



U.S. Fish and Wildlife Service

PACIFIC ISLANDS FISH AND WILDLIFE OFFICE
ANNUAL REPORT
FISCAL YEAR 2007



Pacific Islands Fish and Wildlife Office

Fiscal Year 2007

Message from the Field Supervisor

Hawai'i and the Pacific Islands present many challenges for the conservation of Federal trust resources. This report highlights recent efforts of the Pacific Islands Fish and Wildlife Office (PIFWO) of the U.S. Fish and Wildlife Service's Ecological Services Division to conserve and protect trust resources.

Our area of responsibility includes Hawai'i, American Samoa, Guam, the Commonwealth of the Northern Mariana Islands, and other former trust territories in the Pacific. We live and work on islands that are flung far and wide over a great expanse, five million square miles of ocean. Travel to most of our area must be by air; some islands have no landing strips and can only be reached by boat. Remote mountain tops on many islands, where much of the remaining native species can be found, are only accessible via helicopter.

These islands are populated by people with widely different cultural priorities and sensitivities. Additionally many island governments do not have the financial resources available to address the many challenges facing their natural resources. We have 394 listed species in the Pacific Islands. Ninety five percent of these listed species are endangered. We have 28 percent of the Nation's listed species and 35 percent of the Nation's endangered species. We have 115 candidate species and over 1,000 species of concern. More than 150 plant species have fewer than 50 individuals remaining in the wild.

In spite of these challenges, progress is being made to conserve and recover Federal trust species. Our office is working with a wide array of partners to advance the conservation of Federal trust resources on a number of fronts. We find common ground with State, Territory, Commonwealth and local governments as well as with other Federal agencies, and together we are making headway on many long-standing challenges. Our involvement in watershed partnerships, the Offshore Islet Restoration Committee, and other multi-party efforts is proving its worth with each successive year. The Hawaiian Bird Conservation Focal Areas and Ecosystem Recovery Initiatives has directed financial and technical assistance within Hawai'i and increased cross-program recovery efforts. On the cutting edge of conservation, the our office has funded and provided technical assistance for the first predator-proof fence in the United States and the first national registration of a pesticide for conservation purposes (to control invasive species).

We know that whatever success or progress is made, it would not be possible without our many collaborative partners.

Patrick Leonard
Field Supervisor

Mission

Working with others to conserve, protect and enhance fish, wildlife, and plants and their habitats for the continuing benefit of the American people.

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Front Cover Photo: Removal of non-native invasive fountain grass (*Pennisetum setaceum*) from hawksbill sea turtle nesting habitat on the island of Hawai'i. Photo courtesy of Yamanaka Enterprise, Inc.

Inside Spread: Alaka'i Plateau on the island of Kaua'i. Photo courtesy of Cheryl Phillipson.

About the Pacific Islands Ecoregion

Area

The Pacific Islands Fish and Wildlife Office's area of responsibility includes Hawai'i, American Samoa, Guam, the Northern Mariana Islands, and other U.S. Islands and the former trust territories in the Pacific. These areas represent eight political jurisdictions and a myriad of cultures and languages.

Geography

This area includes 2,300 islands distributed over 5 million square miles of ocean with more than 6,500 miles of coast-line, and encompasses approximately 90% (13,254 square miles) of U.S. coral reefs. These islands contain a range of unique habitat types that support huge numbers of endemic species, hundreds of which are listed as threatened or endangered.

Land Ownership

Very little land in the Pacific Islands is owned by the Federal government (Hawai'i: 5%, American Samoa: 5%, Guam: 28%; Northern Marianas: 6%), making cooperative partnerships vital to the conservation of Federal trust resources.

Human Population

Estimated population numbers are as follows:

Hawai'i: 1,285,498 (2006 Census)

Guam: 154,805 (2000 Census)

Commonwealth of the Northern Mariana Islands: 69,221 (2000 Census)

American Samoa: 57,291 (2000 Census)

Republic of Palau: 19,129 (2000 Census)

Republic of the Marshall Islands: 50,840 (1999 Census)

Congressional Delegations

Hawai'i

Senator Daniel Inouye

Senator Daniel Akaka

Representative Neil Abercrombie (District 1)

Representative Mazie Hirono (District 2)

American Samoa

Delegate Eni Faleomavaega

Guam

Delegate Madeleine Bordallo

Commonwealth of the Northern Mariana Islands

Resident Representative Pedro Tenorio

PIFWO At-risk Species

Endangered..... 378

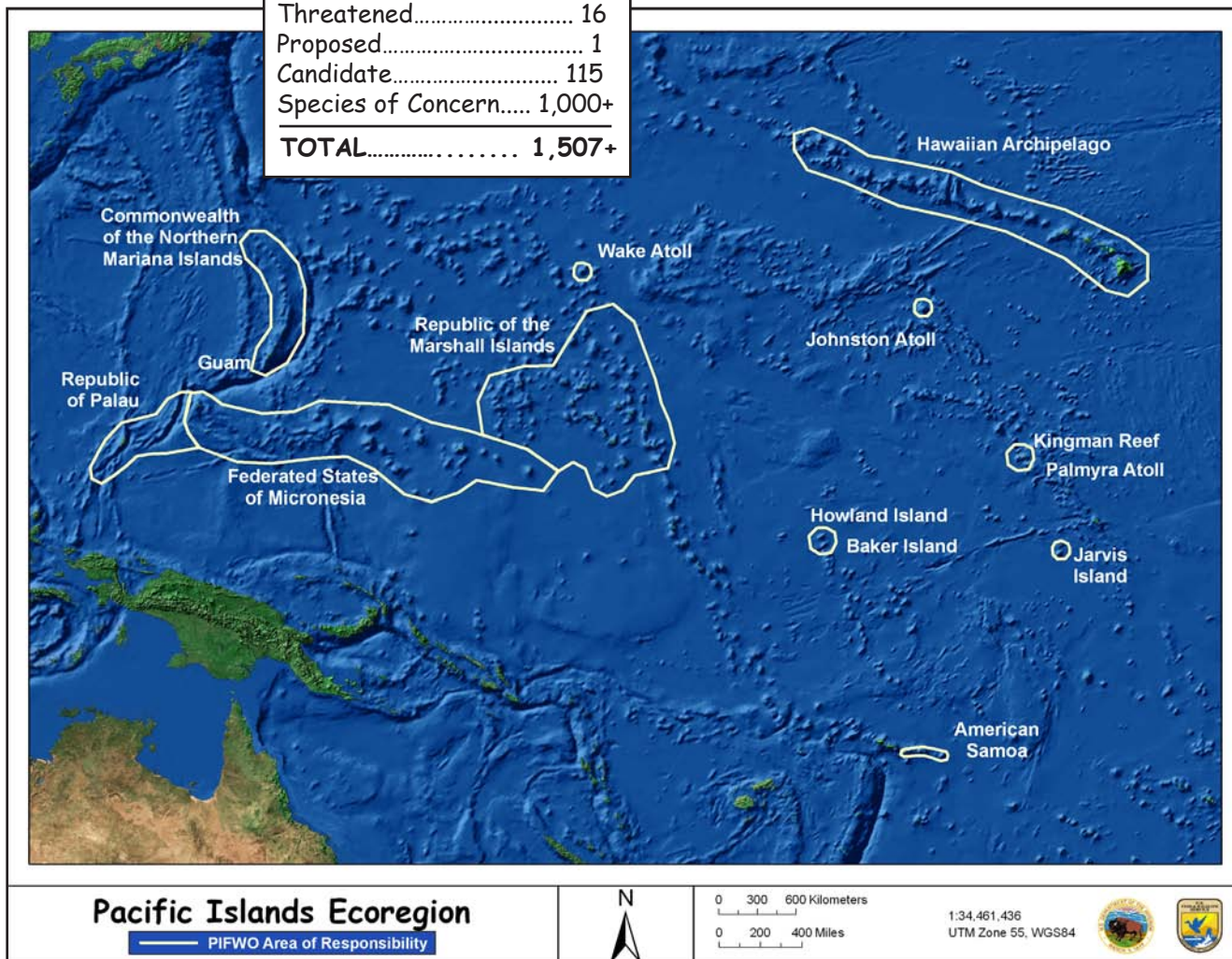
Threatened..... 16

Proposed..... 1

Candidate..... 115

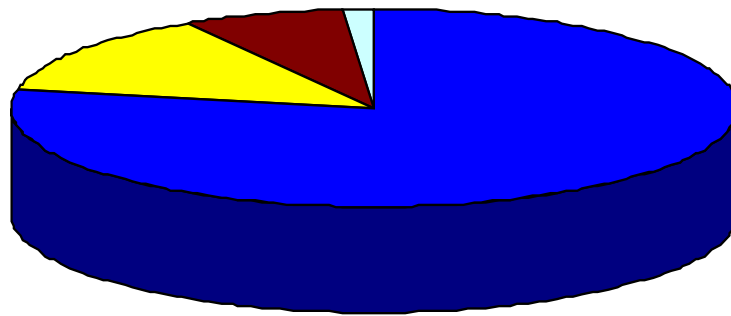
Species of Concern..... 1,000+

TOTAL..... 1,507+



PIFWO Funding

Fiscal Year 2007 Budget Summary



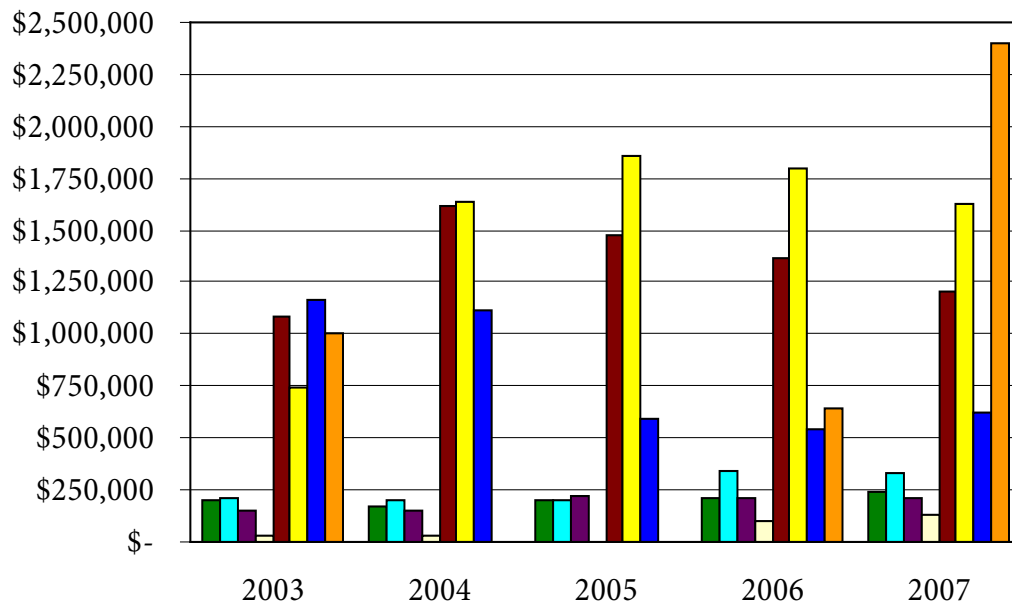
■ Base Funds.....	\$ 8,148,089
■ Other Funds.....	\$ 1,409,854
■ Reimbursable..	\$ 736,796
■ NRDA*.....	\$ 148,305
FY07 TOTAL	\$10,443,044

*Natural Resources Damage Assessment

During Fiscal Year 2007 PIFWO spent 26% or \$2,739,870 of the total budget for on-the-ground projects to benefit trust species.

USFWS Division of Federal Aid obligated an additional \$4,031,132 for conservation projects in Hawai'i.

Funding for Projects



■ Partners for Fish and Wildlife.....	\$ 236,482
■ Pacific Islands Coastal Program.....	\$ 326,859
■ Aquatic Nuisance Species.....	\$ 208,107
■ Prelisting and Listing.....	\$ 123,123
■ Endangered Species Recovery.....	\$ 1,364,129
■ Recovery Land Acquisition Grant*	\$ 1,631,132
■ Private Stewardship Grant.....	\$ 625,420
■ National Coastal Wetlands Conservation Grant*..	\$ 2,400,000

TOTAL PROJECT FUNDING **\$ 6,771,002**

*Funding obligated from USFWS Division of Federal Aid.

Conservation Initiatives

The Pacific Islands Fish and Wildlife Office (PIFWO) started three conservation initiatives during fiscal year 2007 as well as continued support of on-going initiatives to conserve and protect trust species. These conservation initiatives are designed to recover threatened and endangered species with the goal of downlisting and eventually delisting species, and to reduce threats and increase populations of candidate species to prevent the need for listing in the future.

Initiatives started during fiscal year 2007 include:

- Hawaiian Bird Conservation Focal Area Initiative
- Ecosystem Recovery
- Hawai'i Fish Habitat Partnership Initiative

On-going initiatives include:

- Candidate Conservation Pilot Project
- Preventing Extinction and Showing Success National Recovery Funding Initiative

Staff from the three divisions in PIFWO – Endangered Species, Habitat Conservation, and Invasive Species and Marianas – work collaboratively to contribute technical and financial assistance and biological expertise to implement projects under these conservation initiatives.

Hawaiian Bird Conservation Focal Area Initiative

The Hawaiian Bird Conservation Focal Area Initiative targets a subset of priority bird species with diverse habitat needs.

Conservation efforts for these bird species and the associated protection of their habitat will benefit a much broader array of co-occurring bird, invertebrate, and plant species. Four project areas were identified for this initiative based on the opportunity for success, active involvement of other partners, conservation need, and recent and ongoing activities in these project areas.



Laysan duck. Photo courtesy of Jimmy Breeden.

- Recovery of Laysan ducks and Nihoa millerbirds
- Seabird conservation in the Hawaiian Archipelago
- Waterbird recovery in the main Hawaiian Islands
- Forest bird recovery on the island of Hawai'i

These project areas are the core focus of cross-program recovery efforts within PIFWO. More than \$100,000 of Endangered Species Recovery and Pacific Islands Coastal Program Funding was used to support projects that will contribute to the recovery of Laysan ducks and Nihoa millerbirds. Programs within the Endangered Species and Habitat Conservation Divisions contributed approximately \$900,000 toward seabird conservation in the Hawaiian Archipelago and more than \$250,000 toward waterbird recovery on the main Hawaiian Islands. The Conservation Partnerships Program provided technical assistance to



Hawaiian stilt. Photo courtesy of NRCS.

partners to obtain more than \$4.3 million from grant sources administered by the Division of Federal Aid and Section 6 Funding Program to acquire and/or restore habitat for seabirds and waterbirds and to develop a multiple species Habitat Conservation Plan, further contributing to these project areas as part of the initiative. A programmatic Safe Harbor Agreement in partnership with the Natural Resources Conservation Service, State of Hawaii Department of Land and Natural Resources Division of Forestry and

Wildlife, and the Resource, Conservation, and Development Councils was approved by PIFWO to encourage restoration of wetlands habitats on private lands. Nearly \$600,000 of Endangered Species Recovery Funding will support habitat restoration, captive propagation, and reintroduction efforts for endangered forest birds on the island of Hawai'i.

In addition to funding on-the-ground projects, several programs have contributed to the conservation of seabirds in Hawaiian Archipelago by assisting with development of the Kaua'i island-wide multiple species Habitat Conservation Plan, reviewing the status of black-footed albatross, working with partner action agencies to perform radar and other surveys for seabirds, initiating the creation of a seabird database, and providing long-term support for the development and implementation of rodent control techniques.



Newell's shearwater. USFWS Photo

To reduce threats to native Hawaiian birds, the Invasive Species Program provides long-term support for the development and implementation of rodent control techniques. This effort has led to the first national registration of a rodenticide for conservation purposes in the United States. The Invasive Species Program also provides support for preventing the spread of and controlling brown treesnakes. Through the work of the Invasive

Species Program and cross programmatic collaboration, PIFWO is supporting the implementation of control techniques through specific projects in a wide range of habitats to foster recovery of threatened and endangered species under the Focal Area Initiative.



Preparing bait stations. USFWS Photo.

Ecosystem Recovery

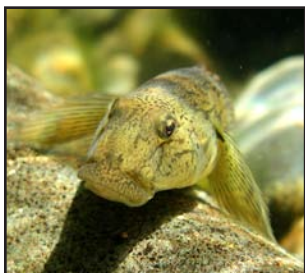
PIFWO initiated an ecosystem-based approach to increase the efficiency of listing and recovery under the Endangered Species Act. Grouping species that occur in the same ecosystem and share common threats and conservation needs is an efficient approach to achieve recovery and may preclude the need to list additional species that co-occur in these ecosystems. Beginning with the island of Kaua'i, PIFWO is developing a proposed rule for to list and designate critical habitat for 48 species of plants and animals endemic to the island, including 10 of the highest priority candidate species in the country.



Island of Kaua'i. Photo courtesy of TNC.

While we are still listing and designating critical habitat for individual species, organizing these species by common ecosystems based on shared threats and conservation needs allows us to reduce the inherent redundancy that follows from a traditional species-by-species approach to the 5-factor analysis, as well as streamline the designation of critical habitat. In addition, the evaluation of threats on an ecosystem scale lends itself to more efficient management actions that provide benefits to multiple species and allows proactive conservation efforts that may prevent the need for listing additional species in the future. Listing packages for the islands of O'ahu, Maui Nui (Maui, Lāna'i, and Moloka'i), and Hawai'i are planned to follow the same format, grouping species that co-occur in the same habitat types.

Hawai'i Fish Habitat Partnership Initiative



Native goby. Photo courtesy of Gordon Smith.

PIFWO initiated interagency coordination for the formation of the Hawai'i Fish Habitat Partnership (HFHP) under the umbrella of the National Fish Habitat Action Plan. The HFHP increases the presence of the USFWS Fisheries Division in the Pacific Islands Ecoregion. The partnerships follow the successful "Joint Venture" model of the North American

Waterfowl Management Plan, which changed the face of wetland conservation in the 1980s. The HFHP will focus on fish and their habitats to conserve the full range of aquatic habitats and biodiversity within the Hawaiian Islands. Anticipated projects include restoration of high priority

streams, wetlands, anchialine pools, and estuary habitats to increase populations of native aquatic organisms. The Coastal Conservation Program within PIFWO is successfully guiding the growth of this partnership.

Candidate Conservation Pilot Project

The Partners for Fish and Wildlife Program contributed to the Candidate Conservation Pilot Project by prioritizing its restoration efforts with the goal of precluding the need to list three candidate species and one species of concern. These species were selected because the threats they face could be removed through habitat improvement projects funded by the Partners for Fish and Wildlife Program. Removal of these threats would likely lead to the removal of these species from the candidate list by the year 2010.

The species selected for the Pacific Islands Ecoregion are:

- *Bidens conjuncta* (ko'oko'olau) - candidate
- *Geranium hillebrandii* (nohoanu) - candidate
- *Myrsine vaccinioides* (kōlea) - candidate
- *Argyroxiphium caliginis* ('eke silversword, 'āhinahina) - species of concern

All four plant species are found in wet forests and/or bogs and are endemic to the island of Maui. They also are all threatened by feral pigs, which are highly destructive to the plants' habitat and act as vectors for invasive non-native plants that out-compete the native plants for space, light, water, and/or nutrients. Because of the similarities in habitat and threats they face, all four of these plant taxa can easily benefit from implementation of the same conservation activities – fencing, removal of pigs, and control of invasive non-native plant species – and monitoring procedures. In addition, these species occur in the West Maui Mountains Watershed Partnership Area, identified by the Partners for Fish and Wildlife Program as one of 10 focus areas in the main Hawaiian Islands.



'Eke silversword. Photo courtesy of Art Medeiros.

Conservation actions that minimize threats are currently being implemented for 75 percent of these candidate species' populations. Fencing and removal of ungulates have successfully stabilized population numbers, but continued mapping and tracking of population numbers are necessary to remove these plant species from candidate status. We are confident that with further conservation of these selected species, together with long-term monitoring and maintenance; we will achieve our goal of eliminating/controlling threats and removing these plant species from

candidate status. Two projects funded by the Partners for Fish and Wildlife Program during fiscal year 2006 are being implemented and will contribute to this initiative. During fiscal year 2007, a Private Stewardship Grant funded a project to strategically install fences to exclude feral pigs from wet forest habitats, bogs, and continuous perennial streams.



Habitat improvement as a result of fencing to exclude pigs. USFWS photo.

Preventing Extinction and Showing Success National Recovery Funding Initiative



Tinian monarch. Photo courtesy of Tim Sutterfield.

This USFWS national initiative provides recovery funding through a competitive process for 1) the implementation of urgently needed actions for critically endangered species to prevent extinction, and 2) the implementation of final recovery actions for species near delisting or downlisting to show successful recovery of

species. The PIFWO and the Hawaiian and Pacific Islands National Wildlife Refuge Complex continue to provide financial and technical assistance for recovery actions for conservation research on the Nihoa millerbird, initially funded during fiscal year 2006 with \$40,000 from the Preventing Extinction Initiative. The brown treesnake containment barrier on the island of Tinian, funded by the Showing Success Initiative, was completed during fiscal year 2007. This barrier protects the recently delisted Tinian monarch, endangered Micronesian megapode, and threatened Mariana fruit bat by preventing the treesnake from getting established on Tinian.



Mariana fruit bat. Photo courtesy of Curt Kessler.

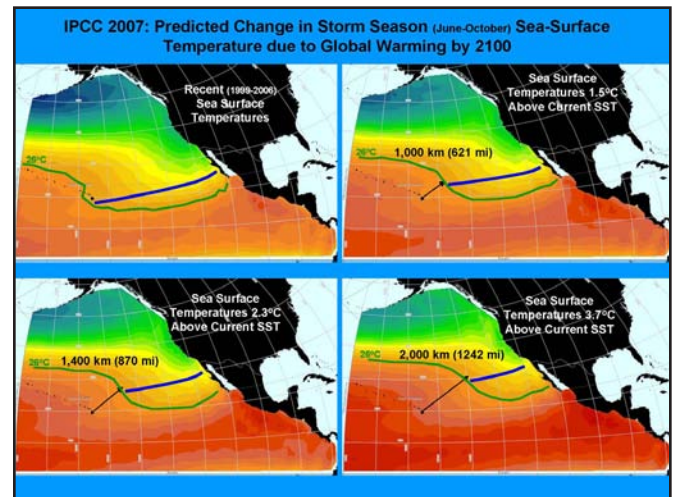
Other PIFWO Program Activities

Priority Conservation Focus Area Analysis

During fiscal year 2007, the Pacific Island Conservation Partnerships Program initiated analyses of geospatial and biological data to identify priority conservation areas within the main Hawaiian Islands. By prioritizing areas for conservation, the Pacific Island Conservation Partnerships Program can develop projects that make the greatest contribution to the conservation of Federal trust species and their habitats. Methodologies developed for the main Hawaiian Islands will also be used to identify priority conservation focus areas within other areas of the Pacific Islands. Priority conservation area planning supports ecosystem recovery efforts by identifying areas that provide suitable habitat for the highest concentration of listed species and contain the most intact native habitats.

Hawai'i and Global Climate Change

The PIFWO, in conjunction with the United States Geological Survey Biological Resources Discipline, is working to promote the development of climate change models that are conducted at a regionally relevant scale for



Hawai'i and other Pacific islands. Global climate change will likely alter seasonal and geographic patterns of precipitation throughout the Pacific. Patterns of precipitation, combined with elevation and relief, promote a wide range of growth conditions that have supported the diversification of Hawaiian plants and animals. Therefore, climate change will likely alter habitats for threatened and endangered species in a dramatic fashion. Current global climate models cannot be run at a fine enough scale to provide geographically useful information for Hawai'i and the other Pacific Islands. PIFWO completed an initial assessment of the potential impacts of climate change in Hawai'i. Based on the results of this assessment, anticipated effects of climate change include an increase in the frequency and intensity of severe weather, a decrease in annual precipitation and changes in seasonal and geographic patterns of precipitation across ecological regimes, an increase in ocean acidification and

ocean temperature, and a rise in sea level. Results of this initial assessment and regional climate change models will allow biologists to evaluate the potential ecological impacts and anticipated changes affecting natural resources within Hawai'i and other Pacific islands. Results will also guide habitat restoration and recovery efforts within the four project areas of the Focal Area Initiative to ensure that recovered populations of listed species are sustainable for the long-term as well as short-term.



Ka'ena Point, O'ahu. USFWS Photo.

Partners for Fish and Wildlife Celebrates 20 Years

Nation-wide, the Partners for Fish and Wildlife Program celebrated its 20th anniversary during fiscal year 2007. This program provides financial and technical assistance to private landowners to implement habitat restoration projects. Since 1997, the local Partners for Fish and Wildlife Program has contributed over \$6.7 million to implement restoration projects in Hawai'i. Projects target unique ecosystems with listed species: caves that provide habitat for listed invertebrates, bogs that contain diverse and rare plant species, dryland forests that have disappeared from most of the islands, wetlands that are home to endangered waterfowl, and island watersheds that connect rainforests with coral reefs. The Partners for Fish and Wildlife program continued its successful development and implementation of restoration projects on private lands by providing more than \$200,000 to four projects on the islands of O'ahu and Hawai'i during fiscal year 2007. A programmatic strategic plan for 2007–2011 was developed by the Partners for Fish and Wildlife Program as part of a national planning effort of the USFWS and provides a framework for directing funding and technical assistance to project partners.



Pacific Islands Coastal Program

The Pacific Islands Coastal Program is one of 21 USFWS Coastal Programs around the nation. Established in fiscal year 2000, the Pacific Islands Coastal Program funds habitat



restoration, biological surveys, GIS mapping, applied restoration research, and environmental education in order to further coastal conservation. During fiscal year 2007, the Pacific Islands Coastal Program provided more than \$325,000 to fund nine projects in Hawai'i, America Samoa, the Territory of Guam, the Republic of Palau, and the Federated States of Micronesia. A programmatic strategic plan for 2007–2011 was developed by the Pacific Islands Coastal Program as part of a national planning effort of the USFWS and provides a framework for directing funding and technical assistance to project partners.

Private Stewardship Grant Program

The Private Stewardship Grants Program is a focused effort to restore habitat on private land for species that are endangered, threatened, candidates, or species of concern. During fiscal year 2007, four projects in Hawai'i were awarded more than \$600,000 out of roughly \$7.2 million available nationwide. These projects will help conserve and restore native habitat for Federal trust species of the islands of Hawai'i and Maui. This program was discontinued nationally in fiscal year 2008.



Volunteers at the Auwahi restoration site. Photo courtesy of Maui Restoration Group.

Critical Habitat Proposed for Hawaiian Picture-wing Flies

The Listing Program drafted a revised proposal to designate approximately 9,200 acres of critical habitat for 12 Hawaiian picture-wing flies on the islands of Kaua'i, O'ahu, Maui, Moloka'i, and Hawai'i. The revised proposal was published in the *Federal Register* on November 28, 2007. The proposed critical habitat is on lands under Federal, state, private, and City and County of Honolulu ownership. Six

of the picture-wing flies are found on O'ahu, three on the island of Hawai'i, and one each on Kaua'i, Moloka'i, and Maui. In addition, the Listing Program reviewed and assessed the status of 115 Pacific Island candidate species for the USFWS 2007 Candidate Notice of Review, published in the *Federal Register* on December 6, 2007.



Hawaiian picture-wing fly. Photo courtesy of The Honolulu Advertiser.

Conservation of Rare Plants



Phyllostegia hispida. Photo courtesy of Hank Oppenheimer.

A proposal to list *Phyllostegia hispida*, a non-aromatic vine in the mint family (Lamiaceae) endemic to the wet forests of eastern Moloka'i, was published in the *Federal Register* on February 19, 2008. At present, there are only 10 known wild plants, all discovered in May 2007 within the Pu'u Ali'i Natural Area Reserve. In addition, there are 23 individuals recently planted into the wild. Over the next two years, the Listing Program intends to finalize the listing and propose the designation of critical habitat within the required statutory time frame.

The national Preventing Extinction Initiative and the PIFWO Endangered Species Recovery Program provided funds for the Plant Extinction Prevention Program to implement conservation actions for the most critically endangered Hawaiian plants. During 2007, USFWS completed reviews of 16 endangered plant species. Based on current population numbers and threats, all species were determined to still warrant listing as endangered.

Consultation and Technical Assistance Program

Section 7 of the Endangered Species Act (Act) outlines the procedures for Federal interagency cooperation to conserve listed species and designated critical habitat. This section of the Act provides some of the most valuable and powerful tools to conserve listed species, assist with species' recovery, and help protect critical habitat. The Consultation and Technical Assistance Program became a separate program within PIFWO in May 2006.

Since that time the program has assisted with over 400 projects throughout the Hawaiian islands,

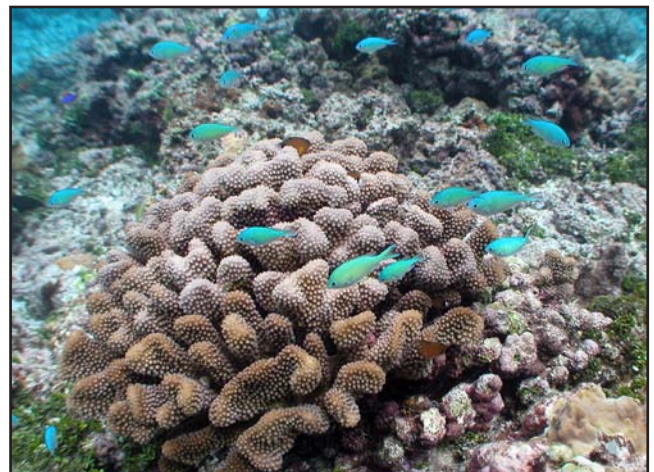


Monitoring *Sanicula mariversa*. Photo courtesy of U.S. Army Natural Resources.

Guam, and the Commonwealth of the Northern Marianas. The scope of these projects range from technical assistance such as species lists, to formal consultations, which address wide-scale project impacts such as road construction or military training on Department of Defense lands. The Consultation Program works with all Federal and non-Federal entities to help avoid and minimize project impacts to listed species or critical habitat. If impacts do occur, then appropriate conservation measures to benefit the species are identified, including activities such as threat abatement, land preservation, or habitat enhancement.

Conservation of Coral Reefs and Aquatic Resources

The Coastal Conservation Program provides conservation planning assistance to Federal and state agencies for high-priority infrastructure, development, and defense projects affecting coastal aquatic and marine resources. Through the Fish and Wildlife Coordination Act and other relevant authorities, the primary objective of the Coastal Conservation Program is to reduce project impacts to protect and conserve coral reef, wetland, and stream ecosystems and enhance or restore these habitats through implementation of effective compensatory mitigation. The



Coral reef habitat at American Samoa. Photo courtesy of NPS.

Coastal Conservation Program assists in the development and implementation of Hawai'i's Local Action Strategies that address the primary threats to coral reefs and assists in the implementation of special inventory and monitoring projects that benefit Federal trust resources in coastal aquatic and marine environments throughout the Pacific Islands. External partnering at many levels is an inherent component of the conservation planning activities. Internally, the Coastal Conservation Program coordinates with other PIFWO grant programs and initiatives to help direct cost-share funding and technical assistance to a wide range of conservation activities that directly and indirectly benefit coastal aquatic and coral reef resources.

Invasive Species Program

The Invasive Species Program aims to control, eradicate and prevent the establishment of introduced invasive species that negatively affect USFWS trust resources and their habitats. Invasive species that threaten trust resources in Hawai'i and other Pacific Islands include marine algae,



Non-native Norway rat. Photo courtesy of Jack Jeffrey.

alien terrestrial plants and insects, mammalian predators (e.g., mongooses and rats), mosquito-born diseases (e.g., avian malaria), and feral ungulates (e.g., pigs, deer, and goats). The Invasive Species Program supports development and implementation of control

techniques for incipient and established populations of invasive species. The Invasive Species Program also provides cross-programmatic technical assistance for habitat restoration.

Brown Treesnake Control

The introduction of the brown treesnake has caused significant negative ecological, economic, and human health impacts to the Territory of Guam. Prevention of this catastrophe on other islands in the Pacific and support for brown treesnake control efforts on Guam are a priority for the PIFWO. The PIFWO provides coordination for multi-agency brown treesnake control efforts regionally and nationally through the legislatively mandated Brown Treesnake Working Group. The PIFWO has a staff member dedicated to brown treesnake issues stationed with the Commonwealth of the Northern Mariana Islands Division



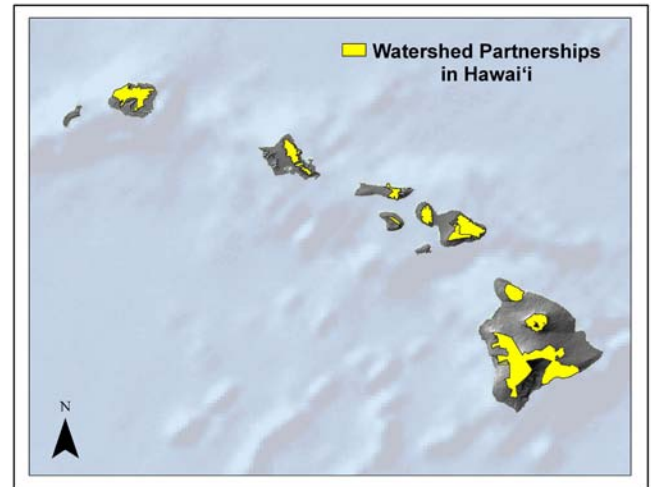
Brown treesnake. Photo courtesy of Malamalama.

of Fish and Wildlife. This position is funded by the Department of Interior's Office of Insular Affairs and managed through a cooperative agreement between Commonwealth of the the Northern Mariana Islands Division of Fish and Wildlife and the PIFWO.

Watershed Partnerships

The PIFWO works with other conservation organizations and government agencies at all levels to develop collaborative conservation projects that maximize benefit to the resources. One such area of collaboration is watershed partnerships within Hawai'i. The Watershed Partnerships are voluntary associations of public and private landowners and managers committed to the common value of protecting large areas of forested watersheds for recharge of water resources, conservation of native species, and other vital ecosystem services. These areas encompass more than one million

acres and include the highest concentrations of listed species, currently providing habitat for over 60 percent of listed species in the Pacific Islands Ecoregion.



Hawaii Wetland Joint Venture

Established within the past year, the Hawai'i Wetland Joint Venture has facilitated collaboration among partners in obtaining funds and providing technical assistance for wetland restoration, contributing to the waterbird recovery on the main Hawaiian Islands as part of the PIFWO Hawaiian Bird Conservation Focal Area Initiative. During fiscal year 2007, the State of Hawai'i received \$2.4 million from the National Coastal Wetland Grant program for acquisition and/or restoration of wetlands and associated uplands on the islands of Maui, O'ahu, and Kaua'i.



Mahalo nui loa to all of our partners who contribute to the conservation of trust resources.



Work group at Mākua Rim. Photo courtesy of U.S. Army Natural Resources.



Surveillance for avian influenza. USFWS Photo.



Students at Mokulua offshore islets. USFWS Photo.

Hawai‘i State-wide and Pacific Islands Regional Projects

Hawaiian Endangered Bird Conservation Program

Since 1993, the collaborative Hawaiian Endangered Bird Conservation Program (HEBCP), including the Zoological Society of San Diego, State of Hawai‘i Division of Forestry and Wildlife, and USFWS, has developed and managed several highly successful captive propagation and reintroduction programs for endangered Hawaiian birds. Facilities for captive propagation and release include the Keauhou Bird Conservation Center (KBCC) near Volcano on the island of Hawai‘i and the Maui Bird Conservation Center on the island of Maui. Since its inception, the program has raised and released significant numbers of endangered Hawaiian birds. The nēnē or Hawaiian goose is now established on the islands of Kaua‘i, Maui, Moloka‘i, and Hawai‘i and a second breeding population of palila has been established on Mauna Kea on the island of Hawai‘i. Ongoing releases of puaiohi on Kaua‘i have increased numbers of this species in the wild, and techniques for captive propagation

of the Maui parrotbill, Hawai‘i creeper, and Hawai‘i ‘ākepa have been developed. In addition to USFWS Section 6 funds provided by the State of Hawai‘i, the PIFWO provides \$550,000 to the HEBCP annually for operation of the captive propagation and reintroduction program. The PIFWO provided \$80,000 for aviary construction that will increase holding capacity at the KBCC by eight birds to meet anticipated breeding aviary needs for the ‘alalā during 2008. Although the ‘alalā is believed to be extirpated from the wild, the HEBCP has developed unique techniques and infrastructure that have enabled the captive flock to grow to its present size of 56 birds. During 2007, the HEBCP released 41 puaiohi on the Alaka‘i Plateau on the island of Kaua‘i, 12 Hawai‘i ‘ākepa and 6 Hawai‘i creeper on the island of Hawai‘i, and 40 nēnē on the island of Maui. In addition, the HEBCP successfully hatched 4 ‘alalā and 3 palila.

Cooperator: Zoological Society of San Diego
USFWS Contact: Jay Nelson
Funding Program: Endangered Species Recovery



Aviary at Keauhou Bird Conservation Center for captive propagation of ‘alalā. Photo courtesy of Zoological Society of San Diego.



Biologists Jenny Hoskins and Jeff Burgett swabbing a mallard to test for avian influenza. Photo courtesy of The Honolulu Advertiser.

Avian Influenza Surveillance for the Pacific Region

Avian influenza is endemic in wild populations of waterfowl and many other species of birds. The emergence and spread of a Highly Pathogenic Avian Influenza (HPAI) H5N1 subtype in Asia over the past few years (hereafter called Asian H5N1) has elevated concerns about potential expansion of this virus to Pacific Islands. Much of the coverage includes speculation that migratory birds are a primary vector of Asian H5N1. Government agencies in the U.S., particularly state and Federal wildlife agencies, were called upon to develop an early detection system to determine if and when the virus arrives. A total of 4,077 samples were collected from Hawai‘i, Guam, the Commonwealth of the Northern Mariana Islands, American Samoa, Marshall Islands, and Palau between September 2006 and April 2007. Fecal samples comprised the majority (70%) of the samples with most samples collected from shorebirds. Capture methods used included mist nets, whoosh nets, cannon nets, walk-in traps (Guam/CNMI only), and swim-in duck traps. The most commonly sampled species were Pacific golden plovers (*Pluvialis fulva*), ruddy turnstones (*Arenaria interpres*), Philippine turtle doves (*Streptopelia bitorquata*; Guam only) and mallards (*Anas platyrhynchos*). Of the 4,077 samples collected, no HPAI was detected and only a single non H5/H7 LPAI was detected from a Pacific golden plover caught in American Samoa.

Cooperators: USDA Animal and Plant Health Inspection Service
State of Hawai‘i DLNR Department of Forestry and Wildlife
University of Hawai‘i Pacific Cooperative Studies Unit
Palau Conservation Society
American Samoa Department of Marine & Wildlife Resources

USFWS Contact: Shelly Kremer
Funding Program: Migratory Birds

Conservation Uses of Rodenticides

The PIFWO continues to build its rodent control program. Staff provide technical assistance for a bait station registration for Ramik® Green (Hacco, Inc., Madison, Wisconsin) for conservation purposes in Hawai'i that is used by a large number of state, Federal, and private landowners. This year the Environmental Protection Agency approved the national registration for conservation use of diphacinone, the first pesticide ever registered nationally solely for the purpose of protecting native species and ecosystems in the United States. This registration allows for the application of Ramik® Green in bait stations, by hand and aerial broadcast, and burrow and canopy placement on islands. Wildlife managers in the United States and its associated territories now can use a technique that has played a critical role in species and ecosystem recovery in New Zealand and other important conservation areas worldwide. A registration for a larger pellet size primarily for rainforest use is under regulatory review in Hawai'i.



Seeds of *Pittosporum* spp., eaten by rats. Photo courtesy of Jack Jeffrey.

Cooperator: USDA Animal and Plant Health Inspection Service
USFWS Contact: Katie Swift
Funding Program: Endangered Species Recovery



A healthy species of *Cyanea* (top) and a species of *Cyanea* following defoliation by rats (bottom). Photos courtesy of Hank Oppenheimer (top) and U.S. Army (bottom).



Recreational birding may be affected if brown treesnakes are introduced to Hawai'i. Photo by USFWS.

Economic Impact of the Introduction of the Brown Treesnake on Tourism in Hawai'i

The goal of this project is to produce a comprehensive assessment of the potential economic impact of the introduction of the brown treesnake (*Boiga irregularis*) to Hawai'i. Accurate tourist survey data are needed for a revised input-output model that will be used to predict potential impacts of brown treesnake establishment, if it ever occurs, on the economy of the State of Hawai'i. Project objectives are to determine weights for the major market areas affected, identify the major visitor activities affected, and assess the impact of snake presence on choice of tourist destination. The Coordinating Group on Alien Pest Species and USDA Animal and Plant Health Inspection Service are providing technical assistance for this project.

Cooperator: CRC & Associates
USFWS Contact: Karl Buermeyer
Funding Program: Aquatic Nuisance Species

Programmatic Safe Harbor Agreement for Five Species of Waterbirds

This agreement was approved by the USFWS during September 2007 and is awaiting a decision by the State of Hawai'i before it can be implemented.

The objective of this agreement is to provide an island-wide mechanism for non-Federal landowners who are participants of USDA Farm Bill conservation programs to provide secure habitat for the Hawaiian goose (*Branta sandvicensis*), Hawaiian duck (*Anas wyvilliana*), Hawaiian common moorhen (*Gallinula chloropus sandvicensis*), Hawaiian coot (*Fulica alai*), and Hawaiian stilt (*Himantopus*



Hawaiian common moorhen (*Gallinula chloropus sandvicensis*). USFWS Photo.

mexicanus knudseni). In return for providing habitat for these listed species, landowners receive assurances that they will be able to continue their ongoing land use practices and should they wish to, return their properties to their baseline condition at the end of the permit term.

The agreement, developed in cooperation with the USDA Natural Conservation Resources Service and the State of Hawai'i, provides a mechanism to implement necessary conservation actions outlined in the recovery plans for the Hawaiian waterbirds and the Hawaiian goose.

Cooperators: Resource Conservation and Development Councils

USFWS Contact: Chris Mullen

Funding Program: Endangered Species Recovery



Hawaiian duck duckling (*Anas wyvilliana*). Photo courtesy of Brenda Zaun.

Pacific Islands Region Mitigation Working Group

Based on a report prepared for the U.S. Coral Reef Task Force entitled *Compensatory Mitigation for Coral Reef Impacts in the Pacific Islands*, the PIFWO spearheaded formation of the Pacific Islands Region Mitigation Working Group (PIRWG), which also includes Environmental Protection Agency, National Marine Fisheries Service, U.S. Army Corps of Engineers, State of Hawai'i Division of Aquatic Resources, and Guam Division of Aquatic and Wildlife Resources. During 2007, the PIRWG increased its focus on integrating Local Action Strategies developed to address the primary threats to coral reef ecosystems with the Federal compensatory mitigation planning process. This integration was implemented in a large Navy project (Kilo Wharf Expansion) in Guam. The PIRWG advocated development of realistic performance criteria and monitoring protocols for incorporation into the mitigation actions to make mitigation projects more defensible in terms of their objectives, scales, and costs. The PIRWG has continued to work with the Navy on a new military expansion being planned for the Mariana Islands. The Navy has expressed interest in becoming an active PIRWG member to continue collaboration on improving the compensatory mitigation process.

Cooperators: Multiple agencies

USFWS Contact: Michael Molina

Funding Program: Conservation Planning Assistance



Three members of the Pacific Islands Region Mitigation Working Group (from left to right) Michael Molina, John Naughton, and Kevin Foster. Yellow foliated coral (*Turbinaria reniformis*) is in the background. USFWS Photo.



Black-tipped reef shark (*Carcharhinus melanopterus*) in Guam's coral reef. Photo courtesy of National Oceanic and Atmospheric Administration.

Hawai'i Fish Habitat Partnership

The PIFWO initiated interagency coordination for the formation of the Hawai'i Fish Habitat Partnership under the umbrella of the National Fish Habitat Action Plan. The participation of a broad range of aquatic resource managers, conservation planners, landowners, researchers, and others is anticipated to result in a broad and diverse partnership with leadership provided by the PIFWO. Activities completed during 2007 included meetings and site visits by the Pacific Region Assistant Regional Director for Fisheries and other Fisheries Division staff, an informational meeting attended by 10 potential partner organizations, and development of a strategic planning workshop. This effort increases the USFWS Fisheries Division "presence" in the Pacific



'O'opu nāpili (*Sycopterus stimpsoni*) is a fish species native to Hawai'i capable of climbing waterfalls. Photo courtesy of Gordon Smith.

Islands. The Hawai'i Fish Habitat Partnership will focus initial conservation planning and implementation efforts on macrofauna native to Hawai'i streams, stream mouth estuary habitat, and freshwater and estuarine sport fishery species. Projects will include planning and implementation of fish habitat restoration and aquatic resource stock enhancement

projects such as enhancement of migratory fish passage, prevention and control of aquatic invasive species and restoration of instream flow. The Hawai'i Fish Habitat Partnership is under development and will request official "candidate status" by the National Fish Habitat Board during fiscal year 2008, following which the partnership will seek full recognition.

Cooperators: Multiple agencies and organizations

USFWS Contact: Gordon Smith

Funding Programs: Fisheries Program

2008 Hawai'i Federal Junior Duck Stamp Calendar

The 2008 calendar highlights the 2007 first place winners of Hawai'i's Federal Junior Duck Stamp Contest. The contest provides students the opportunity to learn about the various waterfowl from Hawaii and the mainland. Students are encouraged to learn about the importance of habitat conservation, threats to the various species, and what they can do to help protect the species and their habitats. Over 1,000 calendars were printed and distributed to local schools to promote a positive environmental awareness in the youth of Hawai'i.

Cooperator: USFWS Division of External Affairs

USFWS Contact: Sandra Hall

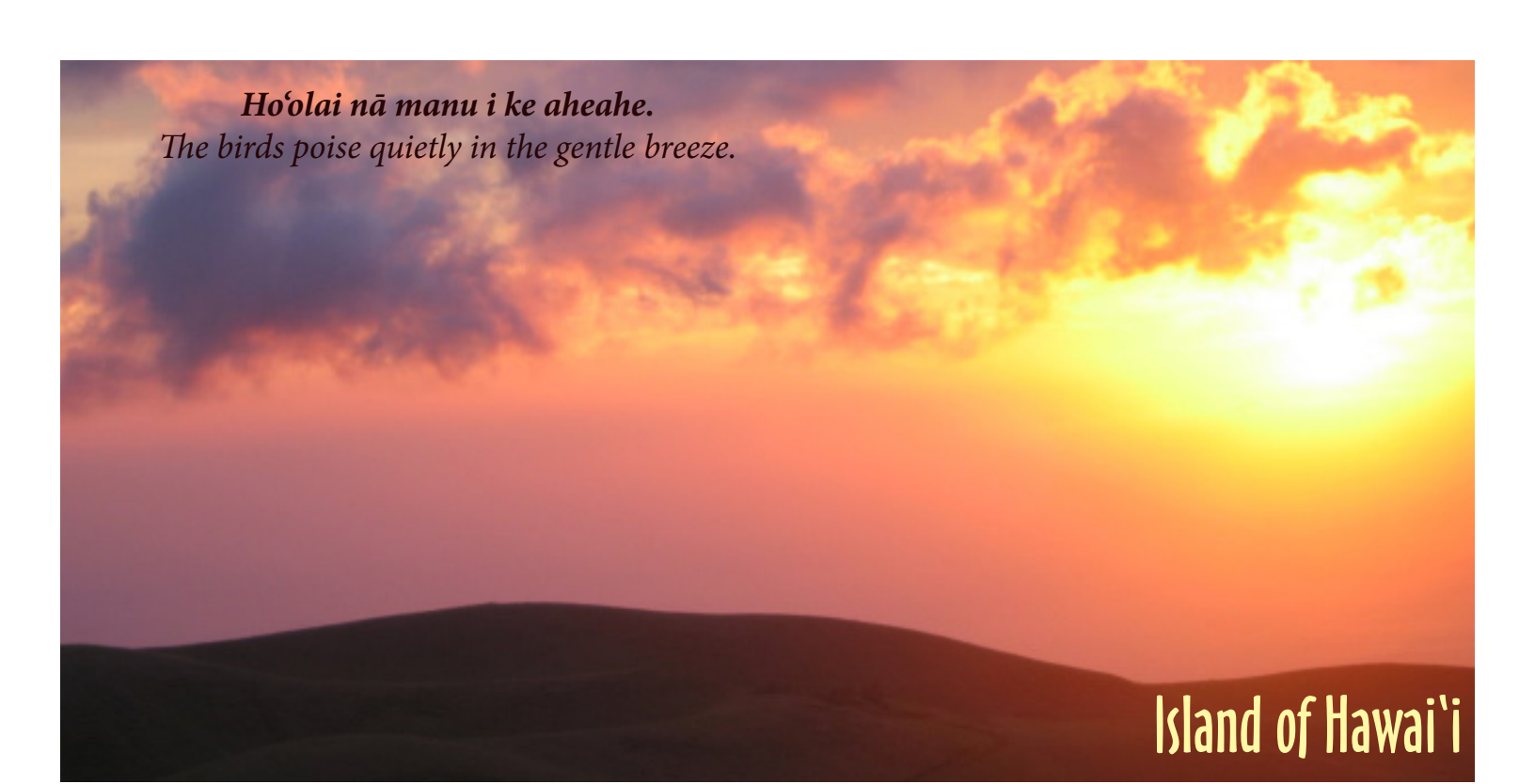
Funding Program: Endangered Species Recovery



Tributary of Upper Limahuli Stream. Photo courtesy of Gordon Smith.



Pastel drawing by Paula Albaneze, 16, of Moanalua High School won "Best of Show" during the 2007 Hawai'i Federal Junior Duck Stamp Contest and was featured on the cover of the 2008 calendar.



*Ho'olai nā manu i ke aheahe.
The birds poise quietly in the gentle breeze.*

Island of Hawai'i

The island of Hawai'i is the youngest and largest island in the Hawaiian archipelago. It is formed by five coalesced volcanoes, the oldest being about 0.46 million years old. Mauna Kea, a dormant volcano, rises 13,796 feet above sea level and is the highest point in the Hawaiian Archipelago. Its large elevation gradient and presence of three active volcanoes, combined with its large land mass make the island of Hawai'i the most ecologically diverse island within the archipelago. Alpine deserts occur on the summits of Mauna Kea and Mauna Loa above 9,000 feet surrounded by subalpine shrubland and forest above 6,000 feet. The island of Hawai'i supports five species of endemic forest birds and several species of endemic invertebrates, including the wēkiu bug (*Nysius wekiuicola*) which is adapted to survive in the alpine zone. Anchialine pools are most abundant on the island of Hawai'i; 80 percent of all anchialine pools worldwide are located there. Coastal beaches support nesting hawksbill sea turtles (*Eretmochelys imbricata*) and Hawaiian green sea turtles (*Chelonia mydas*).

Koa-ōhi'a (*Acacia-Metrosideros*) forests support several endangered species of forest birds including the Hawai'i creeper (*Oreomystis mana*), 'akiapōlā'au (*Hemignathus munroi*), and Hawai'i 'ākepa (*Loxops coccineus*); historically these forests also supported Hawaiian crows (*Corvus hawaiiensis*). Extirpated from the wild, the Hawaiian crow is bred in captivity to support its eventual reintroduction. Because the island of Hawai'i exhibits the largest elevation gradient in the main Hawaiian Islands, it was selected as a priority for conservation of forest birds. If predictions of global climate change for Hawai'i are true and lower elevation habitats become unsuitable, native forest birds may have the ability to move upslope to more suitable habitats.

Three project areas identified by the **PIFWO Hawaiian Bird Conservation Focal Area Initiative** include the island of Hawai'i:

- 1) Seabird conservation in the Hawaiian Archipelago;
- 2) Waterbird recovery in the main Hawaiian Islands; and
- 3) Forest bird recovery on the island of Hawai'i.

Objectives are:

- 1) Identify, improve, and protect sufficient breeding habitat to conserve seabirds;
- 2) Protect sufficient habitat and populations of Hawaiian stilts, Hawaiian coots, Hawaiian moorhen, Hawaiian ducks, and Hawaiian geese; and
- 3) Conserve, protect, and restore native forests for native forest birds.

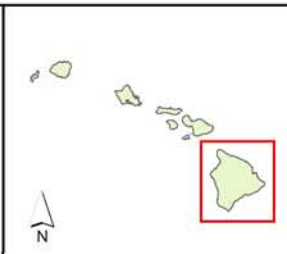
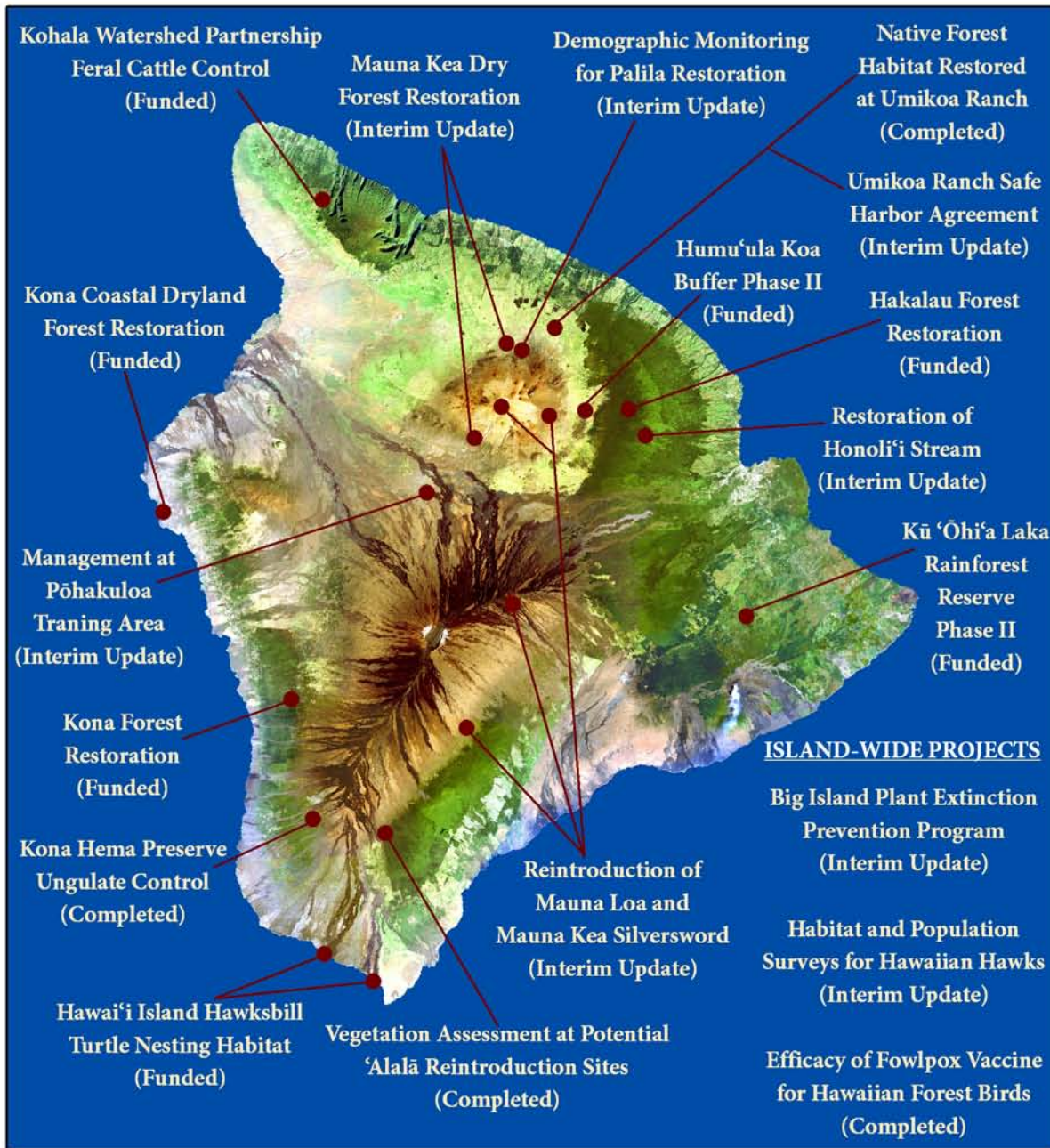
During fiscal year 2007, the PIFWO contributed over \$500,000 to support forest bird and waterbird project areas on the island of Hawai'i. These projects include restoration of riparian and montane wetlands for waterbirds, and captive breeding of endangered forest birds. Based on a vegetation assessment completed during 2007, initial release sites were recommended for reintroduction of the Hawaiian crow.

Key partnerships include:

- Zoological Society of San Diego, State of Hawai'i DLNR Division of Forestry and Wildlife, National Park Service, USGS Biological Resources Discipline, and Hakalau NWR Complex for support of endangered forest birds recovery;
- Non-profit conservation organizations, who assist with project implementation; and
- Corporate and private landowners, who have supported conservation actions.

Pacific Islands Fish and Wildlife Office

2007 Island of Hawai'i Projects



1:1,142,355
UTM Zone 4, NAD83

0 2 4 Kilometers
0 3 6 Miles





Native 'apapane with a species of *Culex* mosquito. Photo © Jack Jeffrey

Efficacy of a Commercial Fowlpox Vaccine for Hawaiian Forest Birds

The primary objective of this study was to test the efficacy of a commercially available, live-attenuated fowlpox vaccine against the three strains of virus that have been detected in forest bird populations, particularly the non-fowlpox Types 2 and 3 that have been isolated only from passerine hosts. If a commercial vaccine is effective against one or more of these strains, then it is a potential new tool for use with captive propagation efforts, translocation and reintroduction of threatened and endangered birds, and management of small, critically endangered populations. Unfortunately, there was 10% mortality of Hawai'i 'amakihi (*Hemignathus virens*, non-listed species) exposed to the live-attenuated fowlpox vaccine. The vaccine was only partially protective and caused pathology in some of the test subjects. This strongly suggests it will be necessary to develop a pox vaccine based on local strains of the avian pox virus.

Cooperator: USGS Biological Resources Discipline
USFWS Contact: Jay Nelson
Funding Program: Endangered Species Recovery

Habitat Evaluation and Population Survey for Hawaiian Hawks

The primary objective of this study was to estimate the distribution and abundance of the Hawaiian hawk (*Buteo solitarius*) and map its habitat on the island of Hawai'i. An island-wide population and habitat evaluation survey was completed during the summer of 2007. Using revised and consistent methods, researchers recalculated and compared the population size and density of Hawaiian hawks between 1998-1999 and 2007. During 2007, the estimated Hawaiian hawk population was between 2,496 and 3,680 individuals. There was no significant difference in population sizes and densities between 1998 and 2007 and no evidence that the hawk's spatial distribution had changed, suggesting the population is stable. Preferred nesting habitat of Hawaiian hawks is in forest areas with large 'ohi'a lehua (*Metrosideros polymorpha*) trees.

Cooperator: USGS Biological Resources Discipline
USFWS Contact: Jay Nelson
Funding Program: Showing Success Initiative

Kohala Watershed Partnership Feral Cattle Control

The goal of this project is to protect 520 acres of wet forest habitats from feral ungulates on the rim of Honokāne Valley within the Kohala Mountains. Three miles of fence will be constructed and a half mile of fence will be repaired on private lands at Kānea'a and Kahuā to exclude feral cattle. Once fence construction is completed, feral cattle will be removed from the project site. In addition to protecting the enclosed lands, these fences will prevent feral cattle from accessing neighboring private and state lands. This region of Kohala is of significant watershed and biological value for several species including the Hawaiian hawk (*Buteo solitarius*), native forest birds, rare plants, and the only known population of the native tree snail *Partulina physa*. Removal of feral cattle from this region will also improve water quality within riparian wetland habitats used by Hawaiian ducks (*Anas wyvilliana*).

Cooperator: The Kohala Center
USFWS Contact: Donna Ball
Funding Program: Partners for Fish and Wildlife



Succinea spp., a land snail native to Hawai'i. Photo courtesy of Kohala Watershed Partnership.



Hawaiian hawk (*Buteo solitarius*). Photo courtesy of Jack Jeffrey.

Kona Coastal Dryland Forest Restoration

The goal of this project is to expand the current 10-acre restoration to include an additional 3 acres of dryland forest at the boundary of Kaloko-Honokōhau National Historical Park and Honokōhau Harbor on the island of Hawai'i. Restoration actions include removal of invasive species, collection and propagation of native seeds, maintenance of the nursery, planting, broadcasting of seeds, monitoring, database management, and volunteer coordination. A 12-week adult education class will provide hands-on skills for native plant restoration.

Cooperator: Tropical Reforestation and Ecosystems Education
USFWS Contact: Chris Swenson
Funding Program: Pacific Islands Coastal Program



The endangered loulu palm (*Pritchardia affinis*) propagated for Kona reforestation. Photo courtesy of Jill Wagner.

Kona Hema Preserve Ungulate Control

The objective of this project was to remove feral ungulates, within three fenced management units, from the 8,089-acre Kona Hema Preserve. To date, a total of 971 feral pigs, 85 mouflon sheep, and 70 feral goats have been removed. Various techniques were used to remove the animals such as trapping, snaring, hunting with dogs and using helicopters. All three management units are believed to be ungulate free, except for a few remaining mouflon sheep in the Honomalino Management Unit. This action will allow native forest vegetation to recover from ungulate damage and prepare the Preserve for a possible release of the endangered Hawaiian crow or 'alalā which now survives only in captivity.

Partner: The Nature Conservancy
USFWS Contact: Craig Rowland
Funding Program: Private Stewardship Grant



Pig trap used to remove feral pigs from Kona Hema Preserve. USFWS Photo.



Nesting hawksbill sea turtle. Photo courtesy of Will Seitz.

Hawai'i Island Hawksbill Turtle Nesting Habitat

The objective of this project is to protect nesting hawksbill sea turtles at Hāli'ipālala, Kahakahakea, Kā'iliki'i, and Wai 'Ahukini Beaches, located on the longest stretch of undeveloped shoreline in the main Hawaiian Islands. Actions that improve nesting habitat and maximize survival of hawksbill sea turtle hatchlings include control of predators and alien plants, restricting vehicle access to nesting beaches, and disseminating education and outreach materials. Monitoring efforts include documenting hawksbill nesting activity, tagging nesting turtles, protecting nest sites, and helping hatchlings to reach the ocean unharmed.

Cooperator: Tropical Nani Kahuku 'Āina, LLC
USFWS Contact: Donna Ball
Funding Program: Private Stewardship Grant



Seedlings of koa (*Acacia koa*) at the Kona Hema Preserve. USFWS Photo.

Demographic Monitoring for Palila Restoration

Palila (*Loxioides bailleui*) have been extirpated from portions of their historic range on Mauna Kea for many years. After adaptively-guided conservation research, palila were reintroduced from 2003-2006 by the United States Geological Survey and the Zoological Society of San Diego to former habitat on the north slope of Mauna Kea using translocation of wild-caught birds and releases of captive-raised birds. Between 2004 and 2007, 22 nests were initiated, and of these 11 young fledged with 5 fledglings surviving to the next breeding season. Three of these five birds exhibited breeding behavior. Monitoring of the north slope population has been instrumental to understanding population status of reintroduced palila and informing management decisions regarding need for additional reintroductions to support the current population.

Cooperator: USGS Biological Resources Discipline
USFWS Contact: Jay Nelson
Funding Program: Endangered Species Recovery



Palila. Photo © Jack Jeffrey

Mauna Kea Dry Forest Restoration

The reintroduced palila on the north slope of Mauna Kea currently require continued management support, including predator control, ungulate removal, and habitat restoration. During 2006 and 2007, the Mauna Kea Dry Forest

Restoration Project removed almost all of the cattle and feral sheep from a 5,000 acre forest restoration enclosure. They also supplied approximately 17,000 māmane (*Sophora chrysophylla*) and 2,000 koa (*Acacia koa*) seeds to the State Tree Nursery in Waimea for germination, planted 2,200 koa and māmane trees within the forest restoration enclosure, and conducted predator control on the north slope of Mauna Kea.

Cooperator: State of Hawai'i DLNR Division of Forestry and Wildlife
USFWS Contact: Jay Nelson
Funding Program: Endangered Species Recovery

Big Island Plant Extinction Prevention Program

The goal of the Plant Extinction Prevention Program is to protect the rarest of the rare Hawaiian plants through on-site management of the last known individuals, collection for genetic storage and reintroduction, and reintroduction of plants into protected areas of suitable habitat. The Big Island staff started work in May 2007. Work on this island to date has included surveying to locate all known and any additional individuals and collecting for genetic storage. Genetic storage will preserve genetic information for species such as *Cyanea shipmannii*, known from only 3 individuals, *Cyanea stictophylla*, known from only 1 individual, and *Isodendron pyriformum*, known from only 4 individuals.

Cooperators: University of Hawai'i Pacific Cooperative Studies Unit
State of Hawai'i DLNR Division of Forestry and Wildlife
USFWS Contact: Marie Brueggemann
Funding Program: Endangered Species Recovery



Isodendron pyriformum, a PEP species on the island of Hawai'i known from only 4 individuals. Photo courtesy of Loyal Mehrhoff.

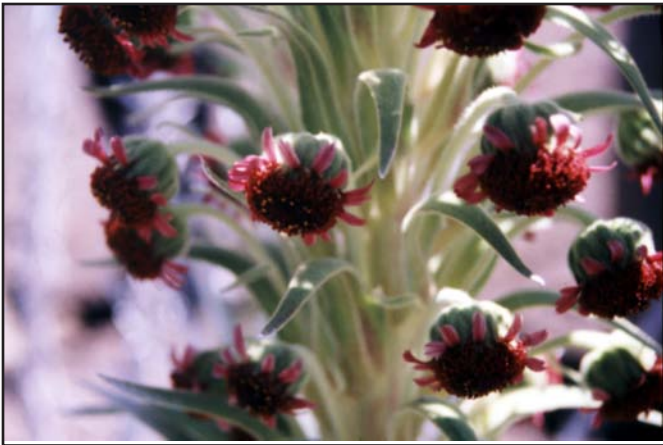


Cyanea stictophylla, propagated from seed at Volcano Rare Plant Facility. Photo courtesy of Marie Brueggemann.

Reintroduction of Mauna Loa and Mauna Kea Silversword on the Island of Hawai'i

This project has been an amazing success, largely due to the efforts of Dr. Robert Robichaux of the Hawaiian Silversword Foundation who coordinates and oversees the work, as well the collaborative efforts of the informal working group. This is one of the largest and most successful reintroduction efforts in the country and is supported by additional contributions from the Volcano Rare Plant Facility, State of Hawaii DLNR Division of Forestry and Wildlife, National Park Service, and USGS Biological Resources Discipline. A maximum number of founders are included in each reintroduced population, over 100 in some cases, taking care not to mix material from populations in different habitat types. In addition, each founder is represented by at least 1,000 individuals. Plants are hand pollinated to increase seed set and grown in the Volcano Rare Plant Facility before planting in appropriate habitat that has been fenced to exclude ungulates. To date, approximately 27,000 Mauna Loa silversword (*Argyroxiphium kauense*) and 8,000 Mauna Kea silversword (*Argyroxiphium sandwicense* ssp. *sandwicense*) plants have been reintroduced, with a survival rate of over 80 percent.

Cooperator: Hawaiian Silversword Foundation
USFWS Contact: Marie Bruegmann
Funding Program: Endangered Species Recovery



Close up of Mauna Kea silversword (*Argyroxiphium sandwicense* ssp. *sandwicense*) in full flower. Photo courtesy of Marie Bruegmann.



'Alalā (*Corvus hawaiiensis*). Photo courtesy of David Ledig.

Humu'ula Koa Buffer Phase II

The objective of the project is to provide a buffer of native forest above the Hakalau Forest National Wildlife Refuge in order to prevent the spread of gorse (*Ulex europaeus*), an invasive alien plant, reduce the risk and spread of wildfire, and continue the expansion of koa (*Acacia koa*) forest within its historical range. The new 475-acre buffer area (Phase II), owned by the State of Hawai'i Department of Hawaiian Homelands, is bounded on the west by Keanakolu Road, on the east by Hakalau Forest NWR, and extends northward to the Kanakaleonui Corridor, an area also fenced by the Partners for Fish and Wildlife program.

Cooperator: State of Hawai'i Department of Hawaiian Homelands
USFWS Contact: Donna Ball
Funding Program: Partners for Fish and Wildlife



Humu'ula koa buffer fence, phase I. USFWS Photo.

Vegetation Assessment at Potential 'Alalā Reintroduction Sites

Reintroduction of the 'alalā, or Hawaiian Crow (*Corvus hawaiiensis*) into formerly occupied habitat is a crucial step in recovery efforts for this critically-endangered bird. Native only to the island of Hawai'i, the 'alalā now numbers 56 individuals, all in captivity. Staff from the United States Geological Survey, with assistance from cooperating public and private landowners, conducted detailed vegetation surveys at six potential reintroduction sites. They measured features important to crow foraging, nesting, and predator avoidance. The surveys were planned cooperatively with the PIFWO using newly processed remote sensing data and historical information. Results of these surveys allowed the PIFWO and the 'Alalā Recovery Team to rank the sites, recommend the initial release sites, and identify habitat restoration measures needed.

Cooperator: USGS Biological Resources Discipline
USFWS Contact: Jeff Burgett
Funding Program: Endangered Species Recovery

Kona Forest Restoration

The Kona Forest Unit of Hakalau National Wildlife Refuge contains native mesic forest habitat dominated by koa (*Acacia koa*) and 'ōhi'a lehua (*Metrosideros polymorpha*) in the canopy and an understory of tree ferns and other native flora. The objective of this project is to fence and remove ungulates from the 1,851-acre Middle Management Unit of the Kona Forest Unit. This project will contribute to the recovery of the Hawai'i creeper (*Oreomystis mana*) and 'akiapōlā'au (*Hemignathus munroi*), as well as several species of endangered plants whose survival is threatened by damage caused by feral pigs. Additional Endangered Species Recovery Program funding from fiscal year 2008 has been prioritized to complete this project.

Cooperator: USFWS National Wildlife Refuge System
USFWS Contact: Jeff Burgett
Funding Program: Endangered Species Recovery



Cyanea shipmanii, an endangered plant that will benefit from restoration actions at Hakalau Forest. Photo courtesy of Jack Jeffrey.



Mesic forest habitat at the Kona Forest Unit of Hakalau National Wildlife Refuge. Photo courtesy of David Ledig.

Native Forest Habitat Restored at Umikoa Ranch

Approximately 150 acres of native 'ōhi'a lehua (*Metrosideros polymorpha*) and koa (*Acacia koa*) forest were fenced and protected at Umikoa Ranch. A successful partnership was forged between Umikoa Ranch, the University of Hawai'i, Alu Like, the National Science Foundation EPSCOR Program, Keaoholoa Stem Program, and Pono Pacific Land Management, Inc. Projects completed by the partnership involved the mapping of native and invasive alien species, control of invasive plants, and the restoration and planting of more than 4,000 native plants into three protected enclosures.

Cooperator: Umikoa Ranch
USFWS Contact: Donna Ball
Funding Programs: Private Stewardship Grant
Partners for Fish and Wildlife

Hakalau Forest Restoration

Hakalau Forest Unit of Hakalau National Wildlife Refuge contains some of the finest remaining stands of native montane wet forest in Hawai'i. The objective of this project is to repair and maintain the fence and remove feral pigs from the Lower Honohina Management Unit. Monitoring surveys will be implemented following deployment of snares to document the success of ungulate removal. Funding will also be provided to control Florida blackberry (*Rubus argutus*) and other invasive weeds on 200 acres within the Hakalau Forest Unit. As part of the Hawaiian Bird Conservation Focal Area, this project will promote the recovery of endangered forest birds and their habitat within Hakalau Forest.

Cooperator: USFWS National Wildlife Refuge System
USFWS Contact: Jay Nelson
Funding Program: Endangered Species Recovery

Umikoa Ranch Safe Harbor Agreement

The objective of this agreement, which has been in effect since December 2001, is to provide a vehicle for the implementation of conservation actions outlined in recovery plans for the Hawaiian goose or nēnē (*Branta sandvicensis*) and the Hawaiian duck or koloa (*Anas wyvilliana*). The At the time this agreement took effect, a pair of koloa were recorded, but no nēnē were inhabiting or otherwise using habitats at Umikoa Ranch. As of December 2006, at least three pairs of koloa are using the wetlands at Umikoa Ranch, but no nēnē have been observed.

Cooperator: Umikoa Ranch
USFWS Contact: Chris Mullen
Funding Program: Endangered Species Recovery

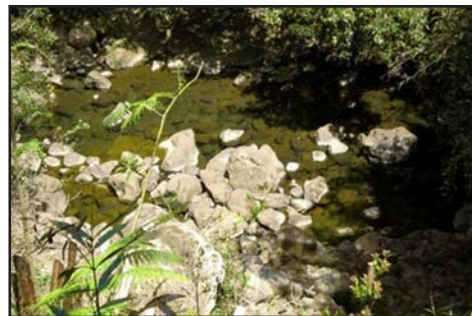


Restored wetland and forest habitat at Umikoa Ranch. Photo courtesy of Chris Mullen.

Conservation of Rare and Endangered Flora and Fauna Along Honoli'i Stream

Honoli'i Stream is among the most pristine streams in the state of Hawai'i in terms of diversity of native fauna and scarcity of invasive stream species. Three acres of invasive rose apple (*Syzygium jambos*) were removed along Honoli'i Stream, and fenced to exclude pigs. All pigs have been removed from the fenced area. This will increase the populations of native fish, waterfowl, and invertebrates by increasing the amount of sunlight reaching the stream, improving food resources, and decreasing soil erosion. A shade house was constructed to propagate native plants and 40 seedlings have been planted. The population size of rare and endangered plants will be increased directly through out-planting.

Cooperator: Wai'ālae Falls, LLC
USFWS Contact: Craig Rowland
Funding Program: Private Stewardship Grant



Honoli'i stream before (left) and after (right) removal of invasive rose apple (*Syzygium jambos*). Photos courtesy of Wai'ālae Falls, LLC.

Natural Resource Management at Pōhakuloa Training Area

The U.S. Army's Natural Resource Staff at Pōhakuloa Training Area (PTA) are in the forefront of habitat conservation in the State of Hawai'i. The training area is a mosaic of unique ecosystems that supports many listed species (15 plants, 4 birds, and 1 bat). Several of these endangered plant species persist only at PTA and their numbers are critically low due to various causes including grazing by feral ungulates, invasive plant competition, and wildfires. As a result of the formal section 7 consultation with the USFWS, the Army is implementing many beneficial conservation actions, including endangered plant propagation and construction of fuel breaks and fences to protect habitat and endangered plants. To date, over 4,700 seedlings have been planted at PTA with a 65 percent survival rate. To reduce grazing pressure from ungulates, over 7,000 acres has been fenced to protect the rare sub-alpine tropical dry forest habitat. Pursuant to their completed Biological Opinion, 33,000 acres of land eventually will be protected and ungulate-free.

Cooperator: U.S. Army
USFWS Contact: Jeff Zimpfer
Funding Source: U.S. Army

Kū 'Ōhi'a Laka Rainforest Reserve, Phase II

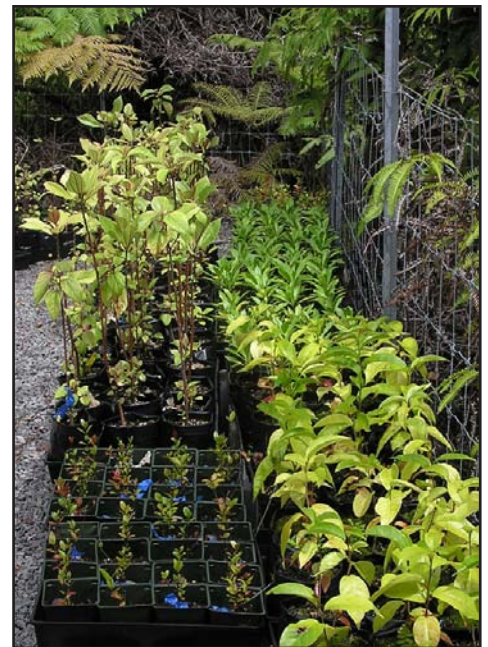
Kū 'Ōhi'a Laka (KOL) is a privately owned, community-based conservation project strategically located in the conservation landscape of Puna. The objective of this project is to restore lowland wet forest habitats by removing invasive plant species and propagating and planting native species.

Populations of threatened and endangered plant species historically found in the area will also be established. These actions will increase native biodiversity and promote educational opportunities within the community. KOL, situated among the largest state and federal forest reserves, has been granted native forest dedication by the County of Hawai'i, ensuring that the property will be protected.

Cooperator: Laura Brezinsky
USFWS Contact: Donna Ball
Funding Program: Partners for Fish and Wildlife



Seed collecting of native māmakī (*Pipturus albus*). Photo courtesy of Wai'ālae Falls LLC.



Seedlings of native species are hardened off before planting at Kū 'Ōhi'a Laka. USFWS photo.



Feral goats and sheep create a browse line on vegetation at Pōhakuloa Training Area. Additional fencing is planned for this area. USFWS photo.

*'Uwē ka lani, ola ka honua.
When the sky weeps, the earth lives.*



Islands of Maui, Moloka'i, and Lāna'i

Up until 300,000 to 400,000 years ago, the present day islands of Maui, Moloka'i, Lāna'i, and Kaho'olawe formed a single island, Maui Nui, more than 2,000 square miles larger than the current size of the island of Hawai'i.

Similar to the island of Hawai'i, the island of Maui supports alpine and subalpine habitats on Haleakalā, the island's tallest peak at 10,023 feet. Kaho'olawe is the smallest of the eight main Hawaiian Islands. Native habitats on the island of Kaho'olawe and Lāna'i have been severely degraded by ranching and military training, resulting in substantial erosion. Lāna'ihale, the highest point on Lāna'i, supports remnant wet and mesic forests and provides breeding habitat for Hawaiian petrels (*Pterodroma sandwichensis*), 'apapane (*Himantopus mexicanus knudseni*), and rare land snails. Hawaiian petrels also nest in the West Maui Mountains and Haleakalā. Offshore islets on Maui (10), Kaho'olawe (2), Lāna'i (5), and Moloka'i (9) also provide important habitat for breeding seabirds.

Recovery habitat has been identified for two species of forest birds endemic to the island of Maui and Moloka'i, the Maui parrotbill (*Pseudonestor xanthophrys*) and 'ākohekohe (*Palmeria dolei*). Both of these species are restricted to small areas on the island of Maui.

Anchialine pools, found in the coastal areas of Maui and Moloka'i dominated by young lava fields, support a unique fauna of amphipods and shrimp. Terrestrial invertebrate diversity is also high and includes several species of endemic bees (*Hylaeus* spp.), treesnails, and beetles. Coastal wetlands and man-made reservoirs support two species of endangered Hawaiian waterbirds, including the Hawaiian stilt (*Himantopus mexicanus knudseni*) and Hawaiian coot (*Fulica alai*).

Two project areas identified by the **PIFWO Hawaiian Bird Conservation Focal Area Initiative** include the island of Maui:

- 1) Seabird conservation in the Hawaiian Archipelago; and
- 2) Waterbird recovery in the main Hawaiian Islands.

Objectives are:

- 1) Identify, improve, and protect sufficient breeding habitat to conserve seabirds; and
- 2) Protect sufficient habitat and populations of Hawaiian stilts, Hawaiian coots, Hawaiian ducks, and Hawaiian geese.

During fiscal year 2007, the PIFWO contributed over \$400,000 to support these waterbird and seabird project areas on the islands of Maui and Moloka'i. In addition, \$1 million was granted to the State of Hawai'i for acquisition of the 78 acre Nu'u Makai Reserve, including 6 acres of emergent wetland and over 5,000 feet of undeveloped shoreline.

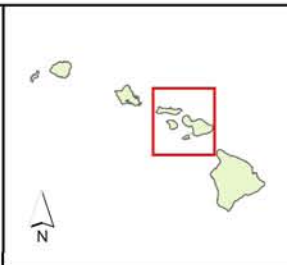
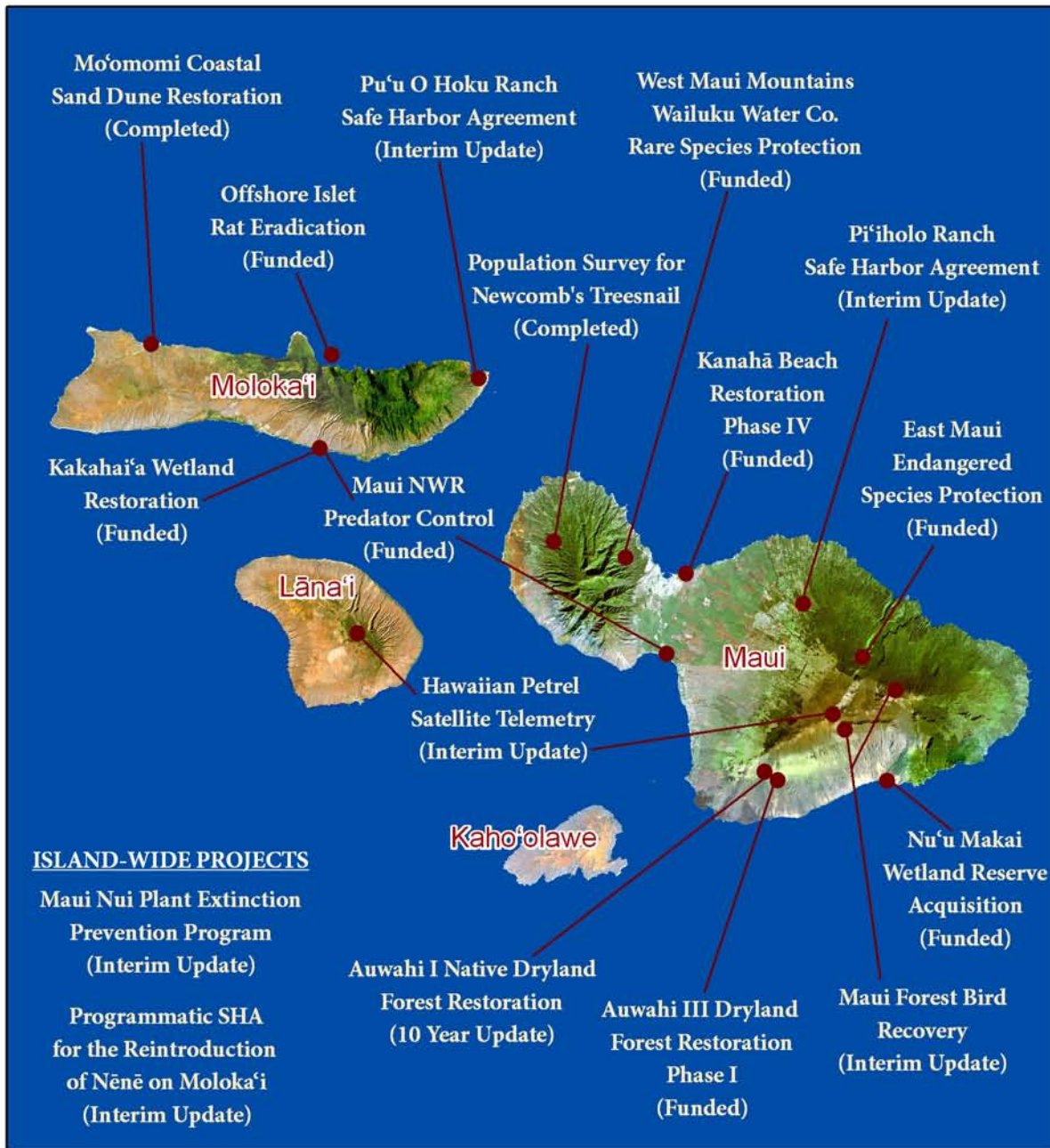
Key partnerships include:

- Maui NWR Complex, State of Hawai'i DLNR Division of Forestry and Wildlife, and Maui Coastal Land Trust who own and manage core habitats for Hawaiian waterbirds and seabirds;
- Non-profit conservation organizations, who assist with project implementation; and
- Corporate and private landowners, who have supported conservation actions.



Pacific Islands Fish and Wildlife Office

2007 Maui Nui Projects



1:952,763
 UTM Zone 4, NAD83
 0 7 14 Kilometers
 0 2.5 5 Miles



Population Survey for Newcomb's Treesnail

Funding was provided to do an intensive survey for Newcomb's treesnail (*Newcombia cummingi*) after a regular monitoring trip failed to locate any snails. During a 3 day survey, in which 144 person hours were expended, 9 living individuals of Newcomb's treesnail were found at Māhinahina Ridge on the island of Maui.

Cooperators: University of Hawai'i
Maui Land and Pineapple Company
USFWS Contact: Lorena Wada
Funding Program: Candidate Conservation



North corner of proposed enclosure for Newcomb's treesnail (*Newcombia cummingi*) on west Maui. Photo courtesy of Mike Hadfield.

Maui Forest Bird Recovery Project

The aim of this project is to implement research and management programs at the population level to better understand the threats to native forest birds on Maui. Results will provide guidance for the establishment of effective management programs for the conservation and recovery of avian populations. Based on demographic research of the Maui parrotbill (*Pseudonestor xanthophrys*) over the past two years, the Maui Forest Bird Recovery Project has developed a comprehensive science-based habitat and population management plan for this endangered species. This plan includes habitat management and restoration at Kahikinui (East Maui), reintroduction to suitable habitat areas, captive propagation, and research to support reintroduction efforts.

Cooperator: State of Hawai'i DLNR Division of Forestry and Wildlife
USFWS Contact: Jay Nelson
Funding Program: Endangered Species Recovery

East Maui Endangered Species Protection

The objectives of this project are to remove feral ungulates and invasive plant species within 2,000 acres of the East Maui Watershed Partnership. These actions will benefit several species of threatened and endangered plants, including the Haleakalā silversword (*Argyroxiphium sandwicense macrocephalum*). Native forest birds that will benefit from improved habitat include the Maui parrotbill (*Pseudonestor xanthophrys*) and Maui 'ākepa (*Loxops coccineus ochraceus*).

Cooperator: Tri-Isle Resource Conservation and Development Council, Inc.
USFWS Contact: Craig Rowland
Funding Program: Private Stewardship Grant



Maui parrotbill (*Pseudonestor xanthophrys*). Photo © Eric Vanderwerf.



Ākohekohe or crested honeycreeper (*Palmeria dolei*). Photo © Eric Vanderwerf.

Native Dryland Forest Successfully Reestablished at Auwahi I

Ten years following initial restoration efforts, 28 dryland forest species have naturally reproduced by seed at the Auwahi I Dryland Forest site, including ‘a‘ali‘i (*Dodonaea viscosa*), olopua (*Nestegis sandwicensis*), and hōlei (*Ochrosia haleakalae*). Compared to only four species of native plants that reproduce naturally outside of the Auwahi I enclosure, removal of non-native ungulates, control of invasive vegetation, and planting native species resulted in a 700% increase in native species reproduction. The cover of native species increased to 61 percent during 2007. Cover of non-native species was reduced to seven percent during 2007.

Cooperator: ‘Ulupalakua Ranch
USFWS Contact: Craig Rowland
Funding Program: Partners for Fish and Wildlife



Auwahi I enclosure (top left) during 2007, 10 years following restoration and Auwahi II enclosure (middle). The Auwahi III enclosure will connect Auwahi I & II and extend restored habitats to encompass the area to the right. Photo courtesy of Maui Restoration Group.



Seedling of hōlei (*Ochrosia haleakalae*) that regenerated naturally at Auwahi I. Photo courtesy of Maui Restoration Group.

Volunteers working to restore Auwahi dryland forests. Photo courtesy of Maui Restoration Group.



Auwahi III Dryland Forest Restoration Phase I

The overall goal of the Auwahi III dryland forest restoration is to conserve a highly diverse and threatened Hawaiian ecosystem. This phase of the project protects 190 acres of dryland forest on private property through construction of an ungulate-proof fence.

Auwahi forest provides a significant portion of the known habitat for the endangered Blackburn’s sphinx moth (*Manduca blackburni*), eight species of endangered plants include mēhamehame (*Flueggea neowawraea*), and two candidate plants (*Nothoestrum latifolium* and *Ochrosia haleakalae*).

Cooperator: Tri-Isle Resource Conservation, and Development Council, Inc.
USFWS Contact: Craig Rowland
Funding Program: Private Stewardship Grant

West Maui Mountains Wailuku Water Co. Rare Species Protection

The primary objective of this project is to protect rare species located on lands owned by the Wailuku Water Company, LLC. This will be achieved by installing strategic fences totaling approximately 6,000 feet to exclude feral pigs and illegal dirt bike use from 2,644 acres of wet forest, bogs, and continuous perennial stream habitats. Six species of endangered plants, 2 species of seabirds, 1 land snail, and 1 candidate plant species will benefit from this project.

Cooperator: Mālama Kahalawai, Inc.
USFWS Contact: Craig Rowland
Funding Program: Private Stewardship Grant



Dirt bike trail through native ‘ōhi‘a lehua (*Metrosideros polymorpha*) and uluhe (*Dicranopteris linearis*) forest that will be fenced to exclude pigs and dirt bikes. Photo courtesy of West Maui Mountains Watershed Partnership.

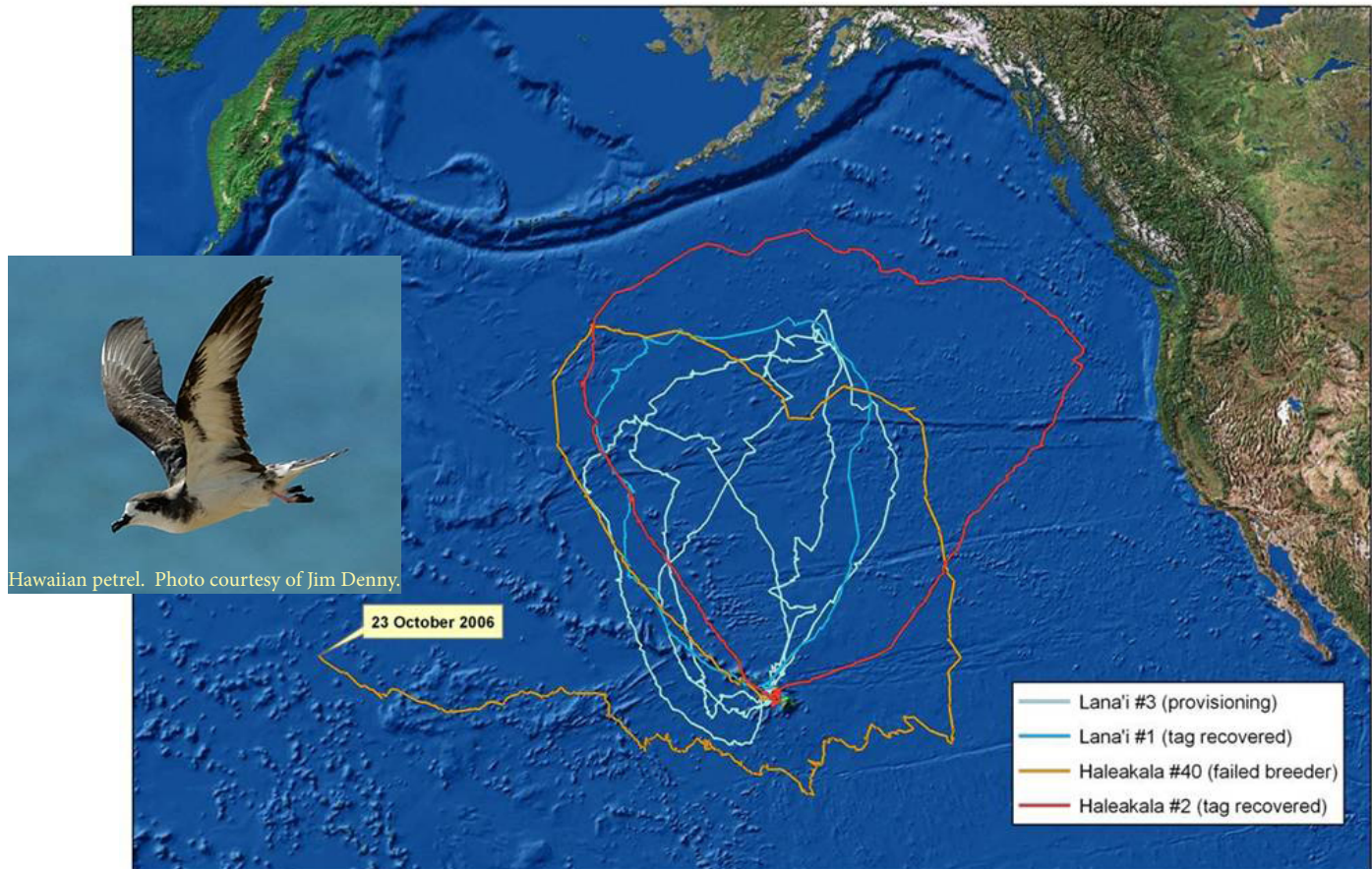
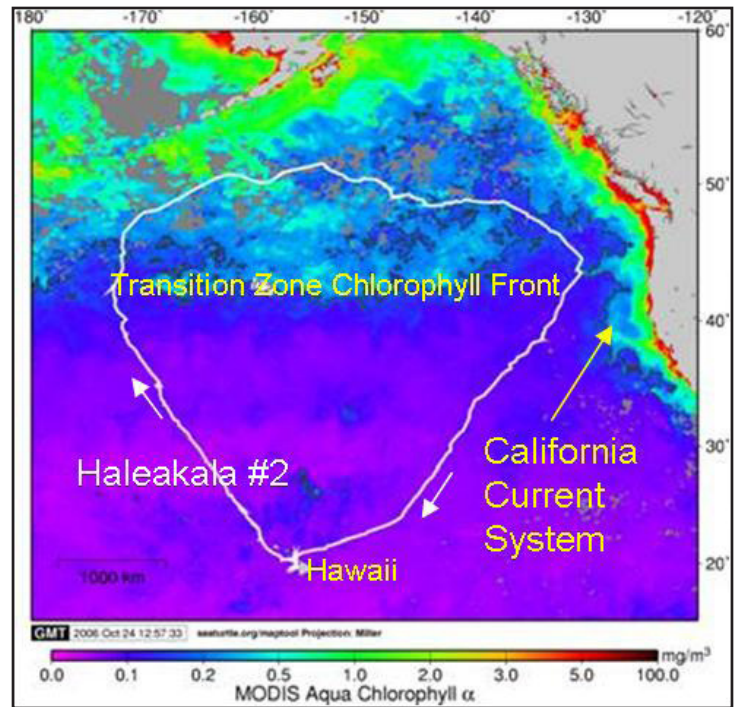
Hawaiian Petrel Satellite Telemetry: Pilot Project

Under the expert guidance of Josh Adams (USGS) and David Ainley (H.T. Harvey & Associates), satellite transmitters were deployed on four endangered Hawaiian petrels (‘ua‘u; *Pterodroma sandwichensis*) at their nest sites, two on Maui and two on Lāna‘i. Additional support was provided by the State of Hawai‘i DLNR Division of Forestry and Wildlife and Haleakalā National Park. The purpose of this project was to test attachment methods and assess the birds’ response to, and data quality of, the smallest satellite platforms deployed on seabirds to date (12 grams). The major finding of this initial effort was an exciting surprise: the petrels, which weigh only about 400 grams, are circumnavigating the North Pacific Ocean, often traveling more than 6,000 miles on individual foraging trips before returning to feed their chicks. New methodological information gained during this pilot study is being applied to ongoing satellite tracking of ‘ua‘u in a three-year project supported by the USGS Science Support Partnership program.

Cooperator: USGS Biological Resources Division

USFWS Contact: Holly Freifeld

Funding Program: Endangered Species Recovery



The white line (top right map) traces the journey of one Hawaiian petrel, tracked from Haleakalā, Maui, that performed an extensive clockwise loop in two weeks throughout the North Pacific and into the Transition Chlorophyll Zone to feed its chick (color-shading indicates satellite-sensed chlorophyll concentration). The large map shows tracks for all four birds carrying transmitters in 2006. Maps courtesy of Josh Adams, USGS unpublished data.

Kanahā Beach Restoration, Phase IV

The goal of this project is to restore the native coastal ecosystem of Kanahā Beach to benefit native plants, shorebirds, insects, and coastal marine resources. This project expands on existing restoration efforts by installing an additional 1,700 feet of fence to restrict off-road vehicles from accessing the wetlands and beach, removing non-native species from an additional 4 acres of coastal habitat, and replanting 2 acres with 500 native plants. Migratory shorebirds, endangered Hawaiian waterbirds, and three species of endangered plants will benefit from this project.

Cooperator: Community Workday Program
USFWS Contact: Chris Swenson
Funding Program: Pacific Islands Coastal Program



Nu'u Pond, part of the Nu'u Makai Reserve Acquisition. USFWS Photo

Nu'u Makai Wetland Reserve Acquisition

The 78 acre Nu'u Makai Reserve will conserve and protect over 6 acres of coastal wetlands and approximately 1 mile of shoreline for the recovery of native birds and native vegetation. At least six endangered taxa, including three Hawaiian waterbirds, the Hawaiian bat (*Lasiurus cinereus semotus*), and Hawaiian monk seal (*Monachus schauinslandi*), have been reported from Nu'u Makai Wetland Reserve. This acquisition will also protect habitat for Blackburn's damselfly (*Megalagrion blackburni*) and five endangered species of plants. The lack of significant development in the area, combined with Nu'u wetlands which filter upland runoff before it reaches the ocean, results in low nutrient loading in the coastal ecosystem. The intertidal and nearshore marine environment at Nu'u is one of the most pristine marine areas on the southern coast of Maui.

Cooperator: State of Hawai'i DLNR Division of Forestry and Wildlife
USFWS Contact: Chris Swenson
Funding Program: National Coastal Wetlands Conservation Grant



Kaiehu Point at Mo'omomi Coastal Preserve before (far left), during (second from left), and after (second from right) removal of kiawe. Twenty months following removal of kiawe (far right), 60% of this area regenerated with native coastal strand vegetation. Photos courtesy of The Nature Conservancy.



Endangered 'ohai (*Sesbania tomentosa*) at Kanahā Beach. Photo courtesy of Forest and Kim Starr.

Native Vegetation Re-colonizes Coastal Sand Dunes

Approximately 2 acres of kiawe (*Prosopis pallida*) was removed from Mo'omomi Preserve on the island of Moloka'i between 2005 and 2007. Recolonization of native species was observed as early as eight months following removal of kiawe in four plots. Twenty months following clearing and chipping, cover of native species increased to 60–90 percent within cleared areas. Native species that naturally recolonized included 'aki'aki (*Sporobolus virginicus*), alena (*Boerhavia repens*), 'ilima (*Sida falax*), pā'ū o Hi'iaka (*Jacquemontia ovalifolia*), hinahina (*Heliotropium anomalum*), and 'ena'ena (*Pseudognaphalium sandwicense* var. *molokaiense*).

Cooperator: The Nature Conservancy
USFWS Contact: Benton Pang
Funding Program: Partners for Fish and Wildlife

Kakahai'a National Wildlife Refuge Wetland Restoration

The objective of this project is to restore Kakahai'a wetlands on the southern coastal plain of the island of Moloka'i to provide shallow water habitat for two species of endangered waterbirds; Hawaiian coots (*Fulica alai*) and Hawaiian stilts (*Himantopus mexicanus knudseni*). Restoration actions include replacing and/or reconfiguring wetland levees, replacing water control structures, installing a well, pump, and water delivery system and removing all invasive plant species.

Cooperator: USFWS National Wildlife Refuge System

USFWS Contact: Holly Freifeld

Funding Program: Endangered Species Recovery



Kakahai'a National Wildlife Refuge. USFWS Photo

Maui National Wildlife Refuge Complex Predator Control

The objective of this project is to implement predator control at Keālia Pond National Wildlife Refuge (NWR) on the island of Maui and Kakahai'a NWR on the island of Moloka'i.

Funds will be used for personnel and supplies to implement actions identified in the recovery plan for Hawaiian waterbirds, including live-trapping and bait stations for mongoose, feral cats, rats, and feral dogs. This project is one of eight projects identified as high priority Hawaiian Bird Conservation Focal Area projects on National Wildlife Refuges within Hawai'i.

Cooperator: USFWS National Wildlife Refuge System

USFWS Contact: Holly Freifeld

Funding Program: Endangered Species Recovery



Hawaiian stilt (*Himantopus mexicanus knudseni*). Photo courtesy of USDA Natural Resources Conservation Service.

Pu'u O Hoku Ranch Safe Harbor Agreement for the Reintroduction of Nēnē

With this Safe Harbor Agreement the endangered Hawaiian goose or nēnē (*Branta sandvicensis*) was reintroduced to the island of Moloka'i. Since implementation of this Agreement, 74 Hawaiian geese have been released at Puu O Hoku Ranch. Sixty-four goslings have successfully fledged at the Ranch. Successful breeding has increased the population to an estimated 146 birds.

Cooperator: Pu'u O Hoku Ranch

USFWS Contact: Chris Mullen

Funding Program: Endangered Species Recovery

Programmatic SHA for the Reintroduction of Nēnē

The objective of this agreement is to provide an island-wide mechanism for expansion of nēnē (*Branta sandvicensis*) onto private lands on the island of Moloka'i. As a result of the reintroduction of nēnē to Moloka'i on the private property of the Pu'u Hoku Ranch, it is likely that nēnē will eventually expand to other private lands adjacent to the original reintroduction site. The purpose of this programmatic agreement is to provide these private landowners with the same assurances as those provided to Pu'u O Hoku Ranch should nēnē begin to populate lands outside of the ranch. No landowners are currently signed up under this agreement.

Cooperator: State of Hawai'i DLNR Division of Forestry and Wildlife

USFWS Contact: Chris Mullen

Funding Program: Endangered Species Recovery



Hawaiian geese (*Branta sandvicensis*) at Pu'u O Hoku Ranch. USFWS Photo.



Mōkapu Islet off the northern coast of Molokaʻi. Photo courtesy of Chris Swenson.

Hawaii Offshore Islet Rat Eradication

The goal of this project is to coordinate and oversee eradication of all introduced rodents from the Hawaiʻi offshore islets of Lehua and Mōkapu. Rats will be removed from Mōkapu Islet using an aerial broadcast of approved rodenticide. Once refined, these techniques will then be applied to rodent eradication on Lehua Islet. Funding supports a biologist who is responsible for coordinating rodent removal and conducting scientifically sound monitoring before and two years after eradication to document success of eradication techniques. This project will provide opportunities to assemble a well-trained team of managers and biologists who can transfer knowledge of eradication techniques to other areas. In addition, this project supports continued public outreach. Eradication of rodents will benefit nesting seabirds by increasing breeding success.



Brown booby chick at Lehua Islet. Photo courtesy of Heather Eijzenga.

Cooperators: USDA Animal and Plant Health Inspection Service
The Wildlife Society

USFWS Contact: Chris Swenson

Funding Program: Pacific Islands Coastal Program



Piʻiholo Ranch. USFWS Photo.

Plant Extinction Prevention Program on Maui Nui

The goal of the Plant Extinction Prevention (PEP) Program is to protect the rarest of the rare Hawaiian plants through management, collection for genetic storage, and reintroduction of plants into suitable habitat. This year the Maui Nui PEP staff, who work on the islands of Maui, Molokaʻi, and Lānaʻi. They collected and managed in situ, or reintroduced populations of 61 of the 104 PEP species. This year's highlights from Maui Nui include discovery of over 400 individuals of *Remya mauiensis*, seed collection from the only known population of *Abutilon eremitopetalum*, and reintroducing 48 individuals of *Cyanea magnicalyx*. Previously, *Cyanea magnicalyx* was known from only four individuals in the wild.

Cooperators: University of Hawaiʻi Pacific Cooperative Studies Unit
State of Hawaiʻi DLNR Division of Forestry and Wildlife

USFWS Contact: Marie Bruegmann

Funding Program: Endangered Species Recovery



Remya mauiensis is no longer considered a PEP species because additional surveys located over 400 individuals. Photo courtesy of Hank Oppenheimer.

Piʻiholo Ranch Safe Harbor Agreement

The objective of this agreement is to implement activities outlined in the recovery plan for the endangered Hawaiian goose or nēnē (*Branta sandvicensis*). Reintroduction of the Hawaiian goose to Piʻiholo Ranch on the island of Maui began in 2005 with the release of five birds and planting native vegetation to improve existing habitat. Since implementation of this agreement, 38 Hawaiian geese have been introduced to the Ranch.

Cooperator: Piʻiholo Ranch

USFWS Contact: Chris Mullen

Funding Program: Endangered Species Recovery

*He ali'i ka āina; he kauwā ke kanaka.
The land is a chief; man is its servant.*



O'ahu is the third largest island in the Hawaiian Archipelago, 1.3 to 2.2 million years old. The island is characterized by parallel mountain ridges eroded from two large shield volcanoes and features coastal plains and sandy beaches creating a large number of estuaries and bays where freshwater streams meet the ocean. Because O'ahu is the most developed and most populated island in the State of Hawai'i, native forests are restricted to ridges in the Ko'olau and Wai'anae Mountains that are unsuitable for development; many coastal wetlands, including estuaries, are surrounded by highly urbanized areas. Most areas managed for conservation on the island of O'ahu are open to the public and provide wildlife-oriented recreation for residents and visitors. Environmental education is incorporated into many restoration projects to increase public awareness of the natural resources on O'ahu and the threats they face.

Offshore islets and Ka'ena Point Natural Area Reserve provide nesting habitat for seabirds. Dogs, cats, and pigs, not found on any of the offshore islets, can cause high mortality of breeding adult and juvenile seabirds in unprotected areas. Therefore, offshore islets have been identified as a priority for seabird conservation in the Hawaiian Archipelago. Ka'ena Point, actively managed for seabird conservation, is one of two known breeding areas for the Laysan albatross (*Phoebastria immutabilis*) in the main Hawaiian Islands.



Two project areas on the island of O'ahu identified by the **PIFWO Hawaiian Bird Conservation Focal Area Initiative** include:

- 1) Seabird conservation in the Hawaiian Archipelago; and
- 2) Waterbird recovery in the main Hawaiian Islands.

Objectives are:

- 1) Identify, improve, and protect sufficient breeding habitat to conserve seabirds; and
- 2) Protect sufficient habitat and populations of Hawaiian stilts, Hawaiian coots, Hawaiian moorhen, and Hawaiian geese.

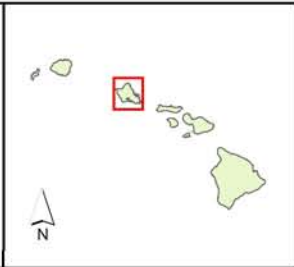
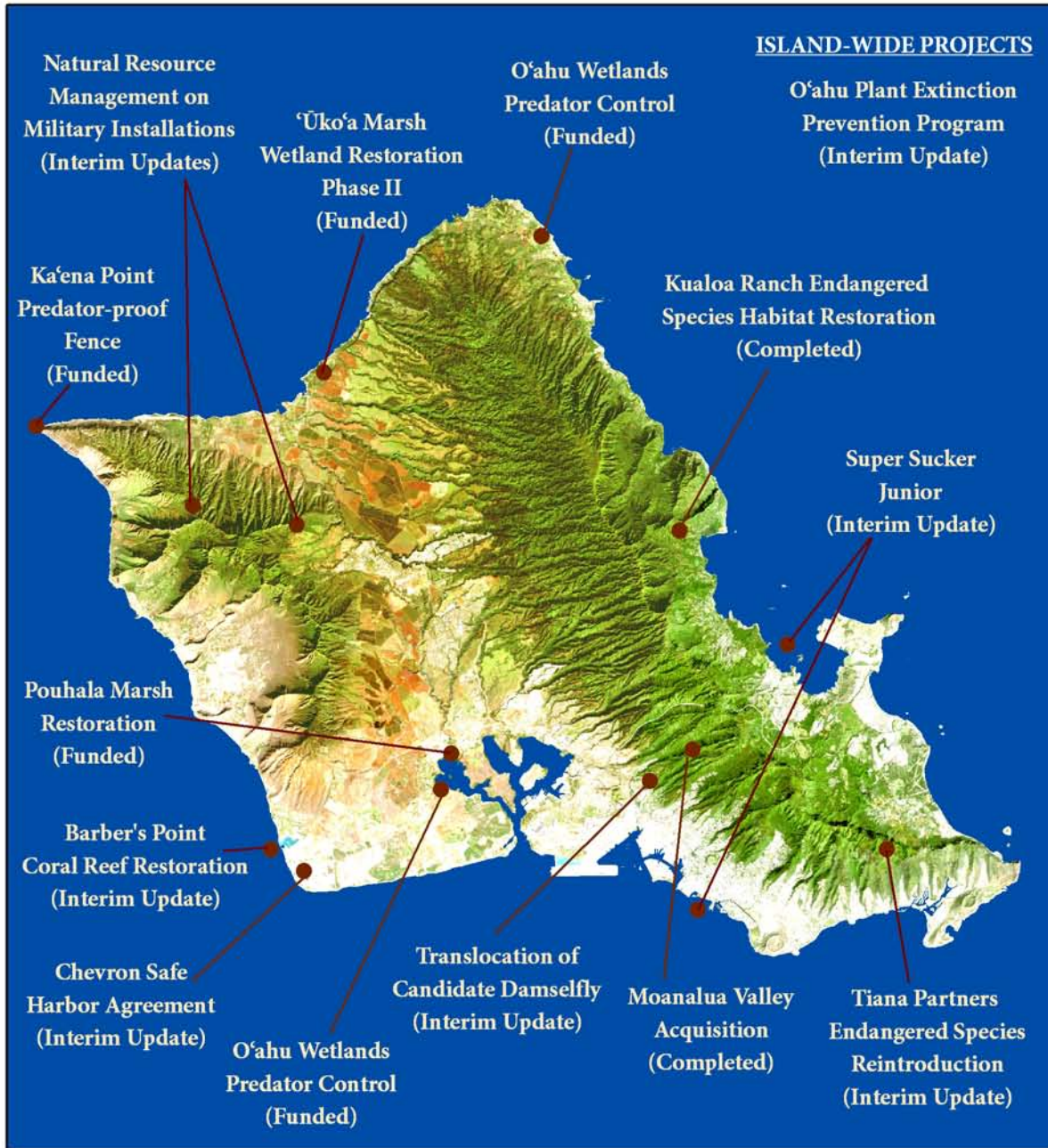
During fiscal year 2007, PIFWO contributed over \$120,000 to support waterbird projects and over \$600,000 to support seabird projects on the island of O'ahu. These projects include restoration and predator control on privately and publicly owned wetlands and coastal strand habitat on the North Shore of O'ahu, as well as planning assistance through Safe Harbor Agreements. In addition, the State of Hawai'i received a \$400,000 National Coastal Wetlands Conservation Grant for wetland restoration at Pearl Harbor. Ongoing acquisition of additional acreage at James Campbell National Wildlife Refuge will increase the area of protected habitats for waterbirds from 260 acres to 1100 acres.

Key partnerships include:

- O'ahu NWR Complex and State of Hawai'i DLNR Division of Forestry and Wildlife, who own and manage core habitats for Hawaiian waterbirds and seabirds;
- University of Hawai'i and non-profit organizations, who assist with project implementation; and
- Corporate and private landowners, who have supported conservation actions.

Pacific Islands Fish and Wildlife Office

2007 O'ahu Projects



1:447,077
 UTM Zone 4, NAD83
 0 2 4 Kilometers
 0 3 6 Miles



Kualoa Ranch Restores Habitat for Endangered Species

Within 1 year of receiving funds from the Private Stewardship Grant Program, Kualoa Ranch and Activity Club fenced 10 acres of mesic forest to protect 5 species of endangered plants. Survival of *Cyanea truncata* and *Schiedea kaalae* six months following planting was high. Currently, only one population of 20 *C. truncata* plants exists naturally in the wild. This project established a second population of *C. truncata*, substantially reducing the risk of extinction. Invasive species control and additional planting will continue through 2007.

Cooperator: Kualoa Ranch and Activity Club, Inc.
USFWS Contact: Craig Rowland
Funding Program: Private Stewardship Grant



Cyanea truncata seedling planted at Kualoa Ranch during 2006. Photo courtesy of Kualoa Ranch and Activity Club, Inc.

Tiana Partners Endangered Species Restoration Successful

Seventy-seven individuals of five species of endangered plants (*Cyanea grimesiana* ssp. *grimesiana*, *Cyrtandra polyantha*, *Diella erecyta*, *Lobelia monostachya*, and *Tetraplasandra lydgatei*) were planted in a fenced area on Tiana Partners land in the Kōʻolau Mountains. Seven months following planting, survival of all species combined was 97 percent. Habitat enhancements for Oʻahu ʻelepaio include baiting to control rats and removal of invasive vegetation.

Cooperator: ʻOahu ʻOahu Kōʻolau, Inc.
USFWS Contact: Craig Rowland
Funding Program: Private Stewardship Grant

ʻŪkoʻa Marsh Wetland Restoration, Phase II

The purpose of this project is to protect foraging and breeding habitat for three species of endangered Hawaiian waterbirds: Hawaiian moorhen (*Gallinula chloropus sandvicensis*), Hawaiian coot (*Fulica alai*), and Hawaiian stilt (*Himantopus mexicanus knudseni*). The objectives of this project are to build a perimeter fence around ʻŪkoʻa Marsh to prevent ungulates and dogs from entering the wetland and to remove mongoose and rats during wetland bird breeding season.

Cooperator: Pono Pacific Land Management, Inc.
USFWS Contact: Benton Pang
Funding Program: Partners for Fish and Wildlife



Cyanea grimesiana ssp. *grimesiana* seedling planted during 2006. Photo courtesy of ʻOahu ʻOahu Kōʻolau, Inc.



ʻŪkoʻa Marsh. Photo courtesy of Adonia Henry.



Hawaiian moorhen (*Gallinula chloropus sandvicensis*) to benefit from restoration actions at ʻŪkoʻa Marsh. Photo courtesy of Eric Vanderwerf.

3,716 Acres Protected in Moanalua Valley

Acquisition of 3,716 acres in Moanalua Valley was completed during March 2007 for a total purchase price of \$5,500,000. U.S. Fish and Wildlife Service provided 30 percent of the total purchase price to the State of Hawai'i Department of Land and Natural Resources, who will hold title to and manage the land for conservation. The acquisition was made possible through the contribution of multiple partners including the U.S. Army, State of Hawai'i Department of Land and Natural Resources, and the Trust for Public Land. The Moanalua Valley acquisition will protect upper watershed habitats from the headwaters of two different stream systems at the summit of the Ko'olau Mountains to the downstream Honolulu Watershed Forest Reserve boundary. As a result of this purchase, habitat for 14 species of federally listed or candidate plants, 3 species of federally listed or candidate invertebrates, and at least 1 species of endangered forest bird will be protected in perpetuity, contributing to the overall recovery of these species.

Cooperator: State of Hawai'i Department of Land and Natural Resources

USFWS Contact: Craig Rowland

Funding Program: Recovery Land Acquisition Grant



Moanalua Valley acquisition site. USFWS photo.



Megalagrion xanthomeles, a candidate damselfly species endemic to Hawai'i. Photo courtesy of David Preston.

Translocation of Candidate Damselfly

This project is expected to create additional self-sustaining populations of the candidate orangeblack Hawaiian damselfly (*Megalagrion xanthomeles*) on the island of O'ahu. Endemic to Hawai'i, this species was abundant in lowland aquatic habitats throughout the main Hawaiian Islands. Currently, the species is thought to be extirpated from the island of Kaua'i; on O'ahu it is restricted to a single population in an intermittent stream near Honolulu. Other populations occur on the islands of Lāna'i, Maui and Hawai'i. Current threats include alteration of freshwater habitats, invasive vegetation that eliminates areas of open water used for breeding, and predation by non-native fish and invertebrates. The success of newly established populations on O'ahu will contribute to the overall conservation of the species. A mark recapture study conducted over the past year shows the current O'ahu population is at a stable level and sufficiently abundant to allow the collection of individuals for translocation. Three possible sites for translocation have been identified and are in various stages of preparation for translocation.

Cooperator: Bishop Museum

USFWS Contact: Lorena Wada

Funding Program: Candidate Conservation



Stream habitat for orangeblack Hawaiian damselflies (*Megalagrion xanthomeles*). Photo courtesy of University of Hawai'i.

Pouhala Marsh Wetland Restoration and Community Development

Pouhala Marsh is the largest intact coastal wetland remaining in the Pearl Harbor Basin on the island of O‘ahu. Managed by the State of Hawai‘i DLNR Division of Forestry and Wildlife since 1995, Pouhala Marsh is the site of an ongoing multi-partner restoration project implemented to restore native wetland habitats for endangered Hawaiian waterbirds, including the Hawaiian stilt or ae‘o (*Himantopus mexicanus knudseni*), Hawaiian coot or ‘alae ke‘oke‘o (*Fulica alai*), and Hawaiian moorhen or ‘alae ‘ula (*Gallinula chloropus sandvicensis*). With the help of local volunteers, the State of Hawai‘i has removed several tons of trash from Pouhala Marsh and restored a portion of the wetland by removing invasive vegetation, excavating new wetland areas, and planting



Aerial view of Pouhala Marsh near the town of Waipahu. Photo courtesy of State of Hawai‘i DLNR Division of Forestry and Wildlife.

native vegetation. Funding from this project will be used to continue removal of invasive plants, including red mangrove (*Rhizophora mangle*), pickleweed (*Batis maritima*), and cattail (*Typha* sp.), implement a predator control program, and develop an interpretive program for education and outreach in the Waipahu community. By including a broad spectrum of community members, this project will educate local residents and visitors and help implement the City and County of Honolulu's 1995 Waipahu Town Plan, which calls for improvements to Waipahu Town. As a wildlife sanctuary, Pouhala Marsh is part of a comprehensive revitalization project now underway in the area.

Cooperator: State of Hawai‘i DLNR Division of Forestry and Wildlife
USFWS Contact: Chris Swenson
Funding Program: National Coastal Wetlands Conservation Grant

O‘ahu Wetlands Predator Control

The objective of this project is to implement predator control on all wetlands within the O‘ahu National Wildlife Refuge Complex. Control of rats, mongoose, feral cats and feral dogs is identified as a priority recovery action in the recovery plan for Hawaiian waterbirds. Predator control at Ki‘i, Punamanō, Waiawa, and Honouliuli wetlands will benefit Hawaiian stilts (*Himantopus mexicanus knudseni*), Hawaiian coots (*Fulica alai*), Hawaiian moorhen (*Gallinula chloropus sandvicensis*) as well as migratory waterfowl and shorebirds.

Cooperator: USFWS National Wildlife Refuge System
USFWS Contact: Holly Freifeld
Funding Program: Endangered Species Recovery



Rowlands Pond at Chevron Refinery. Photo courtesy of Jaap Eijzenga.

Chevron Safe Harbor Agreement

The purpose of the Agreement is to provide a vehicle for the implementation of conservation activities for the endangered Hawaiian stilt (*Himantopus mexicanus knudseni*) and Hawaiian coot (*Fulica alai*) on private lands. This agreement provides regulatory assurances to the Chevron Oil Refinery, whose lands these species have “chosen” to inhabit. Allowing the Hawaiian stilt to nest productively in habitat provided by Chevron contributes to recovery by increasing the species’ population numbers until such time as superior habitat can be provided for them at a nearby marsh that is currently under restoration. The Chevron ponds continue to produce and fledge Hawaiian stilts and Hawaiian coots.

Cooperator: Chevron
USFWS Contact: Chris Mullen
Funding Program: Endangered Species Recovery



Hawaiian moorhen (*Gallinula chloropus sandvicensis*) trying to escape from a mongoose. Photo courtesy of David DesRochers.



Hesperomannia arbuscula. Photo courtesy of Ane Bakutis.

O'ahu Plant Extinction Prevention Program

The goal of the Plant Extinction Prevention (PEP) Program is to protect rare Hawaiian plants that have fewer than 50 individuals remaining in the wild. Conservation actions include on-site management, genetic storage, and reintroduction into the wild. This year populations of 27 of the 63 current PEP species on the island of O'ahu were collected, managed in situ, or reintroduced. Three individuals of *Cyanea grimesiana* ssp. *grimesiana*, which is extinct in the wild, were reintroduced onto private lands, and more reintroductions are planned for the coming year. The first fruit was collected from reintroduced individuals of *Cyanea truncata*, which is reduced to two naturally occurring individuals and 25 reintroduced plants. Eighteen individuals of *Cyrtandra kaulantha*, a candidate species, were reintroduced in 2007, and some of these are flowering. Pollen of *Hesperomannia arbuscula* was collected from flowers in one population and crossed with flowers of another, a critical step for this species that was not producing viable seed on its own.

Cooperators: University of Hawai'i Pacific Cooperative Studies Unit
State of Hawai'i DLNR Division of Forestry and Wildlife
USFWS Contact: Marie Bruegmann
Funding Program: Endangered Species Recovery

Super Sucker Junior

Invasive algae pose a threat to coral reef resources throughout Hawai'i. The Super Sucker Junior is an innovative management tool used to control invasive algae in Kāne'ōhe Bay and along the south shore of O'ahu. This portable barge operates two 4-horsepower diaphragm centrifugal pumps which provide suction to divers who "vacuum" invasive algae such as gorilla ogo (*Gracilaria salicornia*). The State of Hawai'i DLNR Division of Aquatic Resources has taken a leadership role in designing, building, and staffing Super Sucker Junior. The funding for this project came from a USFWS Law Enforcement case that involved the smuggling of the snakehead fish, an invasive alien species designated as federally injurious. As part of the plea agreement, a portion of the fine monies were identified for use in injurious species research and containment.

Cooperator: State of Hawai'i DLNR Division of Aquatic Resources
USFWS Contact: Jeff Herod
Funding Program: USFWS Law Enforcement



Junior Super Sucker off of Waikiki on south shore of O'ahu. Photo courtesy of Tony Montgomery.



A diver operates the Junior Super Sucker to remove invasive algae from coral reefs in Hawai'i. Photo courtesy of Mālama Hawai'i.

Natural Resource Management at Mākua Military Reservation

The Consultation and Technical Assistance Program completed a complex, multi-species Biological Opinion that addressed U.S. Army training-related impacts to 41 listed species and designated critical habitat of 36 species. The Army contributes approximately \$3.5 million a year to sustain and bolster populations of endangered plants, O‘ahu tree snails (*Achatinella* spp.), and O‘ahu ‘elepaio (*Chasiempis sandwichensis* ssp. *ibidis*). The Mākua Implementation Plan, annually updated by an interagency team of biologists, outlines the Army’s endangered species conservation actions at Mākua and on surrounding state and private lands. Some of the beneficial activities conducted by the Army biologists on O‘ahu include, fencing and removal of ungulates to reduce browsing pressure to listed plants, stabilization of 28 listed plant species, and habitat management in 22 designated management units in the Waīānae Mountains. The Army supports research projects to develop measures to reduce

threats to listed plants from invasive pests such as slugs and the black twig borer. Research is also underway to develop methodologies to reduce or eliminate the carnivorous snail, *Euglandia* sp., that preys on endangered tree snails. The Army maintains a large, productive greenhouse for propagation of endangered plants and they are currently constructing a second facility near Pāhole Natural Area Reserve in order to grow mid-elevation plant species. A total of 396 *Pritchardia kaalae* plants, an endangered palm, have been propagated and planted by the Army biologists. Since the Army has fenced and controlled goats and rats on ‘Ōhikilolo Ridge at Mākua, the number of naturally occurring seedlings of *Pritchardia kaalae* has increased steadily from 0 in 1999 to 640 in 2007. In addition, the Army provided over \$3 million of Army Compatible Use Buffer funds to assist with the purchase of land that will be protected in perpetuity for the conservation of native habitats.

Cooperator: U.S. Army
USFWS Contact: Dawn Greenlee
Funding Source: U.S. Army

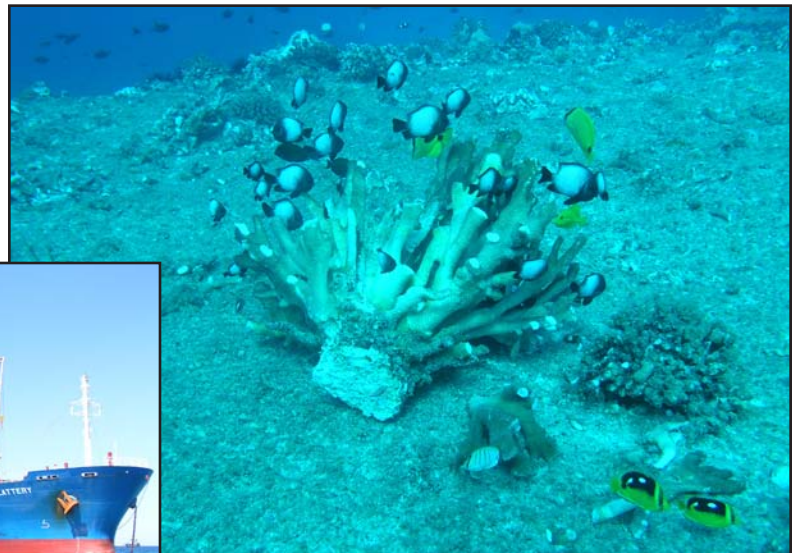


A stand of *Pritchardia kaalae*, an endangered palm, at Mākua Military Reservation. Photo courtesy of U.S. Army.

Barber's Point Coral Reef Restoration

The Coastal Conservation Program is collaborating with National Marine Fisheries Service, the State of Hawai‘i Division of Aquatic Resources, and the Responsible Party in responding to the grounding of the cargo vessel Cape Flattery off the coast of O‘ahu. This response is being conducted as part of the Natural Resource Damage Assessment process. Pre-assessment resource surveys were completed and potential compensatory mitigation projects were developed. Restoration actions have included reattaching broken corals to the reef, mimicking the arrangement of corals in natural reef habitats.

Cooperators: NOAA National Marine Fisheries Service
State of Hawai‘i DLNR Division of Aquatic Resources
USFWS Contacts: Michael Molina and Karen Rosa
Funding Source: Responsible Party



Coral (*Pocillopora eydouxi*) knocked over (above) as a result of the grounding of Cape Flattery (left) and removal of the vessel from the coral reef. Photos courtesy of Kevin Foster.





Biologists Kapua Kawelo and Eric Vanderwerf tag O'ahu 'elepaio (*Chasiempis sandwichensis* ssp. *ibidis*). Photo courtesy of U.S. Army.

Natural Resource Management at Schofield Barracks

The U.S. Army manages endangered species on seven O'ahu installations. Dramatic declines in listed bird populations have occurred in Hawai'i as a result of habitat loss, disease, and nest predation by rodents. The Army controls rodents in the vicinity of 75 O'ahu 'elepaio (*Chasiempis sandwichensis* ssp. *ibidis*) nests located on Army, State, and private lands, increasing reproductive success in these areas. Invasive grasses dominate historically burned and grazed areas on O'ahu. To minimize loss of native forests, the Army contributes to interagency fencing and ungulate removal efforts and responds with skilled wildland fire staff and fire suppression aircraft when fire threatens listed species on federal, state, and private lands.

Cooperator: U.S. Army

USFWS Contact: Dawn Greenlee

Funding Source: U.S. Army

Ka'ena Point Predator-proof Fence

The goal of this project is to promote ecosystem recovery at Ka'ena Point Natural Area Reserve. The first predator-proof fence to be built in the United States, this fence will keep dogs, cats, mongoose, and rodents out of 59 acres of Ka'ena Point. This project is expected to increase the survival of nesting seabirds such as Laysan albatross (*Phoebastria immutabilis*) and wedge-tailed shearwaters (*Puffinus pacificus*) because these ground-nesting seabirds and their young are susceptible to mammalian predators. Removal of rodents will also increase viability of seeds of 11 species of plants listed as endangered. The fence will be located along the base of the mountain and curve toward the ocean. The public will have the same access to the area that is currently allowed and they will continue to enjoy the only spot on O'ahu that is similar to the habitat of the Northwestern Hawaiian Islands.

Cooperators: State of Hawai'i DLNR Division of Forestry and Wildlife
The Wildlife Society

USFWS Contacts: Chris Swenson and Holly Freifeld

Funding Program: Endangered Species Recovery



Laysan albatross (*Phoebastria immutabilis*) at Ka'ena Point. Photo courtesy of Chris Swenson.



Ka'ena Point Natural Area Reserve on the North Shore of the island of O'ahu. Photo courtesy of Adonia Henry.

*Hāhai no ka ua i ka ululā'au.
Rains always follow the forests.*



Island of Kaua'i

The oldest island in the main Hawaiian Islands, the island of Kaua'i was formed by a single shield volcano between 5.0 and 5.6 million years ago. Kaua'i covers approximately 552 square miles and reaches 5,243 feet at its highest point, Mt. Wai'ale'ale. Erosion caused by rain, streams, wind and waves has created the deep canyons and valleys, steep cliffs, and broad coastal plains.

Because of its age and isolation, Kaua'i has a diversity of unique habitats that support the highest number of endemic species in the Hawaiian Islands. Over half of the more than 140 native species and subspecies of animals that were present in Hawai'i prior to human colonization are now extinct. The majority of wildlife and plant species that remain are listed as endangered, threatened, or candidate species. The PIFWO has initiated an ecosystem-based approach on the island of Kaua'i to promote the conservation of these listed species. Grouping species that occur in the same ecosystem and share common threats and conservation needs is an efficient approach to conservation and may preclude the need to list additional species that co-occur in these ecosystems. Using this approach, PIFWO is developing a proposed rule to list and designate critical habitat for 48 plant and animal species endemic to the island of Kaua'i, including 10 of the highest priority species in the country.

Because Kaua'i still lacks mongoose, the island has greater populations of ground-nesting birds than other main Hawaiian islands. Fifteen species of seabirds breed on Kaua'i and its 3 offshore islets, including 2 species of listed endemic taxa, the Newell's shearwater (*Puffinus auricularis newelli*) and Hawaiian petrel (*Pterodroma sandwichensis*). Kaua'i is also home to a genetically pure population of the endangered Hawaiian duck (*Anas wyvilliana*). This important

population, combined with an abundance of coastal wetland and riparian habitats, has made the island of Kaua'i a priority for the recovery endangered Hawaiian waterbirds, including the Hawaiian duck, Hawaiian stilt (*Himantopus mexicanus knudseni*), Hawaiian coot (*Fulica alai*), and Hawaiian moorhen (*Gallinula chloropus sandvicensis*).

Two project areas on the island of Kaua'i identified by the **Hawaiian Bird Conservation Focal Area Initiative** include:

- 1) Seabird conservation in the Hawaiian Archipelago; and
- 2) Waterbird recovery in the main Hawaiian Islands.

Our objectives are to:

- 1) Identify, improve, and protect sufficient breeding habitat to conserve seabirds; and
- 2) Protect sufficient habitat and populations of Hawaiian ducks, Hawaiian stilts, Hawaiian coots, Hawaiian moorhen and Hawaiian geese.

During fiscal year 2007, PIFWO contributed nearly \$500,000 to support these waterbird and seabird project areas on the island of Kaua'i. An additional \$2.6 million was granted to the State of Hawai'i for acquisition and restoration of coastal habitats, including over 100 acres of wetlands.

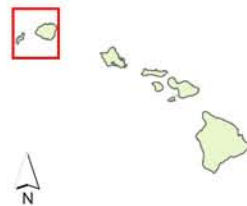
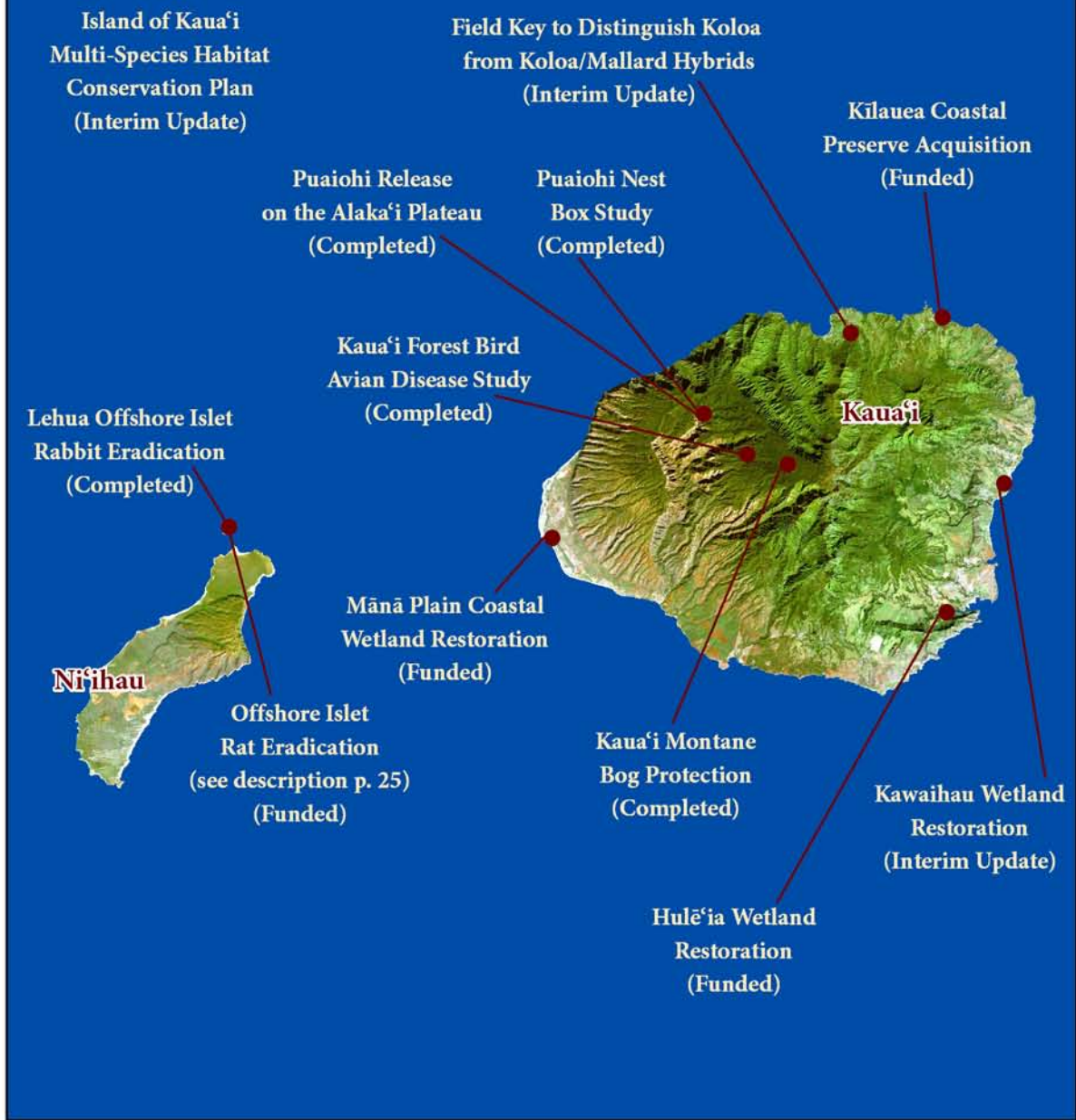
Key partnerships include:

- Kaua'i NWR Complex and State of Hawai'i DLNR Division of Forestry and Wildlife, who own and manage core habitats for Hawaiian waterbirds and seabirds;
- Department of Defense, USDA Animal and Plant Health Inspection Service, Federal Aviation Administration and other Federal agencies; and
- Kaua'i Watershed Alliance, non-profit conservation organizations and corporate and private landowners.

Pacific Islands Fish and Wildlife Office

2007 County of Kaua'i Projects

ISLAND-WIDE PROJECTS



1:705,331
UTM Zone 4, NAD83

0 2 4 Kilometers
0 2 4 Miles



Development of a Field Key to Distinguish the Koloa (Hawaiian duck) from Mallard/Koloa Hybrids

The koloa or Hawaiian duck (*Anas wyvilliana*) is endemic to the Hawaiian Islands. Habitat use studies show that koloa frequent lowland and montane wetlands and winding river corridors in the forest. The koloa is listed as endangered in part due to hybridization with feral mallards (*A. platyrhynchos*). Because of plumage similarities, reliable criteria for differentiating koloa from mallard/koloa hybrids is necessary. Without these criteria, the threat of hybridization cannot be addressed. The purpose of this project, a collaboration between USGS Biological Resources Discipline and USFWS, is to complete and field test a key to differentiate koloa from hybrids using morphology and genetics to verify field identification. The project currently involves testing birds on O'ahu and on Kaua'i. To date, genetics have been tested on 121 individual ducks and morphological measurements have been made on 123 koloa and 82 hybrids. This project implements the main recovery action for the koloa.

Cooperator: University of California, Davis
USFWS Contact: Annie Marshall
Funding Program: Endangered Species Recovery



Biologists identify morphological characteristics of koloa and mallard/koloa hybrids. Photo courtesy of Joshua Fisher.

Endangered Waterbirds and Migratory Shorebirds Forage and Nest in Restored Wetlands at Kawaihau

In cooperation with USDA Natural Resources Conservation Service, ten acres of brackish-water wetlands and mud flats were restored by manually removing invasive vegetation and excavating eight wetland basins (including shallow mud flats). Each wetland is characterized by natural water level fluctuation that has promoted the growth of cyanobacteria, which produces oxygen for organisms to use. Each wetland has been colonized by aquatic invertebrates, including chironomids, an important food source for the endangered Hawaiian stilt (*Himantopus mexicanus knudseni*). Hawaiian stilts, Pacific golden plovers (*Pluvialis fulva*), wandering tattlers (*Heteroscelus incanus*), and ruddy turnstones (*Arenaria interpres*) have been observed at foraging in the restored wetlands and mud flats. Two nests of Hawaiian stilts were observed during July 2007. Planting of native vegetation is ongoing. Predator control will be conducted during the primary breeding season for waterbirds and restoration of additional wetland habitats will be completed in phases over the next two years.

Cooperator: Ducks Unlimited, Inc.
USFWS Contact: Craig Rowland
Funding Program: Private Stewardship Grant



Biologists Kim Uyehara and Annie Marshall check a swim-in duck trap at Hanalei National Wildlife Refuge. Photo courtesy of Joshua Fisher.



Restored wetland at Kawaihau before (top) and after (bottom) restoration. Planting of native vegetation is ongoing. Photos courtesy of Adonia Henry.

Hulē'ia Wetland Restoration

The objective of this project is to restore 20 acres of riparian emergent wetlands at Hulē'ia National Wildlife Refuge (NWR). Currently Hulē'ia NWR contains only 8 acres of restored and managed native wetlands but has the potential for 8 times that amount, totaling approximately 60 to 70 acres of prime wetland habitat once restored. Funding from fiscal year 2007 will partially support staff dedicated to constructing and maintaining wetland impoundments, and installation of a well and solar-powered pump, water-delivery system, and fence to exclude feral dogs and pigs. Additional funding from the Endangered Species Recovery Program has been prioritized for fiscal year 2008. Hulē'ia Wetland restoration, identified as a high priority Hawaiian Bird Conservation Focal Area project, will benefit four species of endangered waterbirds; Hawaiian stilts (*Himantopus mexicanus knudseni*), Hawaiian coots (*Fulica alai*), Hawaiian moorhen (*Gallinula chloropus sandvicensis*), and Hawaiian ducks (*Anas wyvilliana*).

Cooperator: USFWS National Wildlife Refuge System

USFWS Contact: Holly Freifeld

Funding Program: Endangered Species Recovery

Rabbits Successfully Eradicated from Lehua Islet

During December 2006, Island Conservation confirmed that rabbits were successfully eradicated from Lehua Islet. Approximately 1,200 hours of hunting on three trips (November 2005, January 2006, and December 2006) were completed by three hunters with two Jack Russell terriers. Hunting trips were timed to coincide with periods of low numbers of breeding seabirds. During the first trip, 312 rabbits were removed over 26 days. Only one rabbit was encountered during the last 45 days of effort. Approximately 70 percent of the hunting effort was used to confirm eradication. No rabbits were observed during December 2006, one year following removal of the last rabbit. Monitoring of vegetation is ongoing to document the response of vegetation to removal of rabbits and other subsequent restoration actions. Preliminary results suggest the percent cover of shrubs has increased following rabbit removal.



Jack Russell terrier used to hunt rabbits on Lehua Islet. No interactions occurred between the dogs and native animals. Photo courtesy of Heather Eijzenga.

Cooperator: Island Conservation

USFWS Contact: Chris Swenson

Funding Program: Pacific Islands Coastal Program



Managed wetland at Hulē'ia National Wildlife Refuge. Photo courtesy of Adonia Henry.

Kilauea Coastal Preserve Acquisition

The Kilauea Coastal Preserve is a network of managed areas being developed to protect rare and endangered species in the Kilauea River Watershed. The network includes State and County managed lands, Kilauea Point National Wildlife Refuge, and private landowners. Funding from the Recovery Land Acquisition Grants program in the amount of \$1,631,132 will be used to acquire 20 acres of highly productive, ecologically sensitive coastal bluff, sand dune, estuary, and wetland habitats. An additional 8.5 acres have been preserved through conservation easements and funding from other federal partners. With the award of these funds, 15 percent of the projected 200-acre coastal preserve will be protected. The Kilauea Coastal Preserve provides habitat for 7 species of seabirds, Hawaiian monk seals, green sea turtles, 3 species of endemic stream gobies, 3 species of endemic aquatic invertebrates, and 5 species of endemic Hawaiian waterbirds.

Cooperators: State of Hawai'i DLNR Division of Forestry and Wildlife
Kaua'i Public Land Trust

USFWS Contact: Craig Rowland

Funding Program: Recovery Land Acquisition Grant



Kilauea River and coastal bluffs, part of the Kilauea Coastal Preserve. Photo courtesy of Kaua'i Public Land Trust.

Kaua'i Montane Bog Protection

Montane bogs are some of the most fragile ecosystems in the Hawaiian Islands, found in high-elevation forests on the islands of Kaua'i, O'ahu, Moloka'i, Maui and Hawai'i. The most extensive system of bogs is found on the island of Kaua'i. Due to their extreme isolation, these bogs are still relatively undisturbed compared to drier areas at lower elevations. The fragile nature of these bogs, however, requires immediate actions to prevent further degradation by feral pigs and alien plants. In July 1996, the USFWS, State of Hawai'i State Division of Forestry and Wildlife, and Wellington Fencing Company entered into a cooperative agreement to fence nine bogs in the Alaka'i Wilderness Area of the island of Kaua'i. The last fence was completed in 2003. The seven species protected by these fences are: *Platanthera holochila* (endangered), *Astelia waialealae* (candidate), *Dubautia waialealae* (candidate), *Geranium kauaiense* (candidate), and *Labordia pumila* (species of concern), *Lagenifera helenae* (species of concern), and *Lysimachia daphnoides* (species of concern). Unfortunately, since the fencing was completed, the pa'iniu (*Astelia waialealae*) continues to decline for unknown reasons. No seeds have been produced in the wild population for at least 10 years. Seven individuals of *Astelia waialealae* were collected in February 2006 and sent to the Volcano Rare Plant Facility, which has provided in-kind contributions to support bog restoration. One female plant of *Astelia waialealae* started flowering in August 2007. Although no males flowered at the same time to allow pollination, this flowering is an encouraging sign for the future of the species.

Cooperators: State of Hawai'i DLNR Division of Forestry and Wildlife
Wellington Fencing Company
USFWS Contact: Marie Brueggemann
Funding Program: Endangered Species Recovery



Astelia waialealae (pa'iniu) is an rhizomatous perennial herb, endemic to montane bogs on the island of Kaua'i. Photo courtesy of Marie Brueggemann.

Mānā Plain Coastal Wetland Restoration

Restoration of wetland and sand dune habitats on the Mānā Plain contribute to the goals of many multi-disciplinary efforts to protect and restore Hawai'i's unique flora and fauna. This project will restore and enhance a total of 141 acres; of which 116 acres are palustrine emergent wetlands and 25 acres are coastal strand and sand dune habitats. Restoration actions within the Mānā Unit will increase the area of palustrine emergent wetland, a nationally and regionally declining wetland type, by 90 acres. This represents a 45 percent increase in the area of existing wetland and aquatic habitats available to native wildlife. Twenty-six acres of existing wetlands and 10 acres of sand dunes habitats within the Kawai'ele Waterbird Sanctuary will be enhanced, increasing the quality and function of these habitats for endangered waterbirds, including Hawaiian stilts (*Himantopus mexicanus knudseni*), Hawaiian coots (*Fulica alai*), Hawaiian moorhen (*Gallinula chloropus sandvicensis*), Hawaiian ducks (*Anas wyvilliana*), and Hawaiian geese (*Branta sandvicensis*).

Cooperator: State of Hawai'i DLNR Division of Forestry and Wildlife
USFWS Contact: Chris Swenson
Funding Program: National Coastal Wetlands Conservation Grant



Dubautia waialealae is a low compact, cushion like shrub, endemic to the summit bog of Wai'ale'ale on the island of Kaua'i. Photo © G. D. Carr.



Previously farmed sugarcane field on the Mānā Plain that will be restored to wetland habitat. Photo courtesy of Adonia Henry.

Puaiohi Nest Box Study

The PIFWO funded construction and installation of artificial nest boxes for puaiohi, or the small Kaua'i thrush (*Myadestes palmeri*) on the Alaka'i Plateau. The puaiohi is an endangered Hawaiian forest bird with a current population of approximately 400 individuals. Nesting females and their young are particularly vulnerable to predation by rats. The goal of the project is to determine if puaiohi will use nest boxes that exclude rodents, thus improving the species' nesting success and promoting species recovery. Information on nest box use is currently being collected.

Cooperator: Pacific Rim Conservation

USFWS Contact: Jay Nelson

Funding Program: Endangered Species Recovery



Puaiohi (*Myadestes palmeri*), a critically endangered Hawaiian thrush. Photo courtesy of The Peregrine Fund.

Release of Endangered Puaiohi on the Alaka'i Plateau

The Zoological Society of San Diego, in collaboration with the Kaua'i Forest Birds Recovery Project, released 21 captive-raised puaiohi, or small Kaua'i thrushes, (*Myadestes palmeri*) in the Kawaikoi Stream drainage area on the Alaka'i Plateau. Puaiohi were radio tracked following their release and have shown an exceptionally high survival rate. This release in 2007 continues the successful captive propagation and reintroduction program that began in 1999 to bolster the wild puaiohi population.

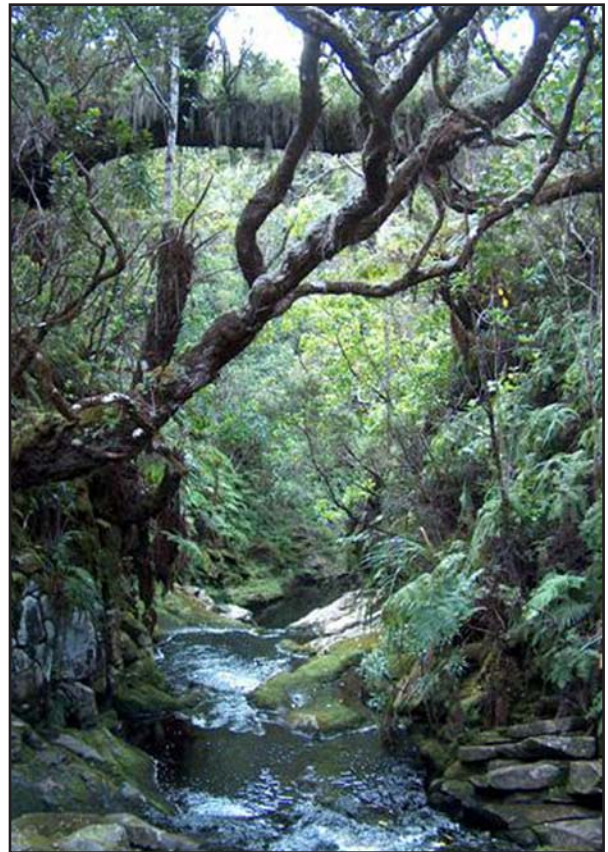
Cooperator: Zoological Society of San Diego,
Hawaiian Endangered Birds
Conservation Program

USFWS Contact: Jay Nelson

Funding Program: Endangered Species
Recovery



Biologist David Leonard installing a nest box for puaiohi. Photo courtesy of Pauline Roberts.



Puaiohi stream habitat. Photo courtesy of Tom Savre.

Kaua'i Forest Bird Avian Disease Study

This study will determine if the overall prevalence of avian pox and malaria have increased in the past 10 years. Recent declines in populations of the Kaua'i creeper (*Oreomystis bairdi*), Kaua'i 'akepa (*Loxops caeruleirostris*), and 'iwi (*Vestiaria coccinea*) on the island of Kaua'i have raised concerns that climate change has allowed mosquitoes that carry avian disease to enter previously disease-free higher elevations on the Alaka'i Plateau.

Cooperator: USGS Biological Resources Discipline

USFWS Contact: Jay Nelson

Funding Program: Endangered Species Recovery



Family of captive-reared puaiohi at Keauhou Conservation Center. Photo courtesy of Jack Jeffrey.

Regional Multi-Species Habitat Conservation Plan

On the island of Kaua'i, the endangered Hawaiian petrel (*Pterodroma sandwichensis*, 'ua'u), threatened Newell's shearwater (*Puffinus auricularis newelli*, 'a'ō), and the candidate band-rumped storm petrel (*Oceanodroma castro*, 'akē'akē) are in dire need of regional conservation efforts to decrease serious human-caused threats to their survival and prevent illegal incidental take. During fiscal year 2007, USFWS provided funds to continue a multi-year effort to address human-caused impacts to listed seabirds on the island of Kaua'i. Since 2005, the project coordinator has met with over 45 businesses and agencies, over 70 percent of which have voluntarily changed lighting management or made permanent lighting improvements in order to



Newell's shearwater (*Puffinus auricularis newelli*). Photo courtesy of Beth Flint.

minimize incidental take of listed seabirds. Outreach has also been provided to over 15 private, professional, and non-profit organizations on the island. The next phase of the project will involve engaging potential applicants who need to address unavoidable incidental take via a programmatic Habitat Conservation Plan (HCP) that provides a streamlined way for participants to receive authorization of incidental take of the covered species. The project coordinator will provide participants with technical information on seabird take at their facilities as well as minimization and mitigation measures that would be acceptable under the HCP.

Cooperators: State of Hawai'i DLNR
 Division of Forestry and Wildlife
 University of Hawai'i PCSU
USFWS Contact: Bill Standley
Funding Program: Section 6 Habitat Conservation Planning Assistance

Kaua'i Ecosystem Recovery

Lowland Mesic Forest



Labordia kaalae (top left), photo © G. D. Carr.
Canavalia napaliensis (right), photo © M. LeGrande.
 Mesic forest (bottom), USFWS photo.

Montane Mesic Forest



Kaua'i creeper (*Oreomystis bairdi*).
 Photo courtesy of Jack Jeffrey.

Wet and Dry Cliffs



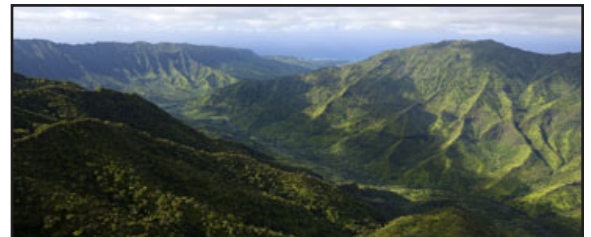
Photos courtesy of National Tropical Botanical Garden.



Chamaesyce eleanoriae. Photo © M. LeGrande.



Montane and Lowland Wet Forests



Wainiha Valley. Photo courtesy of The Nature Conservancy.



Kalalau Valley from Na Pali Kona Forest Reserve. Photo courtesy of Wikipedia.



From left to right: *Dubautia plantaginea* ssp. *magnifolia*; *D. imbricata* ssp. *imbricata*; and *D. waialealae*. Photos © G. D. Carr.



Northwestern Hawaiian Islands

The Northwestern Hawaiian Islands (NWHI) is a chain of islands and atolls that extend more than 1,000 miles northwest of the main Hawaiian Islands from the island of Nihoa to Kure Atoll. All but one of the islands and atolls are managed by the U.S. Fish and Wildlife Service as National Wildlife Refuges (NWRs); the Hawaiian Islands NWR and Midway Atoll NWR. Kure Atoll is managed by the State of Hawai'i as a State Wildlife Sanctuary. All of the islands and waters extending approximately 50 nautical miles from shore also comprise the Papahānaumokuākea Marine National Monument, managed jointly by the U.S. Fish and Wildlife Service, National Oceanic and Atmospheric Administration (NOAA), and the State of Hawai'i.

The NWHI are home to numerous listed species, including the endangered Laysan duck (*Anas laysanensis*) and Nihoa millerbird (*Acrocephalus familiaris*). Following European contact in Hawai'i, both of these species were reduced to small populations found on single small islands. Small isolated populations are extremely vulnerable to a variety of threats ranging from the accidental introduction of alien species (e.g. predators) to a random catastrophic event, such as a hurricane or tsunami. A second population of Laysan ducks was successfully established at Midway Atoll NWR through translocations during 2004 and 2005.

The vast majority of breeding seabirds in the Hawaiian Archipelago nest on the low sandy islands and atolls of the NWHI. These islands are home to more than 95 percent of the world's population of two seabird species identified as focal species by the USFWS Migratory Birds Program; the Laysan albatross (*Phoebastria immutabilis*) and black-footed albatross (*Phoebastria nigripes*).

Two project areas identified by the **PIFWO Hawaiian Bird Conservation Focal Area Initiative** include the NWHI:

- 1) Recovery of Laysan ducks and Nihoa millerbirds; and
- 2) Seabird conservation in the Hawaiian Archipelago.

Our objectives are to:

- 1) Establish at least one more population of Nihoa millerbirds and Laysan ducks, while ensuring the conservation of the existing populations and;
- 2) Identify, improve, and protect sufficient breeding habitat to conserve seabirds.

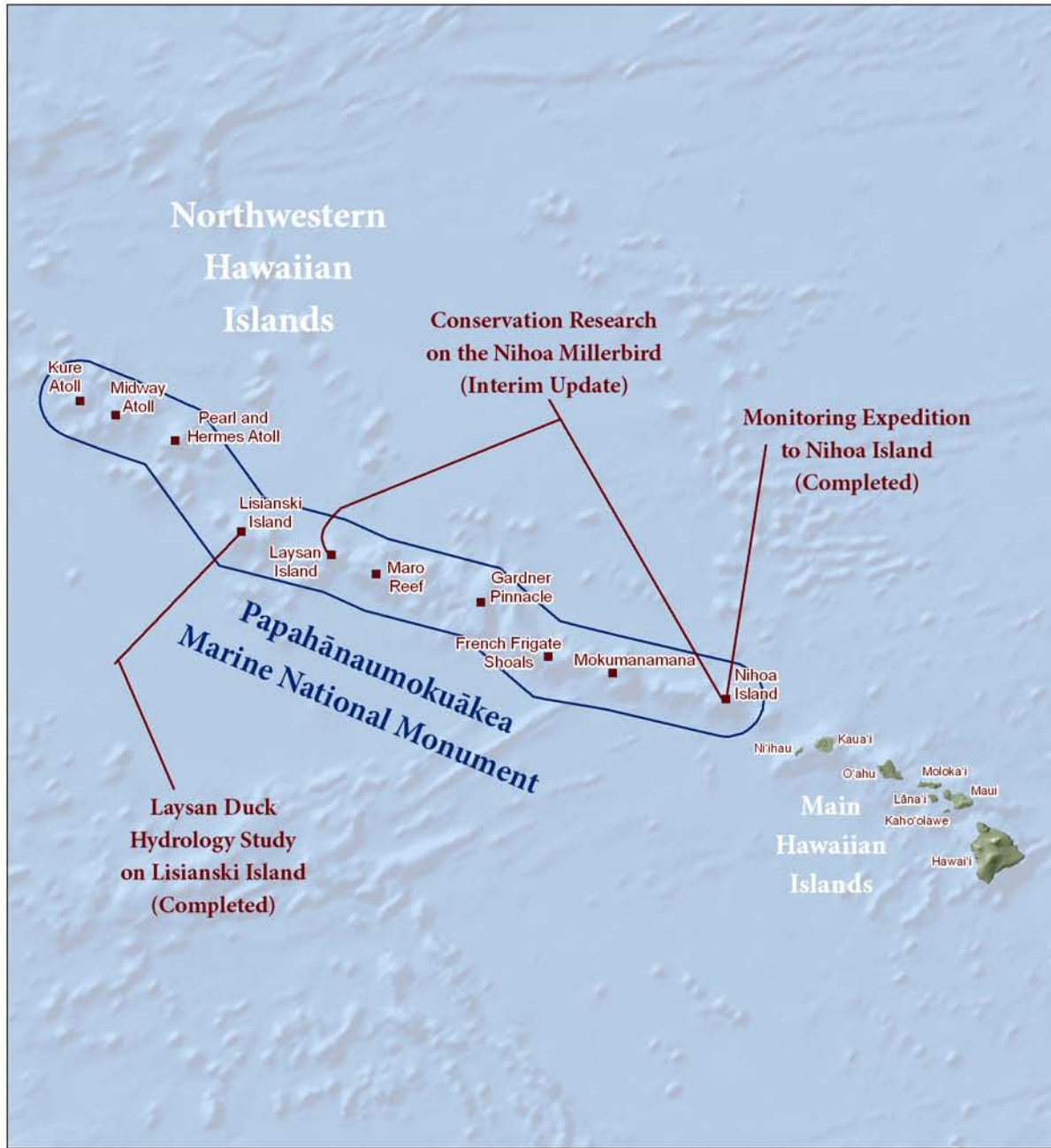
The ultimate goals of these projects are to reduce the threats facing these species of birds in order to reach recovery objectives to downlist and eventually delist threatened and endangered species, and to avoid listing additional species of seabirds.

During fiscal year 2007, PIFWO contributed over \$100,000 to support these NWHI project areas within the Hawaiian Bird Conservation Focal Area Initiative. These projects included a hydrological study on Lisianski Island to assess the feasibility of creating wetland habitat for a third population of Laysan ducks, conservation research and population surveys for Nihoa millerbirds, and restoration of native habitats for nesting seabirds.

Key partnerships include:

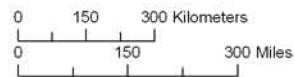
- Hawaiian Islands NWR and Midway Atoll NWR;
- NOAA and the State of Hawai'i who co-manage the Papahānaumokuākea Marine National Monument; and
- USGS Biological Resources Discipline whose scientists are closely involved with reintroduction of Laysan ducks; and
- University of Hawai'i, University of New Brunswick, and Memorial University of Newfoundland.

Pacific Islands Fish and Wildlife Office
 2007 Northwestern Hawaiian Islands Projects



Photos courtesy of Chris Swenson

1:16,657.911
 GCS, NAD83



*Niihau i ka moku manu.
 Niihau, island of birds.*

Conservation Research on the Nihoa Millerbird

Mark MacDonald, a graduate student at the University of New Brunswick, is conducting research on the habitat, diet, and reproduction of the Nihoa millerbird (*Acrocephalus familiaris*). Mark spent 10 days on Nihoa during 2006 doing preliminary work, and during 2007 year he and his assistant Daniel Tsukayama conducted studies of the birds and sampled the abundance and distribution of their invertebrate prey on Nihoa for two months. Elise Christenson, a volunteer from Midway Atoll NWR, conducted a concurrent study of invertebrates on Laysan Island, which once harbored millerbirds and is the likely site of a first translocation. The information that Mark, Daniel, and Elise collected will be an essential contribution for planning a translocation of this critically endangered species to create a second or “insurance” population of the species on Laysan Island. The Pacific Remote Islands NWRC has provided major logistical support for this project, as well as conservation of the millerbirds’ current and probable future homes.

Cooperator: USFWS National Wildlife Refuge System
University of New Brunswick

USFWS Contact: Holly Freifeld

Funding Program: Endangered Species Recovery



Nihoa millerbird (*Acrocephalus familiaris*) on Nihoa Island. Photo courtesy of Mark MacDonald.

Lisianski Laysan Duck Hydrology Survey

This project supports a hydrologic assessment, feasibility, recommendations, and cost analysis for restoring freshwater wetland habitats on the island of Lisianski. Lisianski once harbored a population of Laysan ducks (*Anas laysanensis*) that was supported by a wetland and abundant fresh water that formerly occurred in the island's interior. Introduced mammals denuded the island of vegetation and destabilized the sand, which likely caused the Lisianski wetlands to fill. Because Lisianski supported a historical population of Laysan ducks and currently lacks mammalian predators and supports abundant native vegetation, Lisianski has been identified as a high priority for translocation, which would establish a third population of Laysan ducks.

Cooperator: Tim Mayer, USFWS Hydrologist

USFWS Contact: Chris Swenson

Funding Program: Pacific Islands Coastal Program



The Nihoa flightless weevil (*Rhyncogonus exsul*), endemic to the island of Nihoa. Photo courtesy of Chris Swenson.

Monitoring Expedition to Nihoa Island

The main objectives of this project were to conduct standardized population surveys for Nihoa millerbirds (*Acrocephalus familiaris*) and Nihoa finches (*Telespyza ultima*), document the phenology and abundance of native vegetation, including four species of endangered plants, download climate data from remote weather stations, census nesting populations of seabirds, collect feathers of white terns and Laysan albatross for population genetics studies, identify alien ant species present, collect native seeds for the Laysan plant restoration project, and conduct beach counts of Hawaiian monk seals (*Monachus schauinslandi*). The population of Nihoa millerbirds was estimated at 427 individuals and the population of Nihoa finches was estimated at 2,807 individuals. The Nihoa flightless weevil (*Rhyncogonus exsul*), endemic to Nihoa Island, was commonly observed on leaves of *Sida fallax*. The highest count of Hawaiian monk seals was 37 individuals and included several juveniles. Numerous seedlings of *Pritchardia remota*, the endangered loulou palm, were observed in shady areas beneath larger trees, and 170 seeds were collected for restoration at Laysan Island. Overall, the island was lush and well-vegetated, and most plants showed little or no major insect damage, although a significant exception to this was the endangered plant, *Sesbania tomentosa*. A new species of non-native ant (*Tetramorium simillimum*) was recorded on Nihoa Island.

Cooperator: USFWS National Wildlife Refuge System

USFWS Contacts: Craig Rowland and Chris Swenson

Funding Program: Endangered Species Recovery



Laysan duck and ducklings (*Anas laysanensis*) from first successful translocation to Midway Atoll. Photo courtesy of Jimmy Breeden.



Mariana Archipelago

The Mariana Islands are the southern part of a submerged mountain range that extends 1,565 miles from Guam to near Japan. The archipelago includes the summits of 15 volcanic mountains with a total land area of 389 square miles. The Mariana Islands are composed of two United States administrative units: the Territory of Guam and the Commonwealth of the Northern Mariana Islands (CNMI). The southern islands of the archipelago are of volcanic origin but are covered with uplifted limestone from ancient coral reefs and surrounded by fringing coral reefs. The northern islands are comprised of geologically young volcanic materials, with active volcanoes on Anatahan, Pagan and Agrihan. The highest elevation point in the archipelago (3,166 feet) is on the island of Agrihan.

The archipelago features extensive coral reefs, native forests, and a diverse array of endemic species. Native forests occur on both volcanic and limestone substrates and support the highest densities of endemic forest birds, including the Mariana fruit dove, endangered Mariana crow, and endangered Rota bridled white-eye. Grasslands, savannas, and limestone caves are important habitat for the endangered Mariana swiftlet. Wetlands habitats support the endangered Mariana moorhen and the nightingale reed-warbler. Coral reefs predominate in the southern part of the archipelago, supporting green and hawksbill sea turtles, Napoleon wrasse, and giant clams.



Four islands in the CNMI, Guguan, Asuncion, Maug, and Uracas, are protected under commonwealth law as conservation areas and will be maintained as uninhabited islands for the preservation and protection of native species and their habitats. Approximately 22,500 acres are protected by the Guam NWR on the northwestern tip of Guam. Guam NWR provides habitat for the

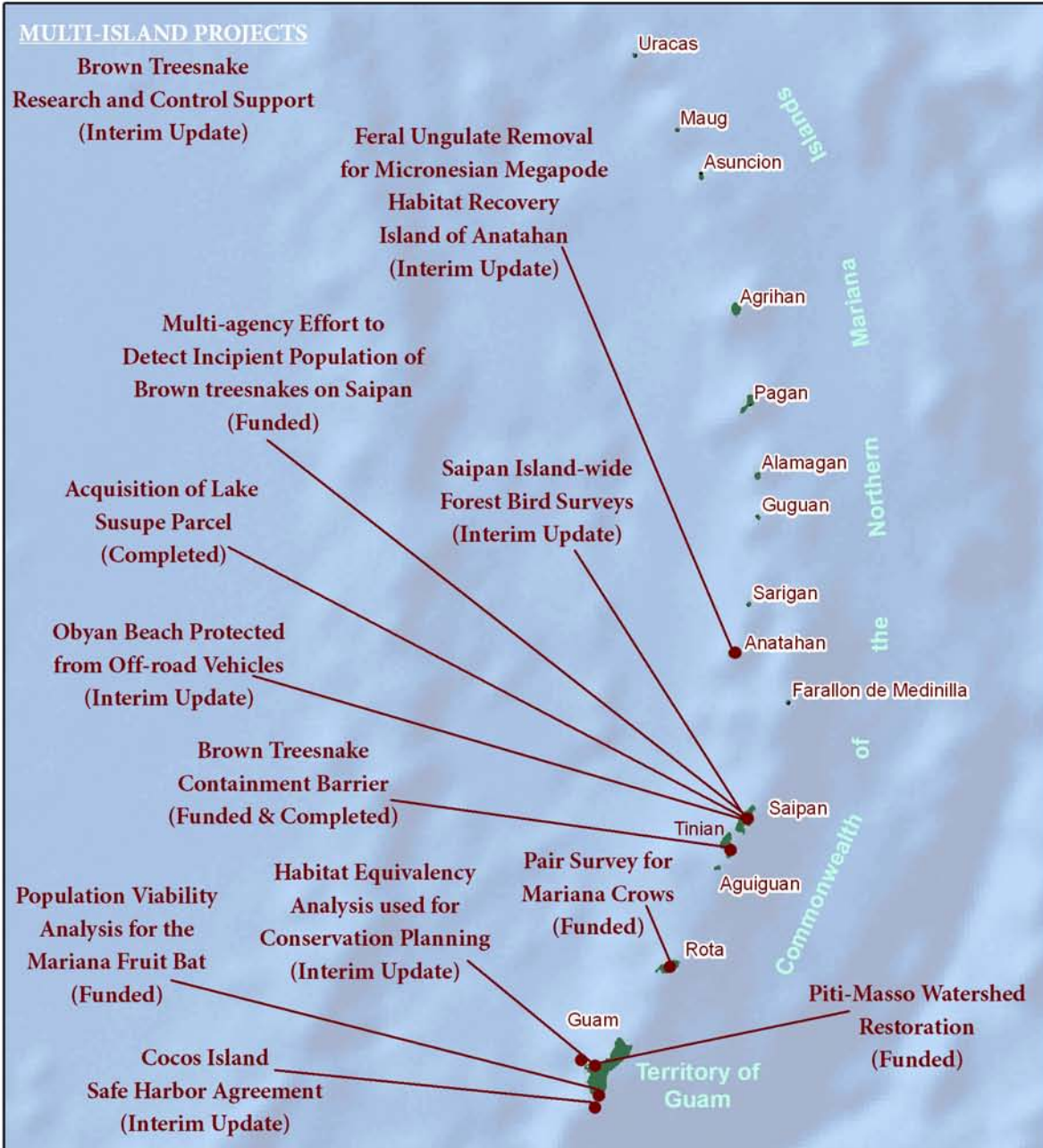


threatened Mariana fruit bat, endangered Mariana crow, and the endangered tree, *Serianthes nelsonii*. *Serianthes nelsonii* is one of the largest native trees in the Mariana Islands and is found nowhere else in the world.

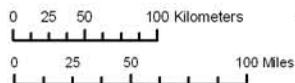
Invasive species and habitat destruction threaten native plants and animals on Guam. Almost half of the plant species on Guam were introduced by humans. The brown treesnake, introduced to Guam in 1949 from Australia, is considered the primary cause for the decline and loss of native bird and bat species on Guam. The PIFWO has supported control of brown treesnakes and preventative measures to reduce the risk of transport to other islands. The PIFWO provides coordination for multi-agency brown treesnake control efforts regionally and nationally through the legislatively mandated Brown Treesnake Working Group. The PIFWO has also provided funding for habitat restoration, population surveys and analyses, and Safe Harbor Agreements. These projects will benefit species such as green sea turtles, Mariana common moorhen, Mariana crow, and Mariana fruit bat.



Pacific Islands Fish and Wildlife Office 2007 Mariana Archipelago Projects



UTM Zone 55, WGS 1984
1:5,243,538



Piti-Masso Watershed Restoration

The purpose of this grant is to restore 6.5 acres of upland, wetland, and riparian habitat in Guam's Piti-Masso Watershed. Restoration actions include planning, removal of invasive species, and planting native vegetation. This project is part of an ongoing effort in the Piti-Masso Watershed to preserve and enhance water quality, native forest, coral reef ecosystems, and species of greatest conservation need. Restoration of the area to native species of plants will reduce erosion and will ultimately benefit marine species that utilize or inhabit Piti-Bomb Hole Marine Preserve (e.g., marine fishes, corals, and sea turtles). This project will support and contribute to the endangered species recovery plans for the Mariana common moorhen (*Gallinula chloropus guami*), green sea turtle (*Chelonia mydas*), and hawksbill sea turtle (*Eretmochelys imbricata*).

Cooperator: Guam Dept. of Agriculture, Forestry and Soil Resources Division

USFWS Contact: Chris Swenson

Funding Program: Pacific Islands Coastal Program



Mariana common moorhen (*Gallinula chloropus guami*) on a nest. USFWS Photo.

Brown Treesnake Research and Control Support

USGS Biological Research Discipline (BRD) is the Federal agency charged with conducting research and development on control and interdiction of brown treesnakes (*Boiga irregularis*). Supporting the efforts of BRD is vital to developing and improving methods to prevent the spread of brown treesnake to uninfested areas, and extirpating or minimizing impacts in areas where the snake is established. This Interagency Agreement funds: 1) staff support for monitoring the construction of a brown treesnake enclosure for the purpose of controlling snake populations so that native vertebrates can be reintroduced, 2) analysis and summary of past brown treesnake research data, and 3) support for brown treesnake research related to snake control on Guam and rapid response to extralimital snake populations.

Cooperator: USGS Biological Resources Discipline

USFWS Contact: Karl Buermeyer

Funding Program: Aquatic Nuisance Species



Roosting Mariana fruit bat (*Pteropus marianus marianus*). Photo courtesy of Curt Kessler.

Population Viability Analysis for the Threatened Mariana Fruit Bat

The Recovery Team for the Mariana fruit bat or fanihi (*Pteropus marianus marianus*) met for the first time in July 2006 on Guam. One outcome of the meeting was a recommendation to compile the existing scientific information about the Mariana fruit bat and build experimental population viability models to explore recovery scenarios, identify critical gaps in our knowledge, and help develop

recovery criteria for the species. Tammy Mildenstein, a Recovery Team member and doctoral student at the University of Montana, volunteered to take the lead on this project with some financial assistance from the USFWS. Preliminary output from the viability models will be available during fiscal year 2008. Tammy has many years' experience studying fruit bat biology and working for their conservation in the Philippines as well as considerable experience with quantitative analysis and population assessment.

Cooperator: University of Montana

USFWS Contact: Holly Freifeld

Funding Program: Endangered Species Recovery



Collecting data on a captured brown treesnake (*Boiga irregularis*). Photo courtesy of USGS.

Saipan Island-wide Forest Bird Surveys

In May 2007, CNMI Division of Forestry and Wildlife and USFWS completed island-wide forest bird surveys of Saipan repeating methods used during 1986 and 1997. Analyses are currently underway by USGS Biological Resources Discipline to compare the results from all three years. The results will help us understand the status of various species of forest birds on Saipan, allowing us to improve our management of endangered species such as the nightingale reed-warbler (*Acrocephalus luscini*a). Increased development and the potential establishment of the brown treesnake (*Boiga irregularis*) on Saipan threatens the remaining habitat for the nightingale reed-warbler on Saipan, where the majority of the population is found.

Cooperators: CNMI Division of Fish and Wildlife
USGS Biological Resources Division
USFWS Contacts: Fred Amidon and Annie Marshall
Funding Program: Endangered Species Recovery



Snake search team coordinating night operations. Photo courtesy of Nate Hawley.

Multi-agency Effort to Detect Incipient Population of Brown Treesnakes on Saipan

Since 1984, there have been 76 credible sightings and 11 documented captures of brown treesnakes (*Boiga irregularis*) on the island of Saipan. This suggests that an incipient population exists, but no reproduction has been confirmed. Local and Federal agencies pooled their resources to detect the likely incipient population at a high-risk site area. Over the course of 21 nights with an average of 20 searchers, 4 canine teams, and 185 traps, the effort accounted for 1660 total visual search hours, 5775 trap nights and over 100 hours of canine searches. No brown treesnakes were detected during this investigation; however agency managers will continue this type of effort annually as an early detection tool.

Cooperators: CNMI Division of Fish and Wildlife
CNMI Division of Agriculture
Commonwealth Port Authority
USGS Biological Resources Discipline
Guam Division of Aquatic and Wildlife Resources
USFWS Contact: Nate Hawley
Funding Program: Department of Interior, Office of Insular Affairs

Lake Susupe Parcel Acquired to Protect Endangered Species

The Lake Susupe wetlands are unique and fill a critical role in the life cycle of the nightingale reed-warbler (*Acrocephalus luscini*a) and the Mariana common moorhen (*Gallinula chloropus guami*). These wetlands also provide essential habitat for migratory waterfowl, three species of candidate tree snails, two species of candidate butterflies, Mariana fruit bats (*Pteropus marianus marianus*), Mariana swiftlets (*Aerodramus bartschi*), and Micronesian megapode (*Megapodius laperouse*). This acquisition protects 9.5 acres of intact habitat currently suitable to benefit the primary species. The Commonwealth of the Northern Mariana Islands Department of Lands and Natural Resources will hold title to the property.



Nightingale reed-warbler (*Acrocephalus luscini*a) on Saipan. Photo courtesy of Eric Vanderwerf.

Cooperator: CNMI Department of Lands and Natural Resources
USFWS Contact: Craig Rowland
Funding Program: Recovery Land Acquisition Grant

Brown Treesnake Containment Barrier

A brown treesnake containment barrier was constructed on the island of Tinian during November 2007. This containment facility will allow high-risk cargo to be quarantined in a snake-proof environment until optimal conditions permit an effective canine search. This project benefits the recently delisted Tinian monarch (*Monarcha takatsukasae*), the endangered Micronesian megapode (*Megapodius laperouse*), and the threatened Mariana fruit bat (*Pteropus marianus marianus*).

Cooperator: CNMI Division of Fish and Wildlife
USFWS Contact: Nate Hawley
Funding Program: Showing Success Initiative



Containment barrier for brown treesnake (*Boiga irregularis*) during construction. Photo courtesy of Nate Hawley.

Pair Survey for Mariana Crows

The objective of this project is to conduct a direct count of territorial pairs of Mariana crows (*Corvus kubaryi*) on the island of Rota. This count will assess the Mariana crow's status in previously unsurveyed areas of Rota and provide a current population estimate for the island. This information will then be used for Habitat Conservation Planning and recovery planning and implementation.

Cooperator: University of Washington

USFWS Contact: Fred Amidon

Funding Program: Endangered Species Recovery



Mariana crow (*Corvus kubaryi*). Photo courtesy of Emily Weiser.

Feral Ungulate Removal for Micronesian Megapode Habitat Recovery

The goal of this project is to promote and enhance habitat restoration for the endangered Micronesian megapode (*Megapodius laperouse laperouse*) through feral pig and goat eradication on the island of Anatahan in the CNMI. Anatahan, a 3,230-hectare stratovolcano island, is located 90 miles north of the island of Saipan. Severe impacts to the vegetation communities resulting from high densities of feral ungulates were severely altering the habitat available for megapodes. Conservation recommendations in the USFWS Biological Opinion from April 1998 recommended that the U.S. Navy implement



Habitat in the CNMI before (top left) and following removal of feral pigs and goats. Vegetation growth is shown 2 years (top right), 3 years (bottom left), and 6 years (bottom right) following removal of ungulates. Photos courtesy of Curt Kessler.

conservation and recovery projects in the Marianas to improve the habitat and population of the megapode to offset operation of their active bombing range on Farallon de Medinilla, a nearby island. The U.S. Navy funded this project in cooperation with USFWS and CNMI Division of Fish and Wildlife. The eradication project began in 2003, and although it has suffered some setbacks from typhoons and volcanic activity, Anatahan is now goat free and has fewer than five pigs left. The pigs will soon be removed and the project will be complete. In addition this project has provided information on threatened Mariana fruit bat numbers, and on other species such as seabirds and sea turtles.

Cooperator: CNMI Division of Fish and Wildlife

USFWS Contact: Curt Kessler

Funding Source: U.S. Navy



The island of Anatahan in the Commonwealth of the Northern Mariana Islands. Photo courtesy of Curt Kessler.

Obyan Beach Protected from Off-Road Vehicle Access

Two recovery actions for green sea turtles (*Chelonia mydas*) have been completed at Obyan Beach. A barricade was constructed to prevent vehicle access to five acres of Obyan Beach and 0.5 miles of shoreline, an area used by nesting green sea turtles. In addition, interpretive signs were posted to educate and inform the public about green sea turtles and the threats they face. Habitat restoration actions, such as planting native vegetation, are ongoing.

Cooperator: Mariana Islands Nature Alliance

USFWS Contact: Chris Swenson

Funding Program: Pacific Islands Coastal Program



Obyan Beach on the island of Saipan. USFWS Photo.



Guam rail (*Gallirallus owstoni*), believed to be extirpated from the wild, will be reintroduced to Cocos Island using birds raised in captivity. Photo courtesy of Guam Division of Aquatic and Wildlife Resources.

Habitat Equivalency Analysis used for Conservation Planning

Coastal Conservation Program staff coordinated with National Marine Fisheries Service, Environmental Protection Agency, Guam Division of Aquatic and Wildlife Resources, and the US Navy on the Kilo Wharf Extension project in Apra Harbor, Guam. The PIFWO staff led a multi-agency field investigation of coral reef habitats at the project site and potential mitigation sites. A mathematical model designed to scale appropriate compensatory mitigation, Habitat Equivalency Analysis, was used for the first time as part of conservation planning for a large and complex infrastructure project in the Pacific Islands. The U.S. Navy worked productively with the resource agencies on a compensatory mitigation package intended to replace the coral reef ecological services that will be lost unavoidably due to project-related impacts. The mitigation action includes a suite of management and restoration activities. Reforestation of 500 acres of eroded watershed lands will improve water quality and reduce downstream sedimentation and result in the enhancement of existing coral reef habitat that has been degraded over time by poor land management practices.

Cooperators: Multiple agencies

USFWS Contact: Kevin Foster

Funding Source: U.S. Navy

Cocos Island Safe Harbor Agreement

The objective of this agreement, which is currently in the final stages of development and will likely be implemented during 2008, is to facilitate the recovery of the endangered Guam rail (*Gallirallus owstoni*) by introducing the species onto privately-owned land within the Cocos Island Resort, on Cocos Island. Conservation activities that will benefit the Guam rail include the eradication and control of predators, the development and implementation of a forest enhancement plan, the release and monitoring of Guam rails, and the creation of educational materials to promote understanding of wildlife recovery and invasive species issues.

Cooperators: Cocos Island Resort

Guam Department of Agriculture

USFWS Contact: Chris Mullen

Funding Program: Safe Harbor Agreement Program



Stonefish (*Synanceia verrucosa*) at Kilo Wharf, Apra Harbor on Guam. Photo courtesy of Kevin Foster.



Caroline Islands

The Caroline Islands include the Republic of Palau and the Federated States of Micronesia, both of which are independent nations with Compacts of Free Association with the U.S. Biologically diverse, the Caroline Islands contain over 800 islands and small islets surrounded by coral reefs.

The Republic of Palau has the most diverse forests in Micronesia, with over 1260 known species of plants and an estimated 25 percent endemism rate. Due to its extensive coral reef resources which include more than 400 species of hard coral, more than 300 species of soft coral, and more than 1,400 species of reef fish, Palau is considered one of the “Seven Underwater Wonders of the World.” Palau also supports the only populations of endangered dugong and endangered saltwater crocodiles in Micronesia. Micronesia’s largest population of nesting hawksbill sea turtles is located on Palau.

Environmental concerns include illegal fishing and overfishing, development, solid waste disposal, invasive species, dredging of coral and sand, global climate change, and rising sea levels. Historically, the coral reefs in the Caroline Islands supported subsistence fishing, commercial fishing and collection of reef species. However, a combination of over-fishing by commercial ventures and poaching by foreign fishing vessels depressed the population of key species throughout the archipelago.

Because of these concerns and the associated impacts on trust resources, PIFWO has supported several projects in the Caroline Islands aimed at developing and managing Marine Protected Areas and other Conservation Areas in cooperation with local villages.

Ngaremeduu Conservation Area and Ngardok Nature Reserve

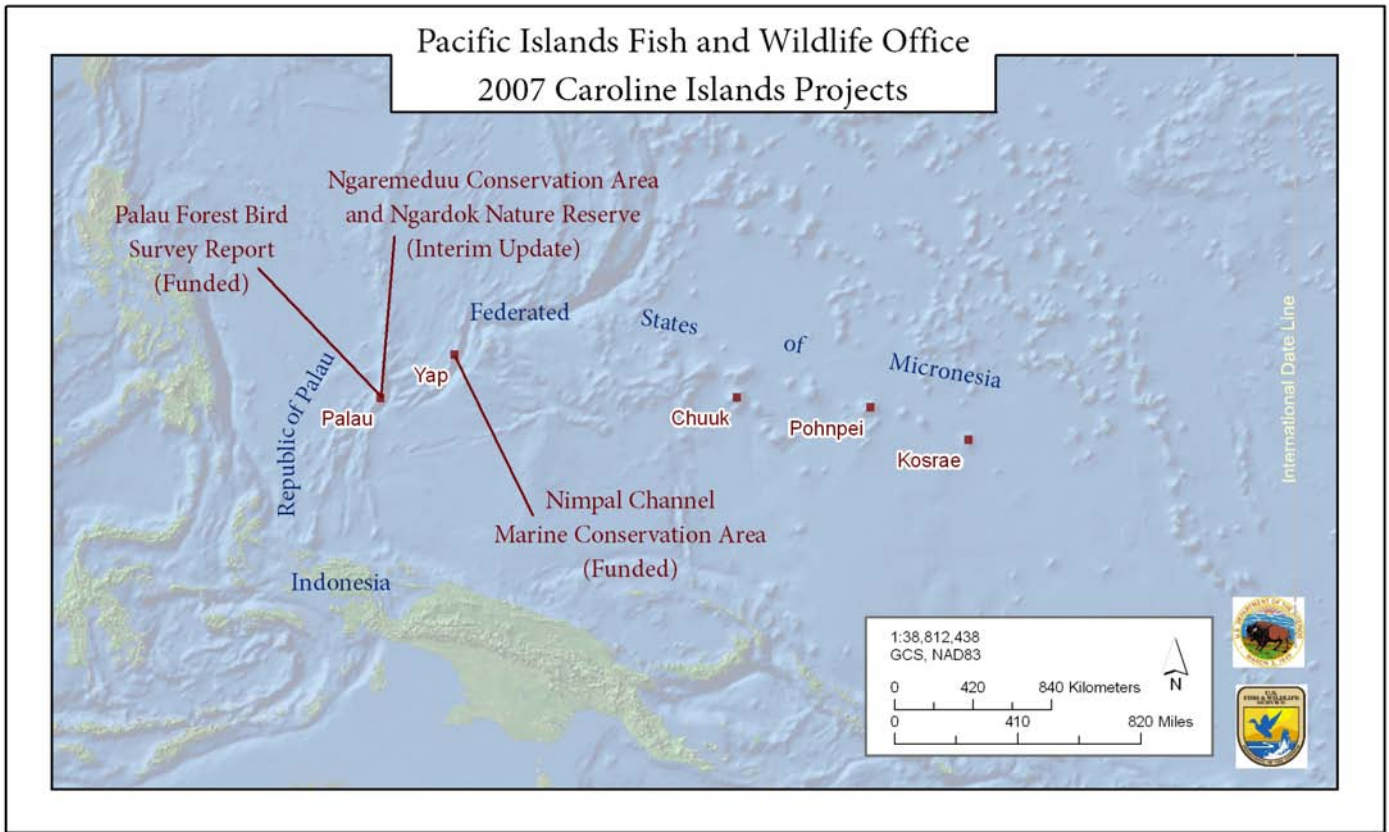
A Department of Interior project to build a 53-mile long road on the Island of Babeldaob in the Republic of Palau was completed during fiscal year 2007. The PIFWO staff participated as a NEPA Cooperating Agency to help evaluate the environmental effects of this federally funded project. This effort resulted in development and implementation of a significant compensatory mitigation package that included establishment in perpetuity of two important conservation areas. The Ngaremeduu Conservation Area (NCA) includes approximately 25,000 acres of healthy coastal mangrove, coral reef, lagoon, and ocean habitat. In addition, the

NCA supports significant foraging and breeding areas for endangered dugongs (*Dugong dugong*), multiple species of sea turtles, and saltwater crocodiles (*Crocodylus porosus*). The Ngardok Nature Reserve (NNR) includes approximately 1,300 undeveloped acres of native forest, lake, stream, and riparian habitat. The NNR is a primary aggregating and breeding site for endangered saltwater crocodiles and home to endangered megapodes and many other sensitive animals and plants.



Mangrove forest on Palau. Photo courtesy of SPBCP.

Cooperator: Republic of Palau
USFWS Contact: Michael Molina
Funding Source: Republic of Palau



Nimpal Channel Marine Conservation Area

The purpose of this agreement is to engage the local communities in Yap State, Federated States of Micronesia in marine conservation practices. Objectives of this project include delineating the marine conservation area (MCA) at Nimpal Channel, developing a management plan through consultation with local communities of Kadaay and Qokaaw, biological monitoring, analysis of data, and enforcement of the of the MCA.

Cooperator: Yap Community Action Program
USFWS Contact: Chris Swenson
Funding Program: Pacific Islands Coastal Program



Coral reef at Nimpal Channel Marine Conservation Area. Photo courtesy of Chris Swenson.

Palau Forest Bird Survey Report

This project will analyze bird survey data collected with USFWS technical assistance during 2005 on Babeldaob, Koror, the Rock Islands, Peleliu, and Angaur. The distribution and abundance of Palau’s bird species has not been estimated since 1991, and analysis of the 2005 data will provide important information on the status of numerous bird species, including 9 species and 6 subspecies endemic to Palau and 5 species listed by the IUCN. This project will assess of the status of each species, estimate population size, inform conservation assessments and planning documents, and provide a means to gauge the impact of ongoing and future development and other projects in Palau.

Cooperator: Pacific Rim Conservation
USFWS Contact: Chris Swenson
Funding Program: Pacific Islands Coastal Program



Collard kingfisher (*Halcyon chloris*). Photo courtesy of Eric Vanderwerf.



The Republic of the Marshall Islands (RMI) consists of over 1,200 small, low-lying islands clustered in 29 atolls and 5 solitary islands. Located in the West Central Pacific Ocean, most of the islands and atolls form two parallel chains, the Ratak Chain (meaning “sunrise”) and the Ralik Chain (meaning “sunset”). Most of the atolls encircle large central lagoons. Although the dry land area covers only 70 square miles, the RMI covers 750,000 square miles of ocean within Micronesia. The American possession of Wake Island, although not part of the RMI, is biologically tied to the RMI. The atolls within the Marshall Islands are geologically young, colonized by terrestrial life only 3,000 – 4,000 years ago. The land area of Marshall Islands is built up from the carbonate remains of coral reef plants and animals and includes sands, gravel, cobbles, consolidated limestone debris, and beachrock. Approximately half of the nation's population lives on Majuro, the capitol, and on Ebeye (island in Kwajalein Atoll), the location of the U.S. Army ballistic missile testing site.



Coral reefs in the Marshall Islands contain over 800 species of fishes, 1,600 species of mollusks, and more than 250 species of stony coral. In contrast, species diversity on the

geologically young terrestrial environments is low. Fewer than 100 species of plants and 700 species of land animals are considered native. Bokak is one of the most intact atolls

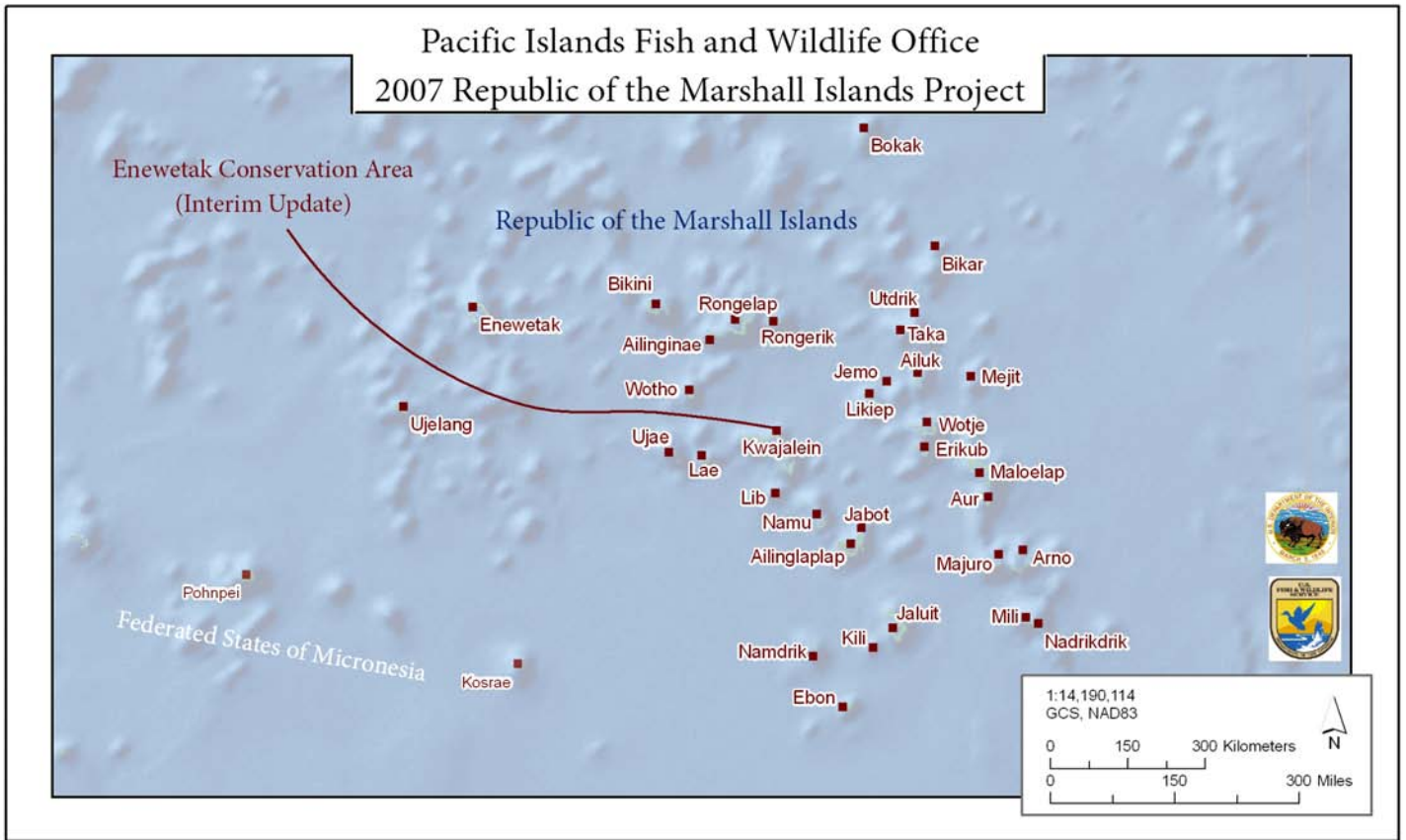


on earth with nine species of plants and 26 species of birds. The waters off Arno Atoll support deep sea habitat for pelagic fishes. Multiple World War II ship and plane wrecks rest in the lagoons on Bikini and Jaluit Atolls.

Because their livelihood depended on resources from the land and sea, ancient Marshallese developed sustainable methods of harvest. “Mo,” or an area restricted from use, were developed as a method to conserve food resources such as crabs and fishes. Some of these “mo” are still recognized today, and efforts are being made to reactivate “mo” in other areas.

Introduced plant and animal species far outnumber native species in the RMI. Major threats to natural resources in the Marshall Islands include invasive species, radiation from nuclear testing, changes in human population and lifestyle, and global climate change. For example, the introduction of long-legged ants drastically reduced the populations of crabs on Ailinglaplap Atoll, formally a “mo” atoll with intact biological resources. Land birds, such as the beautifully colored purple-capped fruit-dove (*Ptilinopus porphyraceus herseimi*) and the flightless Wake rail (*Gallirallus wakensis*), are extinct, likely as a result of human induced environmental changes and increased hunting.

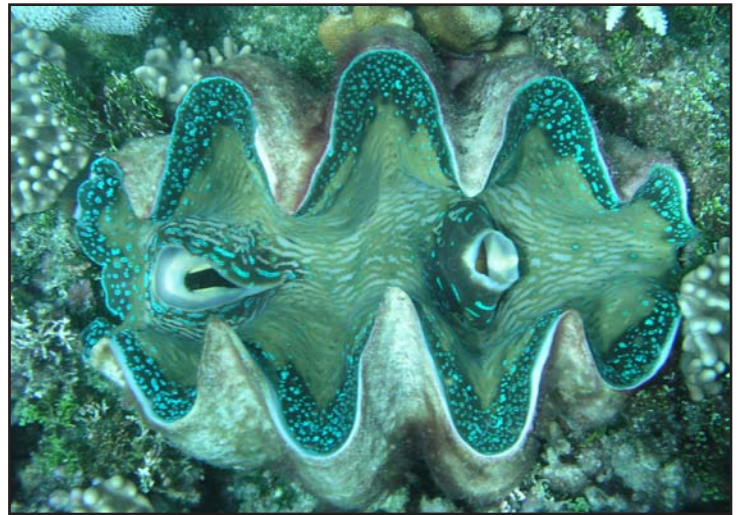
The PIFWO has collaborated with the U.S. Army and The Republic of the Marshall Islands to establish a protected Conservation Area or “mo” on Enewetak Island in Kwajalein Atoll.



Enewetak Conservation Area

During fiscal year 2007, the final step to establish the Enewetak Conservation Area (ECA; see photo opposite page) at the Reagan Missile Defense Test Site at Kwajalein Atoll in the RMI was completed. This step was the adoption of an ECA management plan by the U.S. Army Space and Missile Defense Command, which is responsible for activities at U.S. Army Kwajalein Atoll (USAKA). The ECA was established through coordination with USAKA on mitigation for a high priority national defense project. The ECA includes an entire uninhabited islet that harbors nesting seabirds, a mature *Pisonia grandis* forest, documented sea turtle nesting, and a surrounding coral reef with habitats supporting highly abundant and diverse species assemblages. The ECA will serve as a focus for education, non-consumptive recreation, and other passive activities that are compatible with conservation. The ECA is the first conservation area established at Kwajalein through formal cooperative agreement among the U.S., RMI, and local landowners, and its management will be a joint responsibility of USAKA and the RMI in coordination with USFWS and other partners.

Cooperators: U.S. Army Kwajalein Atoll
The Republic of the Marshall Islands
USFWS Contact: Kevin Foster
Funding Source: U.S. Army Kwajalein Atoll



Giant clam (*Tridacna gigas*) at Enewetak Conservation Area. Photo courtesy of Kevin Foster.



Yellow crinoid (*Comanthina schlegelii*) at Enewetak Conservation Area. Photo courtesy of Kevin Foster.



American Samoa, located approximately 2,600 miles south of Hawai'i, is comprised of 5 volcanic islands and 2 coral atolls, Rose Atoll and Swains Atoll. The islands of American Samoa are characterized by steep, rugged peaks covered with native rainforest. Its highest point, Lata Mountain, rises 3,163 feet above sea level. Although coastal plains are limited in American Samoa, mangrove wetlands historically were prominent features at the mouth of most freshwater streams. American Samoan mangroves provide important resources for wildlife, traditional activities, and shoreline protection. Sheltered from rough seas and high winds, Pago Pago on the island of Tutuila, has one of the best natural deepwater harbors in the South Pacific Ocean. Approximately 95 percent of the population of American Samoa lives on the island of Tutuila.

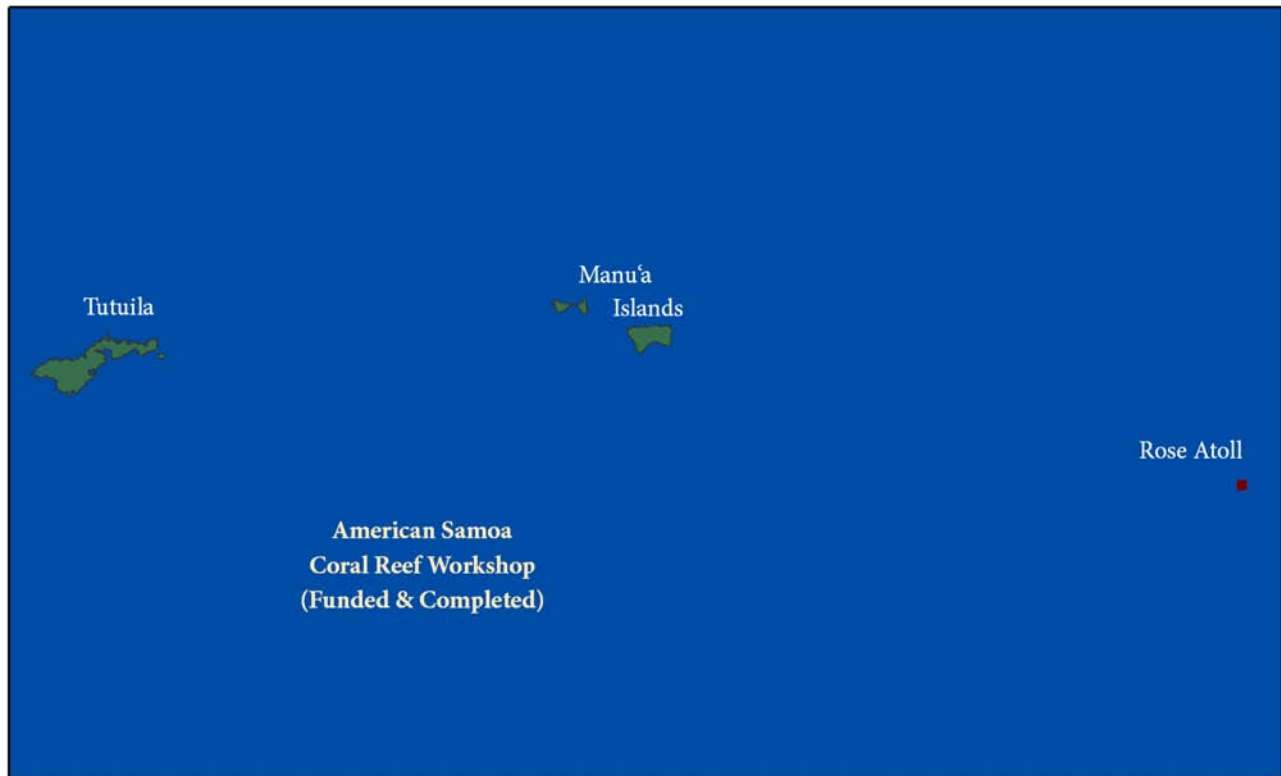
More than 90 percent of the land in American Samoa is communally owned. Federally owned lands include Rose Atoll National Wildlife Refuge (NWR) and American Samoa National Park. Established in 1973, Rose Atoll NWR is the southernmost refuge in the National Wildlife Refuge System and is managed cooperatively by the USFWS and government of American Samoa. Rose Atoll NWR protects 15 acres of land on 2 small islets and 39,236 acres of coral reef. Samoan village leaders and U.S. Congress set aside terrestrial and marine habitats on all four of the main islands as American Samoa National Park. Park resources range from rainforests to coral reefs.



Two species of fruit bats are native to American Samoan rainforests and are important pollinators and seed dispersers. These rainforests also harbor diverse communities of native birds, lizards, and invertebrates. Fringing coral reefs in American Samoa have the largest marine biodiversity in the U.S. and its possessions. Marine mammals include 7 species of whales and 3 species of dolphins confirmed in American Samoa waters (6 other species are found in the region but not confirmed in American Samoa); marine reptiles include 4 species of turtles and 1 species of sea snake. Over 200 species of coral and nearly 1,000 species of fish are present in American Samoa waters. Coral reefs are dominated by six genera: Montipora, Porites, Panova, Pocillopora, Psammocora, and Acropora. Dominant fish families include damselfish (Pomacentridae), surgeonfish (Acanthuridae), wrasse (Labridae), and parrotfish (Scaridae).

Natural resources throughout American Samoa are threatened by invasive plants and animals, global climate change, and increasing human population pressures. Since the early 1900s the majority of mangrove wetlands have been filled by anthropogenic and natural causes. Increased sedimentation has also negatively affected coral reefs. The PIFWO supported projects in American Samoa include conservation and education on mangrove wetlands and coral reefs. Education and outreach programs are an investment to bring about changes by fostering a community that is better informed about the value of the coastal and marine environments. This increase in public knowledge of the importance of the coastal and marine environment provides the local community with information to make informed decisions about the use of their resources, and results in grassroots support for measures to conserve and manage coastal and marine resources in a sustainable way.

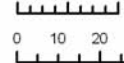
Pacific Islands Fish and Wildlife Office
2007 American Samoa Projects



Rose Island, USFWS Photo

UTM Zone 25, NAD84
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American Samoa Coral Reef Workshop

This workshop provided information to resource managers and others about opportunities for funding coral reef conservation projects in American Samoa. The workshop was modeled on other successful workshops previously held in Hawai'i, Guam, and the Commonwealth of the Northern Mariana Islands.

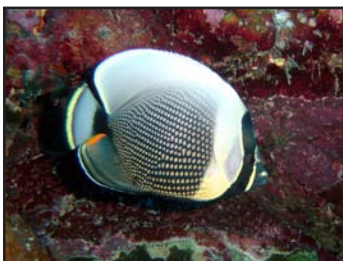
Cooperator: American Samoa Department of Commerce

USFWS Contact: Dwayne Minton

Funding Program: Pacific Islands Coastal Program



Coral reef habitat (above) and fishes at American Samoa: bannerfish (*Heniochus chrysostomus*, far left); butterflyfish (*Chaetodon reticulatus*, middle), and massive *Porites* sp. coral (left). Photos courtesy of National Park Service and USFWS.



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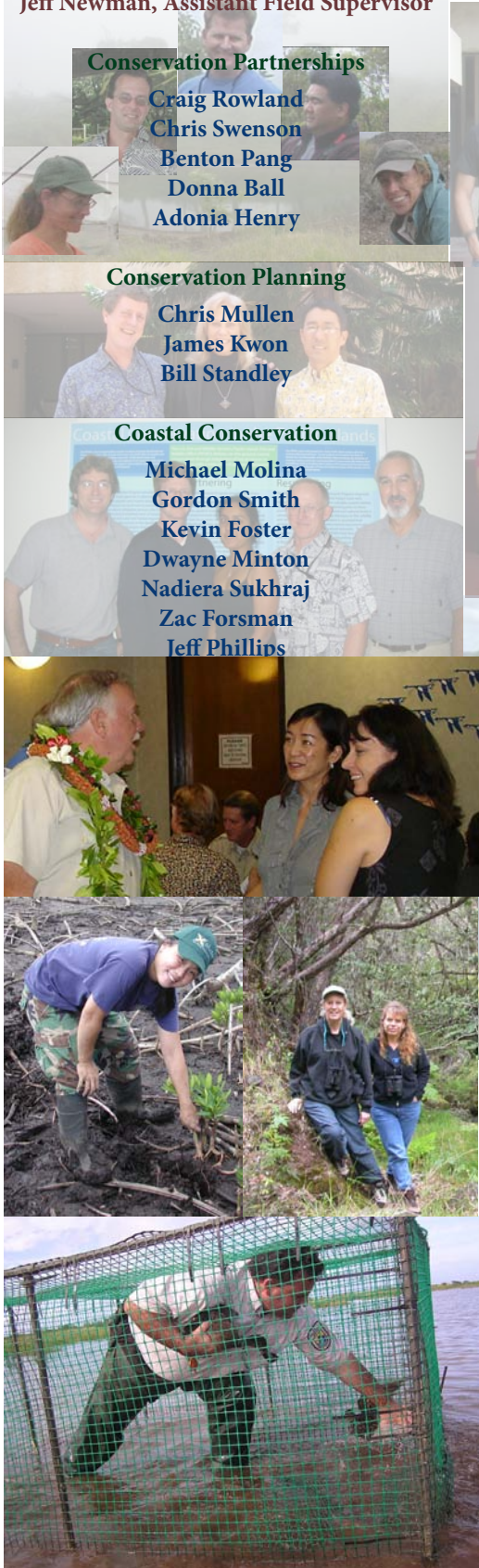
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Photo: Trapping ducks for koloa and mallard/koloa hybrid study at Hanalei National Wildlife Refuge. Photo courtesy of Joshua Fisher.