

History and Current Status of the Laysan Duck (*Anas Laysanensis*) in Captivity

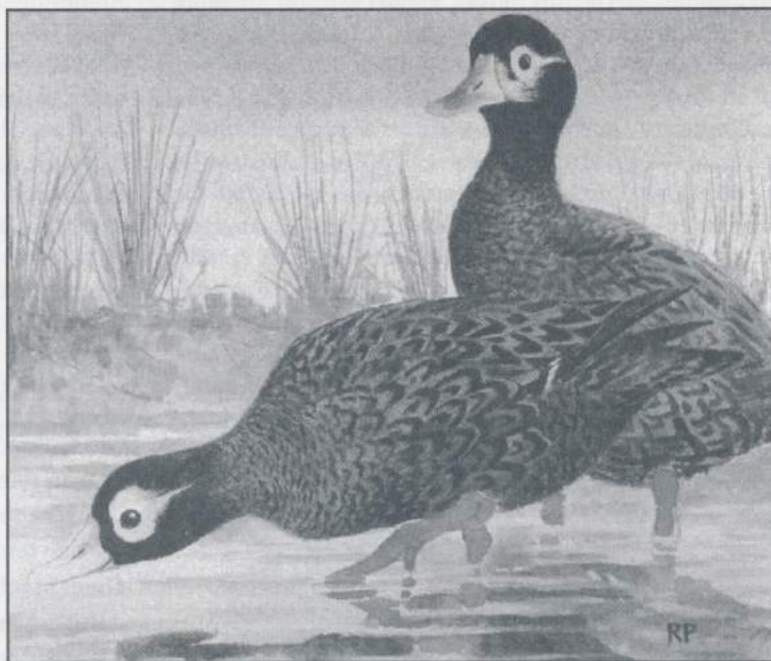
Michelle H. Reynolds¹ and Kelly Kozar²

INTRODUCTION

The Laysan Duck, also called the Laysan Teal, (*Anas laysanensis*) has the most restricted range of any duck species and is among the most highly threatened of birds. They are best known for one of their energetic foraging behaviors; a spectacular fly-snapping sprint through the brine fly swarms on mudflats of Laysan Island (Figure 1).

Like many isolated island species, the Laysan Duck evolved in the absence of mammalian predators and is ill suited to life where non-native predators have invaded. For example, when startled, Laysan Ducks are more likely to freeze their motion rather than to flush or fly (M. Reynolds pers. obsv.). This strategy is well suited as a cryptic defense against Hawaii's native flying predators, but ineffective against ground predators (Williams 1996).

Laysan Island (171° 45' N 25° 45' E), part of the Northwestern Hawaiian Islands National Wildlife Refuge, is the last refugia of this endangered species (Figure 2 on pg. 61). These unique birds were formerly believed to be endemic to Laysan, until subfossil bones revealed Laysan Ducks were previously common and widespread on the Hawaiian Islands (Olson and Ziegler 1995; Cooper et al. 1996; Helen James pers. comm. 1997). These findings, plus new ecological studies of the species on Laysan (U.S. Geological Service [USGS] and U. S. Fish



Illustrated by Ram Papish

Figure 1. Laysan duck brine fly foraging accompanied by mate.

and Wildlife Service [USFWS] data), provide justification for re-establishing Laysan Ducks on additional islands. Current information on the species in captivity is essential for effective conservation and recovery planning.

METHODS

There is no centralized information database or a complete studbook available on the Laysan Duck; thus, information on the status of the Laysan Duck is scattered and disjunct. We scoured State of Hawai'i records (Department of Land and Natural Resources [DLNR]), USFWS reports, USFWS Captive-Bred Wildlife Registration Permits, and the International Species Information System (ISIS), interviewed aviculturists in Hawai'i, and sent a formal survey to 46 facilities and

individuals listed by ISIS or USFWS as holding Laysan Ducks in 1999. Here, we provide a review of the Laysan Duck's status in captivity, and summarize new and historical information.

ORIGINS OF THE CAPTIVE PROGRAM

Captive propagation of the endangered Laysan Duck was conceived as a means to protect the species from extinction. In 1957, a captive program began when nine wild ducks were removed from Laysan Island and taken by ship to O'ahu. Eight of nine ducks (3 males and 5 females) sur-

vived transport and acclimation at the Honolulu Zoo. The removal of ducks occurred during a period of high population numbers on Laysan: 580 ducks were estimated to occur that year (Dave Woodside USFWS memo). In 1958, 36 additional ducks were removed. The 25 that survived transport and acclimation at the Honolulu Zoo, and the eight ducks from the 1957 removal, were transferred to eight different mainland zoos and international facilities (Table 1 on pg. 61).

Difficulty in holding and transporting the ducks occurred because they refused commercially prepared duck food and exhibited aggression in confined groups. Aviculturists promoted acceptance of novel foods (lettuce and duck mash) by mixing live insects with the

continued on page 60

continued from page 59

food after arrival at the Honolulu Zoo (Berger 1982). Separation of confined ducks into smaller groups also reduced interspecific conflict and prevented additional mortality (Warner 1963).

Seven ducks taken from Laysan in 1978 were the only wild birds added to the captive stock since 1958. These birds were placed at Pohakuloa Endangered Species Propagation Facility (Pohakuloa) on the island of Hawaii (Berger 1982).

HISTORY OF CAPTIVE BREEDING IN HAWAI'I

In December 1963, Pohakuloa received its first Laysan Ducks (3 males and 2 females) from the San Diego Zoo, progeny from the 1958 removals from Laysan Island (DNLN data). Thirteen years passed before the birds successfully reproduced. Close inbreeding was suspected as a primary cause for the reproductive failures. When wild ducks from Laysan were introduced to the Pohakuloa flock in 1978 (Table 2 on pg. 63), reproduction improved dramatically: 14 ducklings were produced the

following breeding season (Berger 1982).

Between 1978 and 1987, records indicate that 31 ducklings produced at Pohakuloa survived to fledge (ISIS and DLNR data). Pedigrees were maintained at Pohakuloa; however, the possibilities for genetic mixing were restricted due to limited wild stock, a female biased sex ratio, and lack of exchange between Hawai'i, mainland, and international breeders.

By 1983, the pens at Pohakuloa were in need of repair and renovation. At this time 48 Laysan Ducks were held at the facility. From 1984-1986, no attempts were made to pair Laysan Ducks for breeding, and the flock was maintained in a communal pen (F. Duvall, DLNR, pers. comm.). Efforts were made to place as many ducks as possible at other facilities. Due to the extensive travel time for staff, military noise disturbance, and the isolation from veterinary services, in 1986 a decision was made to establish a facility at a new site, Olinda Endangered Species Propagation Facility (DLNR Final Job Progress Report 1990). Laysan

Ducks were retained at Pohakuloa for three more years awaiting placement. During that period, the decision was made to not establish the ducks at Olinda and to discontinue Laysan and Koloa (*Anas wyvilliana*) breeding. Resources were concentrated so that 'Alala (*Corvus hawaiiensis*) and Nene (*Nesochen sandvicensis*) breeding programs at Olinda could continue and expand. The justification for discontinuing the program was also based largely on the lack of opportunity to release or re-establish Laysan Ducks in the wild. A request to Slimbridge of the Wetland and Waterfowl Trust in England states: "Laysan Teal are breeding well on Laysan Island and birds will be released only if the wild population becomes extinct (which could happen). As several zoos on the mainland breed this duck, we would obtain stock for release from those populations, or from the Wildfowl Trust should it be necessary in the future" (DLNR 1988 memo).

continued on page 61

Hawaii Audubon Society

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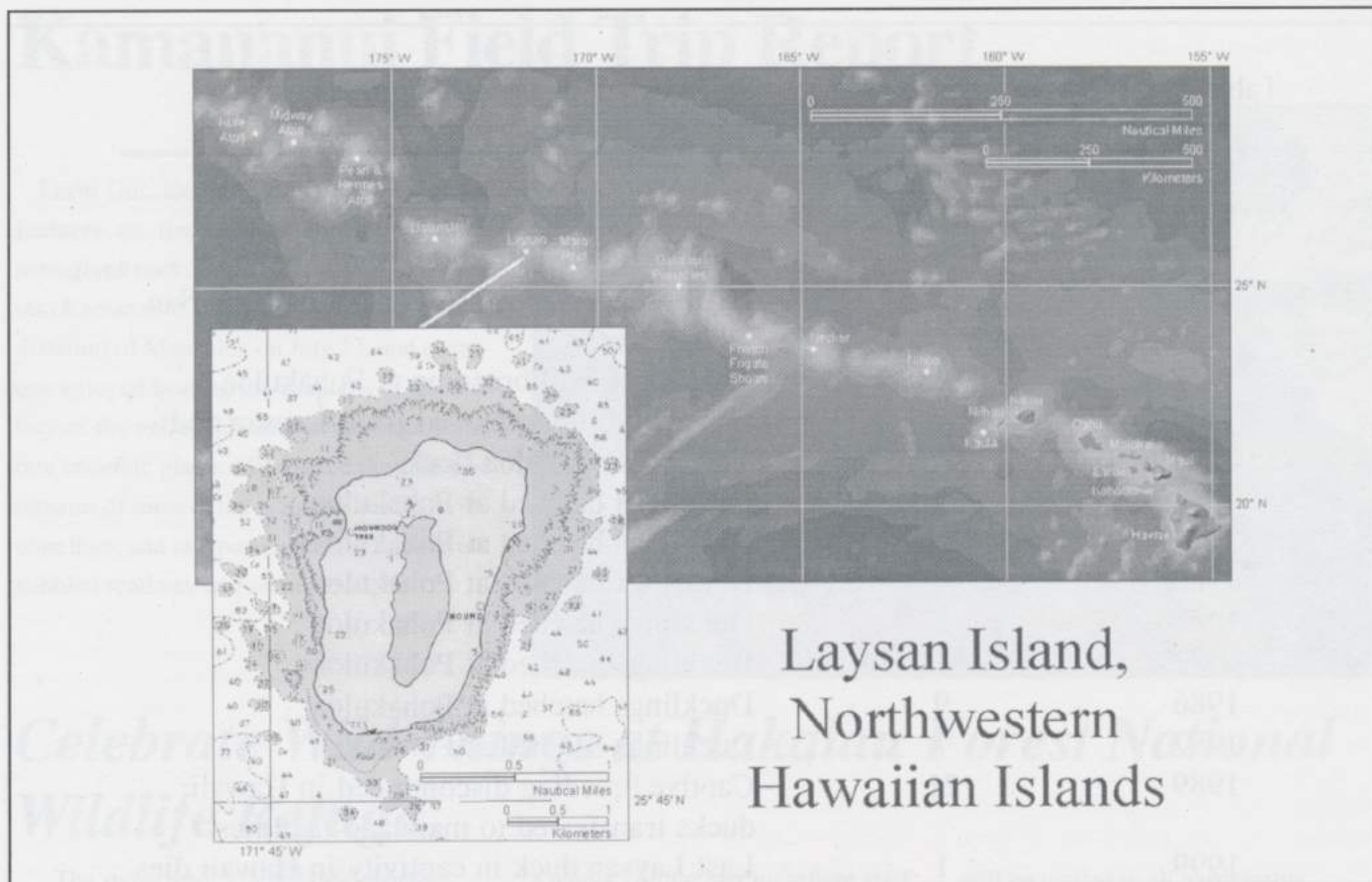


Figure 2. Laysan Island National Wildlife Refuge: relictual range of *Anas Laysanensis*.

Table 1. Distribution of original wild Laysan stock¹.

Year	No. ducks			Facility	Location
	Males	Females	Unknown		
1958	2	2		Philadelphia Zoo	PA, USA
1958	1	3		New York (Unknown)	NY, USA
1958	1	3		San Diego Zoo	CA, USA
1958	2	2		Wetland and Waterfowl Trust	Engl., U. K.
1958	2	2		Parc Zoo de Cleres	France
1958	2	2		San Antonio Zoo	TX, USA
1958	2	2		Tracey Aviary	UT, USA
1958	2	2		Dillon Ripley	CT, USA
1978			7	Pohakuloa Endangered Species Facility	HI, USA

¹ Compiled from Berger 1982 and USFWS 1982

continued from page 60

Captive breeding of Laysan Ducks was discontinued in the state in 1988-1989 (DLNR Final Job Progress Report 1990). In November 1989, 21 birds from Pohakuloa were shipped to Front Royal Virginia National Zoological Park from where they subsequently were transferred to other facilities. Eight non-breeders over nine years of age were euthanized. The

Pohakuloa Endangered Species Facility was officially closed on December 1, 1989.

In June 1999, the last captive Laysan Duck in Hawaii passed away before his 18th birthday. This elderly drake was captive born at the Pohakuloa Breeding Facility and transferred to the Panewa Rainforest Zoo in Hilo in 1983 (DLNR data). He nearly matched the longevity

record for the species, 18 years 10 months, held by another drake born and raised at Pohakuloa (DLNR data).

The USFWS recovery plan for the species pre-dates new information on the Laysan Duck's previously broad distribution, and recommends against introducing the duck into habitats formerly unoccupied (USFWS 1982). However,

continued on page 62

Table 2. Historical summary of Laysan Duck captive breeding in Hawaii.

Year	No. of Laysan ducks	Event
1957	8	Ducks removed From Laysan
1958	25	Ducks removed From Laysan
1963	5	Laysan ducks added to Pohakuloa from San Diego Zoo
1977	4	First successful breeding at Pohakuloa
1978	7	Last wild birds removed from Laysan and added to Pohakuloa flock
1978	4	Ducklings hatched at Pohakuloa
1979	14	Ducklings hatched at Pohakuloa
1980	6	Ducklings hatched at Pohakuloa
1981	1	Ducklings hatched at Pohakuloa
1982	1	Ducklings hatched at Pohakuloa
1986	9	Ducklings hatched at Pohakuloa
1987	7	Ducklings hatched at Pohakuloa
1989	21	Captive breeding discontinued in Hawaii; ducks transferred to mainland facilities.
1999	1	Last Laysan duck in captivity in Hawaii dies at Panaewa Zoo

Table 3. Hybridization status of captive Laysan ducks at 40 facilities as reported from 1999 survey respondents.

Hybridization Status	No. of Respondents
Hybridization	3
No Hybridization	25
No Data	12

continued from page 61

others (W. King and J. W. Aldrich in USFWS 1980) urged that the sooner another population of Laysan Duck is established on another island, the safer the species from extinction. Before the discovery of Laysan Duck bones on the main Hawaiian Islands, translocations and captive releases were considered unlikely.

CURRENT STATUS IN CAPTIVITY

ISIS records from 1999 and our sur-

vey results indicate that there are currently 211 captive Laysan Ducks scattered among 32 facilities on the mainland U.S. and abroad (Figure 3 on pg. 63). All existing captive ducks in zoos and in private collections descend from fewer than 19 founding pairs from Laysan Island.

We mailed questionnaires to 46 facilities in October 1999 and received responses from 33 by December 1999. We used ISIS records to determine responses for six captive Laysan Duck holders that failed to respond by December

1999. Our survey results and other reports suggest that the species initially bred well in captivity, but that inbreeding depression is a problem today (Warner 1963; Marshall 1992). Poor breeding was reported by most of the respondents (Figure 4 on pg. 64). Currently, the average clutch size reported in captivity, 4.9, is less than the average clutch size, 7.3, reported for captive ducks in 1984 (Marshall 1992; Moulton and Marshall 1996). However, specific reproductive

continued on page 63

continued from page 62

statistics (i.e. the number of nests produced, age and sex structure of ducks per facility) are lacking. Moulton and Weller (1984) and others (Ruth Cromie, Wetland and Wildfowl Trust, pers. comm.) suggest that genetic pollution is possible in the captive flocks. Our survey indicated that hybridization is uncommon, despite the fact that most facilities keep Laysan Ducks as part of mixed species captive flocks (Table 3).

DISCUSSION

The Laysan Duck recovery plan specifies the continuance of a viable captive propagation program as a back up in case of natural disaster on Laysan Island (USFWS 1982 page 17): "Propagation in captivity has been highly successful, and with proper management, a healthy gene pool can be maintained for restocking Laysan Island in case of extinction in the wild population."

The captive program was successful in terms of producing birds for exhibit and increased public awareness of this unique endangered species and Laysan Island. However, neither pedigrees nor

propagation for reintroduction into the wild have been maintained. Two major types of harmful genetic change are likely in captivity which prevent successful reintroduction into wild environments: 1) the loss of genetic variation due to the limited breeding opportunities for captive species and 2) genetic adaptation to the captive environment (Frankham 1994). In zoos, selection on many features required for survival in nature, such as hunting and foraging abilities, is relaxed. Over generations in captivity, natural selection acts to maximize fitness in a captive environment (Frankham 1994).

Genetic adaptation to captivity can be minimized by specifically managing captive flocks for wild reintroduction. Techniques to minimize negative genetic and behavioral changes include: 1) minimizing time in captivity, 2) regularly introducing wild genes, 3) using only offspring of wild birds for release, and 4) releasing birds into wild or semi-wild habitat temporarily, until suitable habitats within their previous range can be restored (Frankham 1994). These techniques were not applied to prevent genetic adaption of Laysan Ducks to cap-

tivity.

Disease risks, inbreeding depression, and other concerns, such as changes in behavior due to 30 years of captive breeding, and the scattered location of existing captive birds indicate that current birds in captivity are unsuitable for reintroduction to Laysan Island or other islands. The Avian Disease Group, sponsored by the USFWS, reviewed and rejected reintroduction of mainland source captive birds to the Hawaiian Islands as a conservation strategy. The logistic, cost, and quarantine constraints are not feasible (Cindy Kuhler, Keauhou Bird Conservation Center, pers. comm.).

The USFWS recognizes the precarious state of this species and is supporting research on the status and ecology of the duck on Laysan and the feasibility of re-establishing Laysan Ducks on additional islands. Management on Laysan Island includes the impressive success in controlling the invasive weed, *Cenchrus echinatus*. *Cenchrus* on Laysan displaces native bunch grasses that serve as Laysan Duck nesting habitat. The USFWS has

continued on page 64

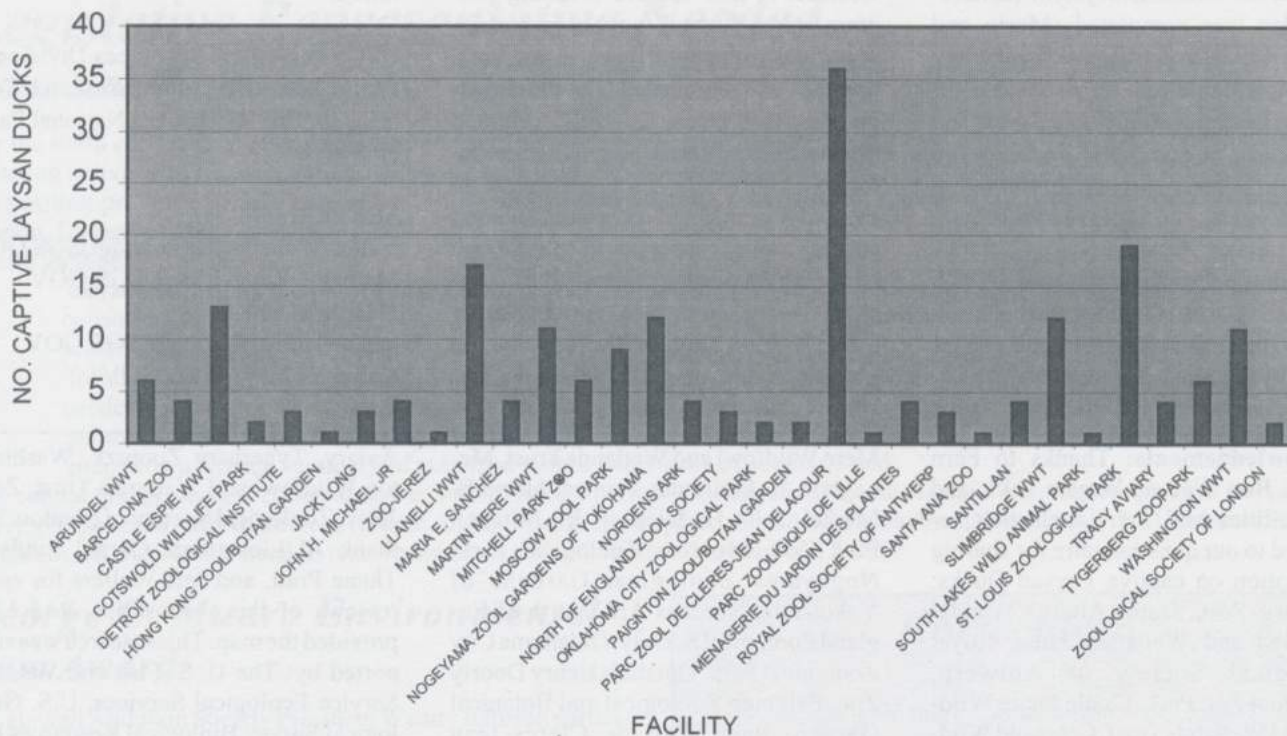


Figure 3. Number of captive Laysan ducks per facility as reported from survey respondents in 1999.

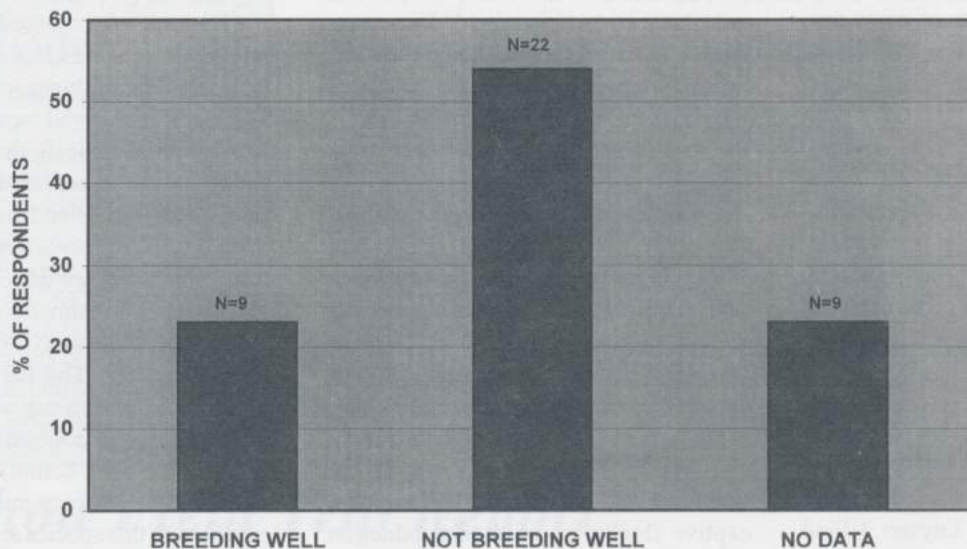


Figure 4. Breeding status of captive Laysan ducks as reported from survey respondents in 1999. N= No. of facilities.

continued from page 63

implemented strict quarantine procedures that help slow or prevent the introduction of additional alien weeds and insects for many of the remote refuges. Non-native insects, such as ants, may compete with Laysan Ducks for native terrestrial prey. The Laysan Island Ecosystem Restoration Plan was completed (Morin and Conant 1998), and restoration planning and implementation is underway for Laysan. Restoration, including weed and ant control, of additional northwestern Hawaiian Islands will help preserve native ecosystems and improve habitat quality for Laysan Ducks.

With the discovery of Laysan Duck bones on the main Hawaiian and Lisianski Islands, there is now justification to restore Laysan Duck populations to additional islands (Olson and Ziegler 1995,

Cooper et al. 1996). Translocation of wild birds, or reintroduction of captive birds, or a combination of both these techniques are recommended to help reduce the Laysan Duck's risk of extinction due to accidental alien species introduction, disease epidemic, or severe weather. A new captive breeding program from wild stock (eggs or juveniles), specifically managed for releasing birds into the "wild" is needed. For the endangered Laysan Duck, the "wild" refers to a managed or restored mammalian predator-free ecosystem. Its confinement in captivity is rejected as a conservation strategy, unless it serves to re-establish wild populations (Williams 1996).

It is appropriate to quote Warner (1963), who studied the species on Laysan: "I am compelled to stress more strongly the conviction that our success

in preserving the bird under artificial conditions must not be a justification for relaxing vigilance in preserving the wild population... Any species loses much of its identity, its aesthetic value, and its ecological significance when divorced from the habitat instrumental to its evolution."

USGS Biological Resources Division
Pacific Island Ecosystems Research Center, P.O. Box 44 Hawai'i National Park, HI 96718

¹HYPERLINK
mailto:Michelle_Reynolds@USGS.GOV
Michelle_Reynolds@USGS.GOV

²HYPERLINK
mailto:Kelly_Kozar@USGS.GOV
Kelly_Kozar@USGS.GOV

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continued on page 65

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Legislative Representative Needed

by Dan Sailer

For the ninth consecutive year, the Society is seeking a part-time legislative analyst to advocate the Society's positions on bills affecting native wildlife and habitat. Following selected bills concerning agriforestry, endangered species, and land use planning, the position provides a much needed voice for conservation interests. The position runs roughly concurrent with the legislative session, December 2000 through May 2001.

Duties include:

- * extracting matters of concern to the Society from the 3,000+ bills, resolutions, and departmental funding requests;
- * consulting with appropriate Society officers and communicating with other environmental organizations to develop an present testimony at hearings;
- * following certain bills and resolutions through the process, lobbying legislators and governmental resource personnel as needed;
- * submitting verbal and written reports at monthly Society Board meetings ; and
- * preparing a written summary of activities within two weeks of session's end.

The contractual position is compensated at \$4,000 for the period. Past experience with Hawai'i's legislative process is a plus. To apply, please send a letter of interest, resume, and short writing sample to: President, Hawaii Audubon Society, 850 Richards St. #505, Honolulu, HI 96813. We need to receive applications no later than November 27, 2000.

George C. Munro Environmental Law Award

Hawaii Audubon Society President Wendy Johnson participated in the annual award ceremony of the William S. Richardson School of Law at the University of Hawai'i on August 28. The Society annually sponsors a monetary award, named in honor of past president George C. Munro, which is presented to the top student in the Environmental Law course. Congratulations to Adrienne S. Yoshihara who is this year's award recipient.

Correction!

In our last issue there was an error on page 49. The dates for Figure 1 were incorrect and should have read 30 August 1999 and 19 December 1999 instead of 30 August 2000 and 19 December 2000. We apologise for the error.

It's Annual Mailing Time Again!

Saturday, November 18th, 10 a.m. to 4 p.m. at the HAS office Can you spare a couple of hours to stuff and seal envelopes so that you and your fellow members can receive 2000 HAS ballots, local membership renewals, and the President's annual report/appeal? YOU WILL BE REWARDED with PIZZA, refreshments, good company, and endless gratitude!

Please call Linda Shapin at the HAS office - 528-1432 and let her know when you can come by on that day.

Slate for 2000 Election Announced

Members encouraged to submit additional nominations

The Nominating Committee announces the following nominees for the 2000 HAS ballot for terms beginning January 2001: incumbent President Wendy Johnson will be running for a second 2-year term, incumbent Directors up for re-election are Marlee Breese and Trae Menard, and nominated to one-year Director terms are: John Harrison, Alice Roberts, and Chad Castle.

Continuing Board members are First Vice President Liz Kumabe, Second Vice President Dan Sailer, and Recording Secretary Tonnie Casey. Their terms will be completed in December of 2001.

The Society bylaws (Article VII, Section 4) provide that members may nominate additional candidates by submitting their names in writing, along with their written consent to be nominated, to the Elections Committee at the HAS office address by November 10, 2000.

Keauhou Field Trip Report

by Mary Gaber

Beautiful weather prevailed during our day-long field trip September 4 on the Big Island. We gathered at 10am at the gate leading to the Keauhou Ranch and the Keauhou Bird Conservation Center ("KBCC"). The gathering point is just a short distance from the Visitor's Center at Volcanoes National Park at about the 5,000' level. There were 20 of us, evenly divided between O'ahu and Big Island residents. HAS Board of Directors mem-

ber Tonnie Casey led our caravan of 4-wheel drive vehicles to the KBCC facility. The director of the facility, Alan Lieberman, gave us a fascinating tour of two of the buildings.

In the first building, we saw each of the rooms where education, research and record-keeping takes place. In the second building, we watched as food was being prepared for the birds, and then had a close look at the several species of

endemic forest birds now inhabiting the facility: Maui Parrotbill, Palila, 'I'iwi, 'Elepaio and Puaiohi.

For several hours after the facility tour, with a stop for lunch, we slowly made our way over the bumpy roads of the Ranch, stopping now and then to watch and listen to the birds. Our best sighting: an 'Io (Hawaiian Hawk) which flew overhead. We are hoping to make this trip an annual event.

October 16 Program Meeting to Feature USGS Wildlife Biologist Paul Banko on "Progress in Palila Conservation: Restoration in a Dry Hawaiian Forest"

The Palila is one of Hawai'i's most thoroughly studied bird species, yet recovery of this endangered species is challenging. The dry, subalpine forest of Mauna Kea is beginning to recover, following landmark legal decisions ordering the removal of feral sheep and mouflon sheep to protect the Palila's habitat. Nevertheless, the Palila population has been slow to respond to improved habitat conditions, and active management is needed to accelerate recovery. Biologists of Pacific Island Ecosystems Research Center (USGS-BRD) have been investigating Palila ecology since 1987 and have been developing restoration techniques since 1996. Results of this ongoing work

indicate that Palila are threatened by a diverse array of alien species. In particular, alien grasses increase the risk of fire and weeds affect the productivity and regeneration of mamane trees, on which Palila depend for most of their food and shelter. Although Palila rely heavily on immature seeds of mamane for food, native insects are also important in their diet; however, they are threatened by a variety of predatory and parasitic alien insects. In addition, feral cats and other introduced small mammals prey on Palila. Palila recovery, therefore, requires management of many factors at large in their habitat.

Paul C. Banko has lived in Hawai'i since 1965. After graduating from Hilo

High School, he completed his B.S. in Zoology and Botany and Ph.D. in Wildlife Science at the University of Washington. His dissertation topic was the breeding biology and conservation of the Nene (Hawaiian Goose) and he worked to restore Nene in Hawai'i Volcanoes and Haleakala National Parks. He also has investigated the ecology of the Alala (Hawaiian Crow) and worked towards its recovery. Presently working as a Wildlife Biologist with Pacific Island Ecosystems Research Center (USGS-Biological Resources Division), his research since 1988 has focused mainly on the Palila and its habitat. **Chaminade University, Henry Hall, Room 109, 3140 Waiialae Avenue.**

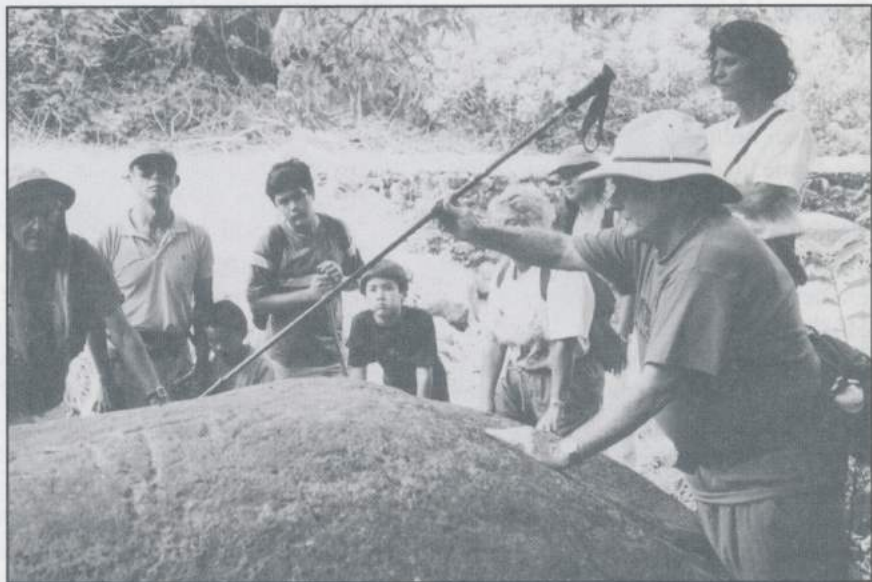
HAS Annual Awards Banquet to be held November 2nd

Join us for our annual awards banquet on Thursday, November 2, 2000 from 6pm until 9pm at McCoy Pavilion, Ala Moana Park. Rob Shallenberger, US Fish & Wildlife Service Deputy Project Leader for Hawai'i and Pacific Refuges, will give a slide show entitled "Palmyra: A New Pacific Refuge?"

Food and beverages will be provided by the Society. Admission will be \$5.00. Please RSVP by calling the HAS office at 528-1432 before October 27th.

Kamananui Field Trip Report

Lorin Gill, far right, explains some of the features on the famous Pohakukaluaahine petroglyph rock. Lorin led 19 of us on a walk into Kamananui Valley in the ahupua'a (land division) of Moanalua on July 23, and everyone enjoyed hearing his accounts of the history of the valley. He also pointed out some rare endemic plants. We visited the sites and remains of some of the grand homes that were once there and saw portions of the famous old cobbled roadway and arched bridges.



Celebrate Wild Things at Hakalau Forest National Wildlife Refuge

The more than 525 wildlife refuges managed by the U.S. Fish & Wildlife Service are throwing a party - and you're invited! The annual National Wildlife Refuge Week is coming October 8-14, 2000. The Big Island's Hakalau Forest National Wildlife Refuge will celebrate this "wild" occasion by opening its gates to the public on Saturday, October 14.

"This refuge was established in October 1985, so we're celebrating our 15th anniversary as well," said Refuge Manager Dick Wass. "We always look forward to National Wildlife Refuge Week as an opportunity to give the owners of these lands, the American people, a chance to catch a glimpse of colorful and endangered Hawaiian birds such as the 'akiapola'au and the 'akepa.

"It's especially nice to welcome back folks who haven't been here in a while. Volunteers who planted some of the first young koa trees in 1989 are amazed to see the now 25-foot trees shading native and endangered plants in the understory," Wass said.

Residents and visitors are invited to participate in this eighth annual open house at Hakalau Forest and to hike through the Pu'a Akala Tract, which harbors a high-elevation rainforest and lots of native birds. A historic 100-year-old koa cabin will also be open for viewing.

Visitors will be met by refuge staff and tour leaders at the Pu'a Akala Barn anytime between 9:00 a.m. and 1:00 p.m. They will receive a briefing on refuge management objectives and strategies and a description of the plants and animals the Refuge protects. Rainforest hikes of varying lengths will be offered. The hikes will be led by biologists and staff familiar with native Hawaiian flora and fauna. Visitors will also have the opportunity to tour the Refuge greenhouse and learn about the forest restoration program. The University of Hawai'i's field station, cultural resource protection, and the gorse control effort will also be highlighted.

Participants must arrange their own transportation to the Refuge. A four-wheel-drive vehicle is required for the two-hour drive from Hilo, Waimea, or Kona. "We don't recommend this trip for young children or those who lack an adventurous spirit due to the long rough ride, rugged terrain, and primitive facilities," said Wass.

Visitors should come prepared for wet chilly weather and bring their own lunch, water, binoculars and rain gear. Reservations are required and may be obtained by calling the Refuge office in Hilo at 808-933-6915 by October 10. Directions and additional information

will be mailed to all participants.

Hakalau Forest National Wildlife Refuge consists of 32,733 acres of native forest and grassland on the windward slope of Mauna Kea between the elevations of about 2,500 and 6,500 feet. The Refuge was established to protect and manage endangered forest birds and their habitat, and contains some of the finest stands of koa-'ohi'a forest in the state.

source: USFWS News Release dated 9/8/00

contact: Jim Glynn, 808-933-6915

Volunteer Needed:

The Society needs a volunteer(s) to index past issues of 'Elepaio. Please call the office for more information - 528-1432.

Forest Birds of the Hawaiian Islands

from *Volcano Watch* - July 20, 2000

Several million years ago, when Kaua'i was the youngest island in the Hawaiian archipelago, and Pele made her home in the caldera atop Mount Wai'ale'ale, a small flock of finches made landfall somewhere in the Hawaiian Islands, exhausted from their trans-Pacific journey. Perhaps they had been blown off-course by a hurricane. The odds against their making the crossing, 2,500 miles over open ocean, were staggering. If the birds were able to find food to eat, cover from the elements, mates, and suitable places to build their nests, they would have thrived. For here there were no mammals to prey upon them, no diseases to sicken them, and few, if any, other birds to compete with them for food or nest sites.

In this profound isolation, with a variety of food sources and habitats, some of the colonists did, in fact, thrive. Very slowly, over millions of years of evolutionary time, the original finch species evolved to become several separate species, each adapted to exploit a different foraging style or habitat. This process, called adaptive radiation, eventually gave rise to a spectacular array of forest birds found nowhere else in the world.

The flame-red 'I'iwi, for example, evolved a long, sickle-shaped beak specially adapted for sipping nectar from the long tubes of lobelia flowers and ohia-lehua. The 'Akiapola'au, with its elaborate two-part beak, is particularly skillful at extracting insect larvae from dead trees. The Palila has developed a thick, strong

beak for crushing the hard seed pods of mamane trees. These diverse birds, along with 29 others, make up the group we know as the Drepanidinae, or Hawaiian honeycreepers.

From North America, Asia, and the South Pacific, other kinds of birds came, carried on the winds of other storms. At the same time, as the older islands submerged into the sea and new islands were formed, the birds dispersed and evolved into yet additional isolated and specialized forms. By the time Polynesians arrived, in addition to the honeycreepers, the archipelago harbored its own species or subspecies of crow, hawk, rail, owl, duck, goose, coot, and stilt, as well as two petrels, five thrushes, five honeyeaters, and five types of 'Elepaio.

Forest birds became integral parts of Hawaiian ecosystems, serving as pollinators, seed dispersers, and insect predators. They also became integral parts of Hawaiian culture, the brilliant yellow feathers of the 'O'o cloaking the king, and 'Elepaio guiding canoe makers to the best koa trees.

Tragically, the very isolation that encouraged this amazing radiation has also been the birds' undoing. Sheltered on the islands for millions of years, the birds lost their ability to deal with mammalian predators and disease. Introduced cats, rats, and mongoose found Hawaiian birds easy prey. Avian malaria and pox devastated bird populations, much as other new diseases devastated the native Hawaiian population after Western con-

tact. Alien plants and feral ungulates (hoofed mammals) degraded the birds' habitat, and exotic birds and introduced insects competed with native species for food.

As a result, about half of the original Hawaiian birds have become extinct since human contact, and about half of the remainder (31 species) are endangered. Many species - the Nukupu'u, for example, and the Bishop's 'O'o - slipped into oblivion before we could even record what they ate or how they raised their young.

Public concern for the natural heritage of Hawai'i has inspired growing efforts to study the remaining birds and to develop safe, cost-effective methods for protecting and recovering them. The goal is to preserve the honeycreepers for our children's children, so that long after the newest volcano in the Hawaiian chain, Lo'ihi, has broken the surface of the ocean, and her slopes have become cloaked in rainforest, a small honeycreeper may find its way there in a storm and begin the process of adaptation and speciation anew.

U.S. Geological Survey
Hawaiian Volcano Observatory
PO Box 51, Hawai'i National Park, HI
96718. Phone (808) 967-7328 FAX
(808) 967-8890

¹Volcano Watch is a weekly feature provided by scientists at the U.S. Geological Survey

Volunteers Needed for Midway Albatross Census

Would you like to join with seabird fanatics to census the world's largest breeding colony of Laysan Albatross? If so, you will have such an opportunity this December when the U.S. Fish and Wildlife Service conducts its count of the albatross breeding colony at Midway Atoll National Wildlife Refuge.

Located at the northwestern end of the Hawaiian archipelago, Midway is the breeding ground for Laysan Albatross and 14 other species of seabirds. For the three-week period between December 9 and December 30, the Service will need 20 volunteers each week to assist in the count. The last census, conducted in 1996, documented nearly 390,000 nesting pairs.

The Friends of Midway is coordinating efforts to recruit volunteers for the count. For all the details about how you can participate, please call Raymond Sweeney at 800-371-0072 or contact him via email at rsweeney@fx-concepts.com.



Laysan Albatross
Photo by Bruce Eilerts

Field Trips for 2000/2001

All trips with an * are still in the process of being planned. Details will be provided as the scheduled dates get closer. A donation of \$2.00 per participant on all field trips is appreciated.

October 28 James Campbell National Wildlife Refuge See Hawai'i's endangered waterbirds and other migratory waterfowl at one of O'ahu's few remaining wetlands. Birds seen in past years include Hawaiian stilt, Hawaiian moorhen, Hawaiian coot, Hawaiian duck, Northern Pintail, Northern Shoveler, Lesser Scaup, Wandering Tattler, Ruddy Turnstone, Sanderling, Red Knot, Semi-palmated Plover, and Bristle-thighed Curlew. Bring water, snacks, binoculars, spotting scope if you have one, and sunscreen. To register, please call Mary Gaber at 247-0104.

November 25th 'Ewa Plains Sinkholes to look for fossils of extinct Hawaiian birds with Dr. Alan Ziegler, who will lead us on a short walk from the Barber's Point Deep Draft Harbor to the sinkholes, sharing information about the geology along the way. Carpool at 8am on the Punchbowl side of the State Library at King Street or meet at the Harbor on Malakole Road at 9am. Bring hat, sunscreen, water, and, if you like, a picnic lunch to eat at Barber's Point Beach Park. To register, please call Mary Gaber at 247-0104.

December* - Christmas Bird Count - Details will be available in November's issue.

January 20 or 21* - A different sort of field trip to Waikiki's Hilton Hawaiian Village! Tour the exotic bird collection with a guide from Hilton's Wildlife Department. There is an extensive variety of birds from all over the world including swans, penguins, flamingos, cranes, ibises, Mandarin ducks, cockatoos and parrots.

February 17 or 18* - Go behind the scenes at Sea Life Park and learn about the Seabird Rehabilitation program. Meet convalescent and non-releaseable seabirds up close.

Two O'ahu Wildlife Refuges to Celebrate National Wildlife Refuge Week!

James Campbell National Wildlife Refuge will give 2 public tours on Saturday, October 7, one at 9:00 a.m., and one at 3:00 p.m.

Hono'uli'uli National Wildlife Refuge will be the site of 2 public tours on Sunday, October 8th, also at 9:00 a.m. and 3:00 p.m. Call 637-6330 to make reservations for any of the tours.



Hawai'i's Seabirds Need Your Help

If you have free time on your hands, enjoy interacting with the public and want to help protect Hawai'i's seabirds, the Hui Malama Na Manu Kai can use your assistance. The Hui was formed as a joint effort between the Hawaii Audubon Society and the National Audubon Society and includes members of the Audubon Society, State and Federal resource managers and other concerned members of the community.

A network of volunteers was initially established for the albatross

project to conduct observations of Kaohikaipu off Makapu'u Point. This project was phased out last May but volunteers are still needed to assist with the recovery of Hawai'i's seabirds. Activities that are planned for this fall include establishing a volunteer network to assist the State Division of Forestry and Wildlife in recovering newly fledged shearwater chicks. During October and November these chicks fledge from their underground nests. On their maiden flight

the birds are supposed to fly out toward the ocean; instead many are distracted by the urban lights and "fall out" onto roadways, lanais, and industrial areas. A network of volunteers is being established to survey local beaches for birds that are weak and wash up on shore and to assist with retrieving the birds that "fall out" into the unsafe areas. If you are interested in participating, please call Sharon Reilly at 386-7029 or send an email message to Shareilly@aol.com



OCTOBER 2000

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Calendar of Events

Thursdays, October 5 and November 2: Education Committee monthly meeting, 7 p.m. at BaLe Sandwich Shop in Manoa Marketplace (near Safeway). For more information, call chairperson Wendy Johnson, 261-5957.

Mondays, October 9 and November 13: Conservation Committee monthly meeting at the HAS office at 5:45 p.m. For more information, call chairperson Dan Sailer, 455-2311.

Mondays, October 9 and November 13: HAS Board meeting, always open to all members, 6:30 to 8:30 p.m. at the HAS office.

October 16: Program Meeting. Chaminade University, Henry Hall, Room 109, 3140 Waialae Avenue. See article on page 66.

October 28: Field Trip to James Campbell National Wildlife Refuge. See page 69 for details.

November 2: Annual Awards Dinner at McCoy Pavilion. See page 66 for details.

November 18: Annual Mailing at office. See page 66 for details.

November 25: Field Trip to 'Ewa Plains Sinkholes to look for fossils of extinct Hawaiian Birds. See page 69 for details.

December 11: Annual Meeting and Program Results of Board Elections will be announced. Program still being planned.

Table of Contents

History and Current Status of the Laysan Duck in Captivity.....	59-65
Legislative Rep. Needed.....	65
Munro Law Award Given.....	65
Correction!.....	65
Annual Mailing Time.....	66
Slate for 2000 Election.....	66
Keauhou Field Trip Report.....	66
October 16 Program Meeting.....	66
Annual Awards Banquet.....	66
Kamananui Field Trip Report.....	67
Celebrate Wild Things.....	67
Volunteer Needed.....	67
Forest Birds of Hawaiian Islands....	68
Volunteers Needed for Midway.....	68
Field Trips for 2000/2001.....	69
Oahu Refuges Celebrate National Wildlife Refuge Week.....	69
Seabirds Need Your Help.....	69