClure
Melissa Dollard
Melissa Lane
Michelle Zajac
Mike Scott
Nanci Baker
Nancy Hedlund
Nancy Mitchell
Neilia Amato
Nicki Pignoli
Phil Gagnon
Quito Braun-Ortega
Rich Downs
Robin Baird
Sally Hinshaw
Sara Guldin
Sayo Nakagawa
Sonia Stephens
Stephanie Ching
Susan Dierker
Tricia McDeed

VOLUNTEERS:

Amanda Talpas
Carly Fisher
Chuck Feinberg
Daxton Brooks
Edna Diaz Negron
Ellen Benson
Jackie Smith
Jade Licudine
Jiny Kim
Jody Smith
Julie Feinberg
Keelan Barcina
Kim Jiny
Kristy Lapenta
Landon Gold
Leila Nagatani
Leilani Fowlke
Liat Portner
Mary Jo
Matt Chauvin
Molly Hagemann
Nick Vargas
Philip Kitamura
Sarah Donahue
Taylor Smith
Terry Lopez
Yo Takada

2017 PARTNERSHIPS AND COLLABORATORS