

## Conservation of the Hawaiian Avifauna

*A Program of the Peregrine Fund*

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### History, Mission, and Leadership

The Peregrine Fund (TPF) is a non-profit conservation organization founded in 1970 at Cornell University by Professor of Ornithology Tom J. Cade in response to the catastrophic decline of the Peregrine Falcon throughout much of North America. The pioneering efforts to save this species resulted in breakthroughs in the field of endangered species research and restoration. Today, TPF has many programs around the world focusing on preserving and restoring endangered birds, their habitat and improving local peoples' conservation awareness and ability.

Our organization employs the interdisciplinary principles of conservation biology. We strongly believe in cooperative efforts involving individuals, organizations, corporations and government, a belief that has been the cornerstone of our programs. We are a results oriented organization that works locally, nationally and internationally. Preserving highly visible, pop-

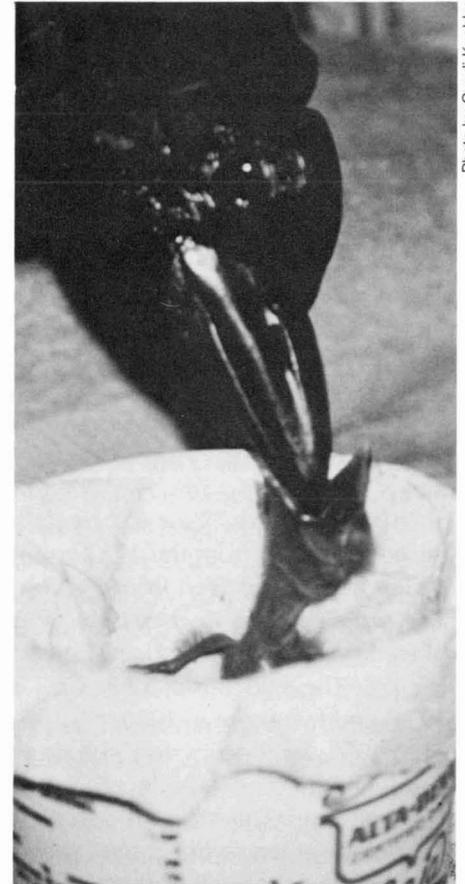
ular, far-ranging species such as 'Alala (*Corvus hawaiiensis*), California Condors (*Gymnogyps californianus*) and Harpy Eagles (*Harpia harpyia*) has many benefits. By focusing on birds and their ecological requirements and providing sufficient protection to sustain viable populations, we are using birds to provide an umbrella of protection for the diversity of life and the entire ecosystem associated with them.

Successful conservation programs must be based on good information and experience. Sound scientific research and practical management provide the basis for what we do and the decisions we make. Over 150 scientific articles and books have been produced by our biologists. TPF is involved in community education through lectures, tours, newsletters, popular publications, and film. We are committed to conservation education because we believe teaching today's children will enhance the conservation awareness of tomorrow's leaders. Our Educational Center in Boise, Idaho, makes it possible for the general pub-

lic to learn more about birds, conservation, and The Peregrine Fund. About 30,000 people visited in 1995 and we expect about 50,000 visitors per year from 1996 on.

### The Hawaiian Situation

With the The Peregrine Fund's long and successful track record restoring mainland species of endangered birds, TPF was contracted by the U.S. Fish



*A crow puppet fits over the human hand and is used to feed the tiny Hawaiian Crow chick.*



*The Crested Honeycreeper is rather gangly-legged at this point but will develop into a very beautiful bird.*



*This is a release cage and tower built high in the Puuwaawaa Forest in Hawaii for releasing weaned and fledged juvenile captive birds.*

and Wildlife Service (FWS) to undertake a similar program in Hawaii. Beginning with the 'Alala, and expanding to a current total of eight species programs, TPF's efforts in Hawaii have grown to include managing two propagation facilities, a staff of 11 persons, a capital investment of \$2.5 million, and an annual operating budget of \$1 million.

The phenomena of island extinctions, historically repeated as a testimony to the expansion of humankind across the oceans, is nowhere more dramatic than throughout the Hawaiian archipelago. An isolated island chain, the Hawaiian Islands enabled nature to display species evolution and diversity unlike any other landmass on earth. However, today many endemic populations are extinct or rapidly declining. Hawaiian forests have become "the endangered species capital of the U.S." with 70 bird extinctions since the arrival of the Europeans

only 200 years ago. This island state is the last stronghold for one-third of America's endangered birds and plants. Perhaps more alarming is that even populations of the common birds are disappearing. A concerted effort involving habitat management, conservation education and "hands-on" species restoration to include captive propagation and reintroduction has begun, hopefully in time to avert an extinction disaster unlike any other in recent history. Beginning in 1993, The Peregrine Fund, in collaboration with the U.S. Department of the Interior and Hawaii's Division of Land and Natural Resources began programs for restoration of native Hawaiian bird species.

### Introduction of Proposed Project

The Peregrine Fund's Hawaii program is primarily conservation, but with strong educational and research components. Captive propagation of critically endangered species is primarily focused on the restoration of the species, which must be considered as the conservation of biodiversity. However, considering that all of the endangered species in Hawaii are new to aviculture, only through carefully designed avicultural programs (research) is there any possibility of successfully incubating, hatching, handrearing, fledging, breeding and ultimately releasing these unique species. Such research on the Hawaiian species includes dietary analyses of required food items, behavioral profiles of wild and captive birds, enclosure design, pathological investigations and release ("hacking") technology.

Because there are currently no programs similar to this in Hawaii (or perhaps even in the world), there is a strong public interest in the activities at the two facilities. Tours are given to special interest groups such as Federal, State and Municipal agencies, university natural science students, clubs and societies (Audubon, Sierra Club, elder hostels, etc.), and conservationists on the national and international level. Also, there is a regular "outreach" program that gives presentations related to TPF programs and the state of conservation in Hawaii to classes, clubs, and other public interest groups. From 1993 to 1996, an estimated 1,500 per-

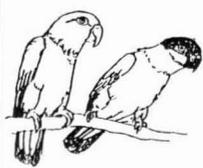
sons either visited one of the two TPF facilities or were given outreach presentations.

### Background Information on Proposed Project

Captive breeding has been recommended as a conservation tool to preserve diminishing avifauna. Captive propagation may involve intervention and subsequent immediate release into the wild (as in the 1993, 1994, 1996 'Alala program), or more prolonged needs to keep species in captivity, such as the case of the Puaiohi. The sense of need that demands improved captive propagation capabilities springs from at least two factors. First, research results on poorly known and rare species are usually very slow to emerge. If we wait for results on why a rare species is in decline, it will very likely be extinct or beyond saving before relevant data are available. Second, when a species is present in only very low numbers, catastrophic events leading to population fluctuations can easily cause extinction, whether or not the cause of decline is known. Ideally, it is important to obtain breeding stock and begin captive breeding and release experiments while birds are still more abundant.

Subsequent observations from such releases may shed light on factors limiting populations and those factors responsible for decline. However, for extremely rare species it may be neces-

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The "Akobekobe" is an endangered native species of Hawaii. This juvenile is showing the beginning of a crest.

sary to glean what life history information is available from field studies prior to captive propagation intervention.

For the Peregrine Falcon (*Falco peregrinus*), the Mauritius Kestrel (*Falco punctatus*), and the Bald Eagle (*Haliaeetus leucocephalus*), removal of first clutches of eggs, broods of young soon after hatching, or young beyond the number normally fledged, has proven to be effective for obtaining birds for breeding and release without seriously affecting wild populations (Jones et al., 1991 Cade, 1986 a, b; Cade, 1988;). Increasingly, captive propagation technology and "hands-on" manipulation of wild populations (cross-fostering, egg replacement, supplemental feeding, artificial nest opportunities, etc.) is becoming an integral component of recovery efforts for endangered species such as California Condors (Kuehler and Witman, 1983; Snyder and Snyder, 1989), San Clemente Island Loggerhead Shrikes (*Lanius ludovicianus mearnsi*) (Scott and Morrison, 1990; Kuehler et al., 1993), 'Alala (Kuehler et al., in press), Chatham Island Black Robins (*Petroica traversi*), Takahe (*Notornis mantelli*), and Kakapo (*Strigops habroptilus*), (Duckworth, 1992).

In Hawaii, The Peregrine Fund's efforts began in 1993 as an emergency

measure to hatch, rear and release chicks of the critically endangered Hawaiian Crow or 'Alala. At that time there was a total wild population of 12 birds with only three breeding pairs. TPF was very successful, hatching and rearing seven birds, five of which were released with two held back for captive propagation. Based on this demonstration of avicultural potential, the U.S. Fish and Wildlife Service contracted TPF to continue this effort of captive propagation for not only the 'Alala but the other endangered Hawaiian forest birds as well. The target species for the first three years (1993-1996) have been 'Alala (E = endangered), Palila (E), Puaiohi (E) and Nene (E), as well as four surrogate species 'Oma'ō, 'Iiwi, Common 'Amakihi, and 'Elepaio. In addition to FWS's commitment to underwrite a major portion of TPF's operating activities, \$2.5 million was appropriated by the U.S. Congress to construct Phase I and II of a new captive propagation facility, now constructed and named the Keauhou Bird Conservation Center. This construction includes facilities for incubation and brooding, 19 forest bird aviaries, six 'Alala aviaries, staff residences, storage and workshop building, and all infrastructure (water, power, roads, etc). In March, 1996, the State of Hawaii

turned over to TPF the management of their captive propagation facility at Olinda, Maui, now re-named the Maui Bird Conservation Center.

In Hawaii, the focus of the program is restricted to the main islands in the archipelago which continue to support endemic species: Oahu, Hawaii, Maui and Kauai. Currently, TPF is active in Kauai with Puaiohi (E) and Nukupu'u (E), in Maui with Po'ouli (E), Nukupu'u (E), Nene (E), and Maui Parrotbill (E), and on the island of Hawaii with 'Alala (E), Palila (E), Akiapola'au (E), 'Oma'ō, 'Iiwi, 'Elepaio, and Common 'Amakihi. The Nukupu'u, Povouli, Maui Parrotbill, and 'Akiapola'au are target species for 1997, while the other eight species already are incorporated in propagation and release programs.

### Project Description

Goals and objectives, methods, community involvement, public information, and international impact.

The Peregrine Fund's goal in Hawaii is to restore endangered Hawaiian birds through effective hands-on management to include propagation and release, as well as supporting mosquito and predator control, environmental education, reduction of alien plant and animal species, and control of livestock in sensitive habitats. It should be noted that it is often only in anticipation of the release of TPF's captive-reared birds into native habitat that the responsible agencies (federal and state) actually initiate the process of habitat management by removing the limiting factors in that habitat (pigs, mosquitoes, rats, cats, mongoose, etc.). It can be said that our efforts in Hawaii have two primary objectives; provide founder stock of endangered bird species for restoration efforts, and to serve as a focus and catalyst for the habitat management activities of the responsible public agencies that will protect that habitat in the future.

In 1997, TPF will continue to collect and hatch wild-produced eggs and propagate captive endangered species, as well as release and monitor the endangered 'Alala, Puaiohi, Palila and

Nene Goose (the state bird of Hawaii) into managed habitat. Additional species anticipated for collection of eggs, hatching, rearing and release (or held for propagation and release) are the endangered 'Akiapola'au, Maui Parrotbill, Kauai and Maui Nukupu'u, and the Po'ouli. All of these above mentioned species are Federally and State listed as endangered and several are considered to be critical to the point of near extinction. All of these hand-on species management efforts are endorsed by the Federal and State Recovery Plans and are carried out in cooperation with the U.S. Fish and Wildlife Service, the State Division of Forestry and Wildlife, the National Biological Service, and private landowners.

The goal of TPF in Hawaii has been to develop the technology required to restore endangered Hawaiian bird species. Perhaps more importantly,

TPF has served as the conservation catalyst for other organizations, agencies and cooperators. Initial success in rearing seven and releasing five 'Alala in 1993 helped break loose the "conservation gridlock" and transferred the focus from litigation between parties to cooperation among parties. Equally exiting results in subsequent years with 'Alala and other species have motivated Hawaiian biologists to redirect their energies from the legal arena to the field where the real conservation work awaits.

The Peregrine Fund, U.S. Fish and Wildlife Service, and the State of Hawaii have made a long-term commitment to conserving Hawaiian natural heritage. The successes of TPF in Hawaii have changed the State's conservation picture from one of gloom, doom and inevitable extinctions to an attitude of hope, optimism and positive results—results that are often so

dramatic that recovery for many rare bird species is not only a possibility but a probability. The positive attitude is infectious. The breakthroughs of TPF programs have generated a conservation inertia which has captured the imagination and energy of Hawaiian conservationists at every level—from the local grassroots organizations, landowners and individuals to the highest levels of the State and Federal conservation bureaucracy. The dream of species' restoration in Hawaii has never been more promising.

### Post-project Follow-up

The cooperative agreement between TPF and the FWS is for 20 years, beginning in 1994. The Keauhou Bird Conservation Center Facility is built on land owned by Kamehameha Schools Bishop Estate with a 35 year lease. The Maui Bird Conservation Center is leased from the State with a 20 year term.

The results of the conservation work done by TPF in Hawaii is made public through annual reports to the FWS and to the Division of Forestry and Wildlife of the State of Hawaii. Significant scientific results are published in peer-reviewed journals. General information and conservation news regarding the program is published in the popular press.

Success of the Hawaii program is measured in results. These are quantified in successful incubation, chicks hatched and reared, pairs reproducing in captivity and birds released back to the wild. These types of results are short-term measurements of success, with long-term success being measured in reestablishment of self-sustaining, naturally breeding populations of endangered species.

### A 1997 Detailed Update of The Peregrine Fund's Activity in Hawaii

#### Captive Propagation

In March, 1996 The Peregrine Fund completed construction and opened the doors of the Keauhou Bird Conservation Center on the island of Hawaii and assumed management of the Maui Bird Conservation Center on



Photo by Alan Lieberman

The "Iiwi" is a representative of an endemic honeycreeper subfamily. It is one of the first two more common Hawaiian native species to be incubated and reared by the Peregrine Fund in Hawaii and then released back into its habitat.

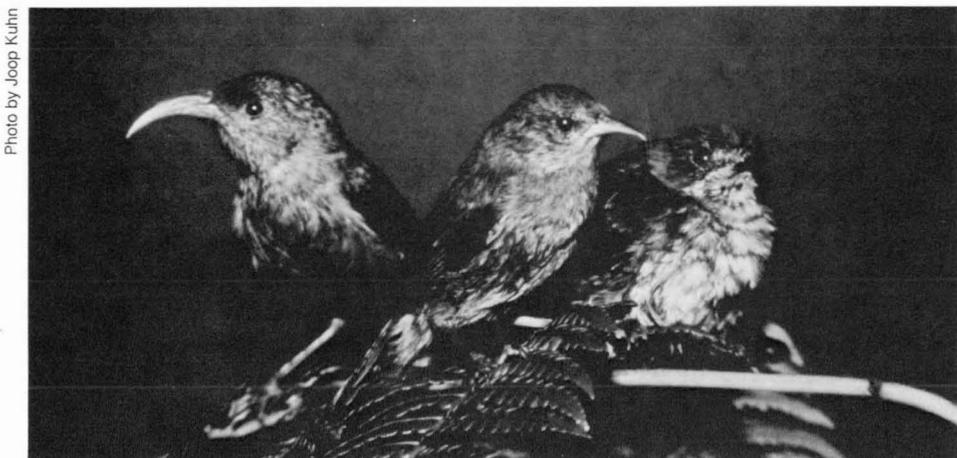


Photo by Joop Kuhn

Three native Hawaiian species, all in juvenile plumage. The "Iiwi" and "Amakibi" (left and center) are honeycreepers. The "Elepaio (right) belongs to an Old World Flycatcher family.

**Maui.** Both facilities are dedicated to conservation education and the restoration of endangered Hawaiian avifauna. Over the past four years, The Peregrine Fund has established an aggressive program which has accomplished several milestones, to include the development of the technology to incubate and hand-rear 11 species of native Hawaiian songbirds, and to successfully release two species of native passerines. To date, over 110 endemic passerines have been hatched.

Initially, using the more common native Hawaiian species, The Peregrine Fund successfully incubated and reared Common Amakihi, (*Hemignathus v. virens*), 'Iwi (*Vestiaria coccinea*), 'Oma'o or Large Hawaiian Thrush (*Myadestes obscurus*) and 'Elepaio (*Chasiempis sandwichensis*). The former two species represent the endemic honeycreeper sub-family, with the latter species representing the families of New World thrush family and Old World flycatcher family, respectively. Supported by this successful surrogate experience, the program has expanded to include six of the endangered native species: the Puaiohi or Small Kauai Thrush (*Nyadestes palmeri*), Palila (*Loxioides bailleui*), Hawai'i Creeper (*Oreomystis mana*), 'Akohekohe or Crested Honeycreeper (*Palmeria dolei*), and Maui Parrotbill (*Pseudonestor xanthophrys*). Each of these species represents biological challenge, covering the spectrum of life histories from the obligate nectivore to obligate insectivore.

### **Reintroduction of Captive-reared Birds**

With the wild population of 'Alala (*Corvus hawaiiensis*) numbering less than 10 individuals [field estimates of 12], The Peregrine Fund began an intensive reintroduction program in 1993. 'Alala have now been released into historical habitat in the South Kona District on the island of Hawaii. Five, seven and four juveniles were released in 1993, 1994 and 1996 respectively, with 10 birds surviving to date (1997). The juveniles are conditioned prior to release for several months in a 15 x 30 m (49.2 x 98.4 ft.) predator-proof, free flight aviary locat-

ed in the forest. The release birds are supported with supplementary food for several weeks post-release and monitored for weight maintenance. As the birds mature and explore the native food resources, their dependence on the supplementary foods decreases to a level of total independence. Reproductive behavior has been observed in several of the release birds and it is hoped that there will be breeding in 1997.

In 1995, an experimental release of Common Amakihi was carried out in lower elevation forest containing predators (rats, cats and mongoose) and mosquito-transmitted avian disease (avian pox and malaria): to develop release techniques for endangered honeycreepers and test the advisability of releasing birds in compromised habitat. Almost all the birds released returned to the release aviary and died due to avian malaria and pox. This experiment showed that although hand-rearing and release techniques are available, restoration of endangered honeycreepers may only be possible in mosquito and predator controlled release sites in Hawaii.

In 1995 and 1996, the first restoration attempt of a small Hawaiian passerine in disease-free, predator controlled habitat was made with the release of captive-reared 'Oma'o, into the Pu'u Wa'awa'a Forest Reserve; habitat that has been without this species for nearly 100 years.

In 1995, two birds were reintroduced as a preliminary test release and in 1996, 23 birds were released in cohorts numbering from two to seven birds. They were acclimated in aviaries built on towers in the lower canopy of the forest for up to two weeks prior to release. Like the 'Alala, their weights were monitored closely and their supplemented foods were decreased to reflect their improved ability to forage on native foods. Of the 25 released birds, the two birds released in 1995 currently survive and 21 of the 1996 hatched birds were monitored and known to have survived for at least 30 days post-release (duration of transmitters). Follow-up surveys will establish the flock's survivorship and the population growth.

The first four years of this program

presents a more optimistic future for the beleaguered avifauna of the Hawaiian islands. As the captive flocks of the endangered species grow, and the techniques for rearing and release are refined, it is hoped that many of the endangered Hawaiian birds will benefit from restoration efforts.

However, captive propagation and reintroduction is only one aspect of the ecosystem management tools required in Hawaii. Without commensurate action on the part of private land-owners, and local, state and federal agencies, to protect and enhance the native habitat, reintroduction of endangered birds will fail.

### **Staff**

The two propagation facilities, along with the field component of 'Alala releases now require a total of 10 biologists. Peter Harrity manages the 'Alala release, while Joope and Marla Kuhn and Paul Oesterle together manage the Keauhou Bird Conservation Center and Barb McIlraith, John Turner, Judy Holley and Tracey Powers manage the Maui Bird Conservation Center. Alan Lieberman and Cyndi Kuehler provide the coordination and scientific support for the Hawaii Program.

### **Cooperators**

Primary collaborators and donors for The Peregrine Fund's Hawaiian endangered bird program include: The U.S. Fish and Wildlife Service, Pacific Ecoregion Office; The Biological Resources Division—Hawaii Field Station; The Department of Land and Natural Resources, Hawaii; Kamehameha Schools Bernice Pauiahi Bishop Estate; the McCandless Ranch; the Cooke Family Foundation; and the Zoological Society of San Diego, as well as several avicultural organizations to include the American Federation of Aviculture and the West Valley Bird Society. ➤

Donations for the Peregrine Fund's conservation activities in Hawaii can be sent to:

**Jeffrey Cilek  
Vice President**

**The Peregrine Fund  
5666 W. Flying Hawk Lane  
Boise, Idaho 83709**

Donations are tax deductible. Please indicate "Hawaii Program" on your check.