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CONSERVATION STATUS OF BIRDS OF CENTRAL PACIFIC ISLANDS

By Warren B King

Second of Three Installments

Johnston Atoll

Although Calvin Coolidge decreed Johnston Atoll (0.98 square miles) a bird sanctuary in 1926, it was turned over to the U.S. Navy and then to the U.S. Air Force because of its strategic location. Atmospheric nuclear tests were conducted here in the early 1960's.

The appearance of Johnston Atoll has been changed drastically by the demands of U.S. military activities. The largest island, Johnston Island, is 570 acres, 75 percent man-made. Two islets, 24 and 17 acres respectively, are also man-made, while the fourth, Sand Island, supports a U.S. Coast Guard LORAN C Station with a 625-foot antenna, separated from the Coast Guard billets by a long causeway. The antenna guy wires anchor in the ocean around the periphery of this 16-acre island. In spite of human inhabitants and the hazard of the guy wires to bird flight, Sand Island has a large seabird colony, all but three species having been chased from Johnston. Eleven species breed on Sand. The Sooty Tern colony there numbers 300,000 birds.

Johnston Island has up to 1,000 human inhabitants, mostly U.S. Air Force personnel. About 60 percent of the island is covered by man-made objects, including an aircraft runway. Black rats, a few cats, and a few dogs are also on the island.

By contrast, Sand Island has a complement of 19 Coast Guard personnel and two to five Air Force personnel. It has no rats, and the pet cats and dogs are normally confined to the end of the causeway away from the seabirds (Kirkpatrick, 1966a). The attitude of the personnel on Sand Island toward seabirds is largely dependent upon the attitude of their commanding officer. There have been cases of jeeps driven on joy rides through the Sooty Tern colony during incubation. The antenna guy wires kill approximately two dozen Sooty Terns per day at the start of the breeding season when the birds swirl in vast numbers above the island (Shelton, in prep.; A.B. Amerson, Jr., pers. comm.).

Line Islands

Palmyra (0.82 square miles)--Palmyra is administered by the U.S. Department of Interior. It is presently uninhabited and privately owned. There are dozens of abandoned buildings in various states of repair there. As of 1966 it had no dogs or cats, but black rats were fairly common. It has the largest Red-footed Booby colony in the central Pacific, 25,000 birds, and a Sooty Tern colony of 750,000. Black rats have been observed in the Sooty Tern colony preying on eggs. In 1967 a weather project of the National Center for Atmospheric Research (NCAR) utilized Palmyra. At certain times several airplanes per day were landing on the runway. The runway was scraped to prepare for this activity. The Sooty Tern colony was located in large part on the runway at that time, and wholesale death and nest abandonment occurred. Dead Sooty Terns were to be found in the piles of dirt scraped from the runway. No new population figures are available subsequent to the NCAR Weather Project's use of Palmyra (POBSP, unpubl. reports; R.B. Clapp, pers. comm.).

Washington (ca. 2 square miles)--Washington is administered by the United Kingdom. It has a population of 78 Gilbertese whose income is derived from copra harvest. Cats, dogs, and pigs are kept by the Gilbertese, and feral cats are abundant. Rats, species

not determined, are present, but rare. Seabirds are eaten by the Gilbertese. Seabird populations are low, and are restricted to tree-dwelling species. The large fresh-water lagoon is visited by up to 200 ducks annually and was the home of the Washington Island Gadwall (Anas strepera couesi), extinct since ca. 1874. The Christmas Island Warbler (Acrocephalus aequinoctialis) reaches maximum population here, ca. 2,000, but there are indications that the population may fluctuate considerably. The introduced lorikeet Vini kuhli is also present, numbering about 800 (POBSP unpubl. reports; R.B. Clapp, pers.comm.).

Fanning (13 square miles)--Fanning is administered by the United Kingdom. It has a population of 337 Gilbertese who derive their livelihood from copra harvest. The Gilbertese eat seabirds, populations of which are now insignificant. Dogs, cats, and pigs are present under domestication. Black rats are common.

The Christmas Island Warbler once occurred here but appears to be extirpated. The introduced lorikeet maintains a population of ca. 200 birds (POBSP unpubl. reports).

Christmas (124 square miles)--Christmas is administered by the United Kingdom. It supports a population of 400 Gilbertese who work the island's extensive coconut plantations for copra. Nuclear tests were conducted here in 1956 and 1958 by the British and in 1962 by the U.S. In 1960 the administrator made it illegal to catch seabirds, but many are still taken for food. Most seabird species nest on islets within the island's several lagoons. Three of these islets are recognized as important bird sanctuaries, and visits are restricted.

Both Polynesian and black rats are present, along with large numbers of feral cats. In addition hermit crabs (Coenobita perlitus) are reported to prey on ground nesting birds here as well. Great Frigatebirds prey heavily on Sooty Tern chicks on Christmas. This practice is not widespread on other central Pacific islands. Large populations of several species of seabirds are present on Christmas. The island supports the largest population of Sooty Terns in the Pacific, estimated at 25,000,000 birds. The Gilbertese collect as many as 250,000 Sooty Tern eggs for food annually. In one Sooty Tern colony where 500,000 eggs were laid in 1968, one half were gathered by Gilbertese, and most of the remaining hatched, to be eaten by Great Frigatebirds, rats and cats. Only perhaps 25 nestlings, fledged from this colony.

The Lesser Frigatebird (Fregata ariel) population on Christmas has declined as a direct result of cat predation, and may be eliminated entirely in the next few years.

The Christmas Island Warbler has a population of about 400 birds, while the lorikeet, introduced repeatedly from Washington Island, was represented by 2 individuals in 1968 (Schreiber and Ashmole, 1970).

Jarvis (1.60 square miles)--Jarvis is administered by the U.S. Department of Interior. It is uninhabited, but an attempt at colonization was made from 1938 to 1940. It was further occupied in 1966 by scientists connected with the International Geophysical Year (IGY). The IGY scientists' house, a few sheds, trash, and old lighthouse, and a tramway are the only signs of human habitation remaining. The settlers brought cats with them, and these now feed on seabirds. Rats formerly occurred on Jarvis but were probably extirpated by cats. POBSP personnel killed over 200 cats in 1964 and 1965, and in later visits in 1967 and 1968 eight or nine were seen in a day or two. Jarvis has a large Sooty Tern colony numbering 1,900,000, and large populations of both frigatebirds and the three boobies, e.g., 9,000 Blue-faced Boobies. Elimination of the remaining cats would make Jarvis among the most important seabird islands of the Central Pacific. There is presently no special protection afforded the birds of this island (POBSP unpubl. reports; R.B. Clapp, pers. comm.).

Malden (7.78 square miles)--Malden is claimed jointly by the United Kingdom and the United States. It is uninhabited, but extensive guano mining took place. The remains of an Atomic Energy Commission camp, set up in 1962 in connection with a nuclear test here, are still apparent.

POBSP killed a herd of five pigs in 1964, and one last pig died in 1967 or 1968. Five cats were seen in 1967, indicative of a very small population. The pigs were evidently responsible for the moderate numbers of most species of seabirds. The size of the guano deposits suggest that this island was at one time a very significant seabird island. No petrels were found on the island, an indication of predation pressure, although islets in the central lagoon, where they might be expected to occur still, were not visited (POBSP unpubl. reports; R.B. Clapp, pers. comm.).

Starbuck (ca. 8 square miles)--Starbuck is uninhabited. It is claimed jointly by the U.K. and the U.S. A few stone buildings remain from the days of guano mining.

Cats and Polynesian rats are present on Starbuck, the former in large numbers. Cats prey heavily on the large Sooty Tern colony (estimated at 2,500,000 birds); about 1,000 adult birds per night were killed by cats during POBSP visits. POBSP personnel killed 120 cats here in 1964 but in 1967 the cat population was still about 150. In 1968 "scattered wings and bodies, and piles of bodies were frequently noted" around the edges of the Sooty Tern colony. Petrels were evidently present once, but no longer (POBSP unpubl. reports; R.B. Clapp, pers. comm.).

Caroline (1.45 square miles)--Caroline is claimed jointly by the U.K. and the U.S. It was used as a coconut plantation until 1943, when it was abandoned after a prolonged drought. Polynesian rats are uncommon and may be restricted to one islet in the atoll. Seabirds attain significant numbers; for example, 10,000 Great Frigatebirds, 5,000 Red-footed Boobies, 500,000 Sooty Terns (Clapp and Sibley, 1971a).

Vostok (0.10 square miles)--Vostok is claimed jointly by the U.K. and the U.S. It is uninhabited. Polynesian rats are abundant. Most of this small island is covered by a Pisonia forest. Moderate populations of the representative seabirds, primarily those adapted to nesting in trees, occur (Clapp and Sibley, 1971b). Vostok is a relatively unaltered, but simple island ecosystem.

Northern Cook Islands

Penrhyn (6.2 square miles)--Penrhyn is administered by New Zealand, but it is claimed both by New Zealand and the United States. Its human population in 1966 was 694. It has extensive coconut plantations, and copra harvesting is the main source of income of the inhabitants. Domestic cats, pigs, and chickens are common, as are rats, species not determined. Most of the few seabirds that inhabit Penrhyn occur on the islet farthest from the village. These are almost exclusively the tree-nesting species, numbers of which are of no great significance (POBSP unpubl. reports; R.B. Clapp, pers. comm.).

Tokelau Islands

The Tokelau Islands are claimed by New Zealand and the United States, and administered by New Zealand.

There are three islands as follows:

<u>Island</u>	<u>Land Area</u>	<u>Human Population in 1966</u>	<u>Cat Population in 1965</u>	<u>Pig Population in 1965</u>
Fakaofu	1.02 sq.mi.	733	40	227
Nukunonu	2.08 sq.mi.	551	30	300
Atafu	0.78 sq.mi.	616	"many"	300

All three islands are devoted to coconut palm culture. All have populations of Polynesian rats and, at times, dogs (Kirkpatrick, 1966b). The inhabitants take seabirds for food without restriction; for example, up to 1,000 Brown and Black Noddies are taken by the residents of Fakaofu annually. Palea Islet of Fakaofu has breeding populations of several seabirds, including Sooty Terns, and is undoubtedly the most valuable islet in the group from this point of view. Two landbirds occur, the migratory Long-tailed Cuckoo (Eudynamis taitensis), and the Pacific Pigeon (Ducula pacifica). The latter is said to have declined from overhunting (Thompson and Hackman, 1968; Wodzicki and Laird, 1970).

American Samoa

American Samoa is an unincorporated territory of the United States, administered by the U.S. Department of Interior. It is composed of six islands as follows:

<u>Island</u>	<u>Land Area</u>	<u>Human Population, 1970</u>	<u>Island</u>	<u>Land Area</u>	<u>Human Pop. 1970</u>
Tutuila	54 sq.mil	24,973	Olosega	1.5 sq.mi.	380
Tau	15	540	Rose	0.3	-0-
Ofu	2	412	Swain's	1.25	74

The black rat is found on Tutuila, and may be present on some of the others as well. Polynesian rats have been observed on all islands of this group. There are no legally recognized nature sanctuaries in American Samoa.

The following are the major recent changes in the avifauna of American Samoa. The Sooty Rail (Porzana t. tabuensis) from Tau has not been seen in recent years, but the wetland from which it was collected is no longer used for cultivation of taro, and is suspected to be better habitat for the species than in the past. The Mao or Giant

Honeyeater (Gymnomyza samoensis) has been extirpated from Tutuila, although it still can be found occasionally in Western Samoa. Samoans hunt doves and pigeons avidly, and populations of the Pacific Pigeon are now low. The introduced Red-vented Bulbul (Pycnonotus cafer) is now abundant on Tutuila (Clapp and Sibley, 1966; R.S. Crossin, pers. comm.).

The dense interiors of Tutuila and Tau are visited by Samoans only rarely on hunting forays after wild pigs. A recently discovered colony of three and possibly four procellariid species in the mountains of Tau, attests to the relatively unaltered nature of the interior of this island (R. Crossin, pers. comm.).

Rose Island has substantial seabird populations including a Sooty Tern colony (Swerdlhoff and Needham, unpubl. MS). It is uninhabited, has as a predator only the Polynesian rat, and should be given legal status as a sanctuary. Swain's Island, on the other hand, has been inhabited for many years, has Polynesian rats, cats, dogs and pigs (Kirkpatrick, 1966b) and few birds (Clapp, 1968), and would be of little value as a sanctuary.

Phoenix Islands

Canton (3.5 square miles)--Canton is administered jointly by the U.K. and the U.S. It was inhabited by 500 people up to 1966, when the island was evacuated, and the military base was closed. It was reinhabited by about 200 U.S. Air Force personnel and civilian contractors of the firm Holmes and Narver in 1969, and is now an essential part of a new U.S. missile testing system. About 40 percent of the land area of the island is covered by man-made structures. The Air Force has placed installations on Enderbury and Hull Islands as well, and they have leased Birnie, Gardner, and Sydney from the U.K. but have not yet utilized them. The Air Force, conscious of its "ecological image," requested a consultant from the U.S. Bureau of Sport Fisheries and Wildlife, who advised them on ways of minimizing disturbance of the substantial seabird colonies of these islands, and who laid out guidelines for conduct vis-a-vis natural resources for those stationed on the islands.

Canton has feral cats, dogs, and Polynesian rats, in spite of which three and possibly four procellariids are breeding in small numbers. Red-footed Boobies and Great Frigatebirds formerly nested in the thousands, but are now extirpated because of clearing of the shrubs on which they bred (Clapp, in prep.).

Enderbury (1.95 square miles)--Enderbury is administered jointly by the U.K. and the U.S. The only visible signs of human habitation were a frame house in hopeless repair and a lighthouse until 1970 when Holmes and Narver constructed a 200-foot antenna at one of the island near a colony of 10,000 Gray-backed Terns, two 40-foot sighting towers at the other end, and a road across the island from their air-conditioned trailer near the antenna to the two towers. Two or three employees are now on the island most of the time. Supplies are brought in by helicopter from Canton. The seabird colonies have not been disturbed unduly by this activity. A few feral cats still are present, descendants of pets brought during an attempt at colonization from 1938 to 1940. Hermit crabs, in large numbers, have been seen to cause mortality in the large Sooty Tern colony (800,000 birds) and in the frigatebird colonies.

Enderbury is the most important green sea turtle breeding island in the south central Pacific (POBSP unpubl. reports; R.B. Clapp, pers. comm.).

Phoenix (0.16 square miles)--This island is claimed both by the U.K. and the U.S. It has been uninhabited since guano mining days, and the coral rock walls of the miners' houses still stand, providing nesting sites for White Terns and Black Noddies. Phoenix has large populations of all representative seabirds that do not require trees for nest sites. It has five breeding procellariiform species, the largest known Blue-gray Noddy population (10,000 birds) and a Lesser Frigatebird population of up to 45,000 birds.

Phoenix has European rabbits, estimates of which vary from 100 to 1,000. This population is evidently kept in check by periodic harvesting, along with some seabirds, by the crews of copra boats that service the Line Islands (POBSP unpubl. reports; R.B. Clapp, pers. comm.).

McKean (0.13 square miles)--McKean is claimed by the U.K. and the U.S. Rock walls remain from guano mining days; otherwise there are no signs of man's activities. It has no introduced predators. The largest known populations of White-throated Storm Petrels (Nesofregatta albigularis) (1,000) and Lesser Frigatebird (85,000) occur here. Populations of the other representative seabirds are large also (POBSP unpubl. rept., R.B. Clapp, pers. comm.).

Birnie (0.10 square miles)--Birnie is claimed by the U.K. and the U.S. It has never been inhabited and is one of the few dry central Pacific islands not to have been mined for guano. Polynesian rats, presumably introduced from an early shipwreck on reefs around the island, are abundant at times. Although populations of seabirds are not high, owing to the small land area, the island has great value because it is nearly in an undisturbed state (POBSP, unpubl. reports; R.B. Clapp, pers. comm.).

Sydney (2.07 square miles)--Sydney is claimed jointly by the U.K. and U.S. It was inhabited by Gilbertese for copra harvest until 1961, when it was evacuated because of prolonged drought. Both Polynesian and black rats occur, and cats and dogs were left behind during evacuation. POBSP personnel killed several cats between 1964 and 1968 but there may still be enough cats to continue reproduction. One dog seen in 1968 may be the last on the island. Seabird abundance is low. In 1968 POBSP observers saw a pre-breeding swirl of roughly 4,000 Sooty Terns above the island. This species was not recorded previously, and may attempt to breed now that the larger predators have been removed or reduced (Clapp and Woodward, in prep. a).

Hull (2.21 square miles)--Hull is claimed jointly by the U.K. and the U.S. The 590 Gilbertese who inhabited Hull were evacuated in 1963. They left behind dogs and cats, of which a few individuals of each are still present, but their reproductive status is unknown. In 1967 the Sooty Tern population was estimated at 3,000,000 birds. Other species, mostly the tree-nesting ones, are not abundant. In 1970 the U.S. Air Force had a 200-foot antenna built on Hull as part of their new missile testing system in the Phoenix Islands. The Sooty Terns are presently not nesting near the antenna. Periodic maintenance visits are made to the antenna by helicopter from Canton (POBSP unpubl. reports; R.B. Clapp, pers. Comm.).

Gardner (1.41 square miles)--Gardner is claimed jointly by the U.K. and the U.S. In 1963 the 210 Gilbertese inhabiting Gardner were evacuated because of drought. They left behind cats, dogs, and chickens. Polynesian rats are present. Only low numbers of the tree-nesting seabirds occur here (Clapp and Woodward, in prep. b).

To be continued

'AKIAPOLA'AU AND ITS REMAINING HABITAT

By James D. Jacobi

Since May 28, 1972, I have had the opportunity to regularly observe a population of 'akiapola'au (Hemignathus wilsoni) in the Kilauea Forest Reserve on the island of Hawaii, approximately seven miles north of Volcanoes National Park Headquarters. This area has a thriving assemblage of native forest birds, which additionally include: 'amakihi (Loxops virens), 'akapa (L. coccinea), creeper (L. maculata), 'elepaio (Chasiempis sandwichensis), 'apapane (Himatione sanguinea), 'i'iwi (Vestiaria coccinea), 'omao (Phaeornis obscura), and occasionally 'io (Buteo solitarius). The dominant tree in this rain forest region is koa (Acacia koa), which has an elevational range here between 4000 ft. and 6700 ft. Other major tree components are: 'ohi'a (Metrosideros collina), 'olapa (Cheirodendron trigynum), naio (Myoporum sandwicense), and hapu'u (Cibotium spp.).

My sightings of the 'akiapola'au have been chiefly in the area from the east boundary of the Keauhou Ranch to Pu'u Kulani, between the elevations of 5600 ft. to 5000 ft. /6000 ?/. No 'akiapola'au have been sighted on several trips north to Pu'u Kipu, (6100 ft.), although the forest is continuous.

Between May 29 and December 5, 1972, I have recorded 60 'akiapola'au on 34 different occasions (see table #1). Many of these were certainly repeated sightings of the same birds, however, a continuous trip from Pu'u Kulani to the east boundary of the Keauhou Ranch on December 3, 1972, yielded 8 birds in 4 different groups.

While foraging in the Kilauea forest area, the 'akiapola'au have a distinct preference towards koa (see table #1). They methodically work their way along branches, constantly prying or tapping with their straight, lower mandible, in search of bark-dwelling insects; stopping occasionally to emit a vigorous song or call note. Less frequently I have watched them foraging along the branches of naio, 'ohi'a, and kolea (Myrsine sp.). Immature 'akiapola'au have been seen with adults on nearly every sighting in the period between October 18 and December 5, 1972, indicating successful breeding during the past summer.

I have been able to distinguish at least three distinct vocalizations of the

'akiapola'au:

1. Long song: an elaborate melodic pattern lasting about two seconds, often ending with a rising, clear whistle or a trill;
2. Short song: a rapid "pit-er-ieu", repeated occasionally;
3. Call note: most frequently heard while immature and adults are foraging together; a sharp declining "cheew", repeated regularly by both the adults and the immature birds.

The total population of 'akiapola'au on the island of Hawaii has become markedly reduced in the last century. Perkins (1903), in FAUNA HAWAIIENSIS, noted their distribution: "Hawaii (Is.) widely distributed and common in many localities." But recently, only rarely have individuals been seen in the Big Island's remaining koa forests and in the dwindling mamane (Sophora chrysophylla)-naio forests of Mauna Kea.

One of the most important factors for the survival of the 'akiapola'au is the retention of large tracts of its remaining native habitat in as pristine condition as is possible. The mamane-naio forest on Mauna Kea is currently subjected to heavy feral sheep and goat populations affecting replacement tree seedlings in particular. Similarly, the Kilauea koa forests are literally plowed under by feral pigs. As a result, neither of these forest areas is able to sufficiently maintain itself. Reduction of populations of goats and sheep in the Mauna Kea forest to the level at which the forest is able to reproduce itself, is possible through more extensive sport hunting: longer seasons and increased bag limits. Kilauea Forest, on the other hand, is a dense rain forest where sport hunting is only minimally effective in controlling pig populations in the easily accessible areas (i.e. along the edges), while a high reservoir population is maintained in the interior areas. Only through an active management plan, which would eliminate feral pigs in certain of these rain forest areas, will the koa forest and its remaining native components survive.

Literature Cited

Perkins, R.C.L. 1903 Vertebrata (Aves) In FAUNA HAWAIIENSIS, edited by David Sharp, Vol. 1, The University Press, Cambridge, England.

Table 1: Sighting dates and associated foraging host of the 'akiapola'au (H. wilsoni) in the Kilauea Forest Reserve between May 29 and December 5, 1972

<u>Date</u>	<u>No. Adults Seen</u>	<u>No. Immatures Seen</u>	<u>Foraging on</u>
May 29, 1972	1		koa, 'ohi'a
June 5	2		koa
June 12	1		not foraging
June 24	1		koa
July 22	2		koa
July 26	1		koa
July 29	1		'ohi'a; koa
Aug 1	3 (heard 2 others)		'ohi'a, koa, naio
Aug 10 (9:45AM)	1		koa
Aug 12 (9:45AM)	1 bird heard calling		---
Aug 12 (1PM)	1 bird heard calling (different area)		---
Aug 16	2 (heard 3 others)		koa
Aug 20	2 birds heard calling		---
Aug 21 (12 noon)	1 bird heard calling		---
Aug 21 (1PM)	1 (heard 1 other-different area)		not foraging
Aug 21 (1:50PM)	2 (heard 2 others-different area)		koa, naio
Aug 21 (2:30PM)	2 (same area as Aug 21 - 1PM)		'ohi'a, naio, koa
Aug 24	2		koa, naio
Sep 4	1 heard calling		---
Sep 11	1 heard calling		---
Sep 13	1 heard calling		---
Sep 22	1 heard calling		---
Oct 2 (10AM)	1 heard calling		---
Oct 2 (11AM)	1 heard calling (different area)		---
Oct 18	1	2	koa
Oct 23	2	1	koa
Nov 29 (11:49AM)	1 heard calling		---

Date	No. Adults Seen	No. Immatures Seen	Foraging on
Nov 29 (3PM)	1	1	koa
Nov 29 (4:30PM)	1 (different area)	1	koa
Nov 29 (5PM)	1 (different area)	1	koa, naio
Dec 3 (1:30PM)	2		koa
Dec 3 (4PM)	1 heard calling (different area)		---
Dec 4 (10:30AM)	1 heard calling		---
Dec 4 (11AM)	1 (different area)	2	koa

READERS NOTES:

HONOLULU STAR-BULLETIN, 20 September 1973, page B-12: Hawks' Secrets are Aired

The following is a very exciting article illustrated with the State Forester Ernest Pung's comparative pictures of the 'Io at one month and at six weeks in its nest in a Eucalyptus robusta tree at the Honokaia Boy Scout Camp, Big Island:

A Big Island forester and the staff and the boys at the Honokaia Boy Scout Camp on the Big Island have reported what is believed to be the first descriptions of the nest life of the 'io, or Hawaiian hawk.

The 'io, Hawaii's only native hawk, is one of 11 Hawaiian birds on the list of rare and endangered species. It is considered a beneficial bird, as it feeds on rodents and caterpillars.

The staff at the scout camp, between Honokaa and Waimea, observed a pair of Hawaiian hawks soaring above the camp in May. In June the staff discovered the hawks had made a large flattened nest 20 feet off the ground in a Eucalyptus robusta. ...By early July three downy chicks were seen in the nest, but two disappeared. ...

In a description of the young hawk's growth, Ernest Pung, forester, said that by the end of the fourth week the chick spent most of the day patrolling around the nest, and would often peer over the nest to look at the scouts.

"The hawks are devoted parents and both took an active share in rearing their young," Pung said. "Feeding was almost on a scheduled basis. An average of six to eight rodents were brought in daily plus an occasional frog and smaller bird...The male hawk, distinguished by his slick appearance, would never feed the young but merely leaves his catch in the nest and takes off. The female on the other hand would tear off bits of her catch and feed it directly to the young bird."

The young hawk developed rapidly and by the end of the sixth week was almost fully developed and would devour animals whole, tearing off chunks of flesh with his sharp beak.

The young bird's instinct for flight also developed as he prepared for his first solo by jumping across the nest. His mother spent each night in the nest protecting the young bird.

"During the seventh week the young hawk became obsessed with his flying lessons and by the end of the eighth week, he left the nest to learn and master the finer skills of survival," Pung said.

Andrew J. Berger, author of HAWAIIAN BIRDLIFE, says Pung's account is probably the first record of a Hawaiian hawk nesting in eucalyptus and that up to now, little had been known about its nest life or period of dependency. He said the hawk can be seen soaring in wide circles on the slopes of Mauna Loa or Mauna Kea and quoted the Bureau of Sport Fisheries and Wildlife as listing the total population in the low hundreds. Chief reason for the decline, he says, has been people shooting hawks and the drastic deterioration of the environment.

Berger and other students of bird life have expressed concern about the ability of native birds to adapt to introduced trees. Hawks' nests have previously been observed only in 'ohi'a and mamane, both native trees. Berger said the 'elepaio among the native forest birds has adjusted best to exotic trees, although the 'amakihi also seems to adjust. Generally, however, he says that native birds depend on the ecosystem in which they evolved, are not very adaptable, and therefore are very susceptible to changes in the environment. ...

HAWAII TRIBUNE HERALD, Sunday supplement, 16-22 September 1973, page 4: Hawaiian Hawk Takes to Eucalyptus by Ernest Pung

The assumption by concerned bird preservationist that the endemic birds, especially

those on the endangered inventory, will not adapt to a man-made, exotic species forest can be disputed by a recent discovery. The Hawaiian hawk...one of eleven Hawaiian birds on the endangered list, found the Eucalyptus robusta, a fastgrowing timber species introduced from Australia and extensively planted to clothe the denuded and brush infested areas for water conservation in the mid-thirties under the C.C.C. program, suitable for nesting. ...Although this is only a single observation and may be an exception to the rule; nevertheless, the instincts incorporated through genetics are a powerful force and form from an early age. Contrary to the thinking of many, animals as well as human can adjust to a new environment. Oftentimes, time is the essential ingredients.

HAWAII TRIBUNE HERALD, Readers Forum: Birds and Their Habitats by James Kaye, Volcano

The discovery of a hawk nest in a non-native eucalyptus tree is, indeed, news. I refer to the article "Hawaiian Hawk Takes to Eucalyptus" in the Sunday supplement of the Sept. 16 Tribune-Herald. At last, after decades of planting tens of thousands of these exotic trees around the State, someone has finally found one that is actually doing some good. But the fact should not go unmentioned that birds often nest in the strangest of places. Birds may nest inside tree stumps, atop telephone poles, under roofs of houses, and inside mailboxes, tin cans, cardboard boxes and junked automobiles.

Using the hawk discovery as a logical assumption of bird adaptation to man-made habitats, Hawaii is fast on the road back to recovery of its native birds. In another century or two when Hawaiian forests are little more than stumps of trees and/or have been bulldozed and paved over in wall to wall subdivisions, native birds will have never had it so good. Each house will have a roof top, a couple of telephone poles, one mailbox and backyards littered with tin cans, cardboard boxes, and junked automobiles. Through efforts of the Division of Forestry every yard may have a eucalyptus tree or two. What more could a native bird need? Then people from all over the world will come here and marvel at what "forsighted" Hawaii has done towards salvaging its native birds from extinction. Someone, someday, might even write an article on the subject for a Sunday newspaper supplement.

A Critique of the 4th Hawaii Wildlife Symposium and the 15th Annual Forestry Conference
Ilikai Hotel, Honolulu, October 17-19, 1973

By Wayne Gagne

Wildlife Symposium (Oct 17)

Nine papers were presented during the Wildlife Symposium on October 17th. David Woodside's (Non-game biologist, State Division Fish and Game) talk on "Wildlife in an Urban Environment" (the theme of the symposium) got some attention in the press (Honolulu Advertiser, Oct 18) for his statement that Hawaii's biomass hasn't enjoyed natural stability since the Polynesians arrived here. I understood him to mean that this applied to the disrupted situation in the contemporary lowlands; otherwise, many of us can vouch for the apparent stability and integrity of Hawaii's undisturbed native forests, at least from the botanical aspect. I think the often repeated contention that exotic grasses and annual weeds are going to overrun our forests needs some experimental verification to sort out the fiction. Woodside went on to detail the increasingly familiar story of the destruction and alteration of the lowland biota and the introduction of exotic plants and animals. He said that in view of what has happened we'd best appreciate what's now there, for there is no bringing back pristine Hawaii.

On a similar note, Dr. Alan Ziegler, Bishop Museum mammalogist, made a pitch for not introducing any more game mammals for hunting. In view of the damage these do to our non-adapted ecosystems, he plugged strongly for non-introduction. Ziegler further asked that non-native game species be at least kept at levels which could not further degrade the native environment. His contention that there is a growing nation-wide antipathy towards hunting was contested by a subsequent speaker, Ah Leong Ho, President of the Hawaii Rifle Association.

Jack Throp, Director of the Honolulu Zoo, made a hit with his new "Manual of Hawaiian Snakes" in discussing the new animal quarantine regulations. Gerald Swedberg, U.S. Navy, showed slides of the "replacement habitat" for wading birds displaced by construction of the Reef Runway now being built in Pearl Harbor. He said the military is actively managing the wetland bird habitats under their jurisdiction, especially on Oahu.

William Devick, Freshwater Fisheries Biologist, State Division of Fish and Game,

outlined the trials and tribulations of establishing and managing a recreational freshwater fishery based on exotic species in Wahiawa Reservoir (Lake Wilson). The problems centered on environmental degradation and the excessive reproduction potential of the tilapia.

That evening Sandra Guest, graduate student in Ornithology at the University of Hawaii, presented her Masters thesis work on "The Natural History of the White-eye in Urban Oahu." She demonstrated the biological factors that make this aggressive exotic bird such a successful, adaptable species in both urban and natural environments.

We were treated to a new movie on the demise, captive propagation and release to the wild of the Hawaiian Nene. This is the best film on Hawaiian natural history I've seen. It showed what can be done by a consortium of individuals and organizations at the individual, state, and international levels to bring back a species from near extinction.

Copies of the Wildlife Symposium presentations are available for one dollar from the Secretary, Hawaii Chapter of the Wildlife Society, Box 936, Hilo, Hawaii 96720. Forestry Conference (Oct 18)

By contrast with the Wildlife Symposium, I found this Conference barely worth attending. Many of the presentations were pro forma and added little new to one interested enough to go to such a meeting in the first place. This made for an overall boring day. James Lovell's seemingly endless series of slides of a house made out of eucalyptus wood was excruciating and he even "threw in" a couple of slides of aerial photos where he couldn't find the house. Most of the State employees there either were so familiar with and/or apathetic to the whole exercise that hardly a question or comment was raised on their part. Save for a few remarks from retired forester Karl Koste, and some occasional pointed questioning from a few conservationists, Sierra Club members mostly, one presentation just followed another.

Ramon Duran of Parks and Recreation demonstrated that there was still new, exciting thinking remaining in government. This particularly applied to the plans for the new park at Kualoa, Oahu. We just might bring Hawaii back into our parks yet if Rom has his way!

Cliff Davis, Branch Chief of Entomology here, admitted that the state has not sufficiently pressed its search for effective natural enemies of Clidemia, a noxious weed familiar to hikers in the Koolau Mountains. After his presentation on plant, insect, and disease pests he was also questioned about the biological control of banana poka, a smothering exotic vine on the Big Island and Kauai. The state's position is that biological control agents might pose a threat to the related passion fruit and the small commercial operation here. He agreed that the state has not yet looked for host specific insects that feed on banana poka with biological control potential.

I passed up the annual banquet (too expensive), so I have relied on an article entitled "Big Koa Replanting Planned" in the Honolulu Star-Bulletin, October 19. The banquet speaker, William Thompson, Deputy Chairman of the Department of Land and Natural Resources, announced that the department was embarking on a koa planting program on the Big Island, as well as considering a similar endeavor for sandalwood. This is especially welcome news for those of us concerned about the continuing demise of our koa forests through the familiar procedure of harvest then conversion to cattle pasture. If the state can offset this trend then maybe there is a future for koa and its associated biota, including several endangered bird species. Believing that this type of thinking needs all the encouragement that conservationists can muster, the Hawaii Audubon sent Mr. Thompson a congratulatory letter and suggested possible areas for replanting.

I was unable to attend the annual Forestry field trip on Friday (October 19) to various areas on Oahu.

HONOLULU STAR-BULLETIN, 19 October 1973, page B-1: Big Koa Replanting Planned by Jerry Tune

The State is making final plans for a 1,500-acre koa forest on the Big Island and may embark on a similar project for sandalwood trees. The program was sketchily outlined yesterday at the 15th annual Foresters Conference by William W. Thompson, deputy director at State Department of Land and Natural Resources.

"All the skills and experience gained in the past will be brought into play in this program to replant koa trees in the first sizable tract of land," said Thompson.

"This project is proposed for the Big Island. Other select areas throughout the State will be included in this program."

For many years there has been talk about reviving the koa forests. Two years ago, the Bishop Estate was looking at koa forests as a source of lumber after efforts to grow other tree species proved costly. The Bishop Estate talked about harvesting koa and 'ohi'a in 4,000 acres of the Keauhou Forest at Ka'u on the Big Island. More recently there has been some discussion of a koa program at the Kilauea Forest near, but outside the Hawaii Volcanoes National Park.

Thompson talked about previous problems in growing koa trees at Laupahoehoe and added: "Some of you are familiar with this area and will recall the impractical conditions imposed on our State Foresters. The harvesting of the older trees is being done on a helter-skelter basis with very little thought given to future management of the area.

"It is doubtful whether the young sprouting koa trees can survive the smothering effects of the rapidly growing banana poka vine. I am sure we will not accept such arrangements when other areas are selected for harvesting and clearing to bring back a healthier forest."

Thompson said that while the State cannot bring back the vast tracts of koa and sandalwood of centuries ago, it can produce "significant elements of what Hawaii had then."

He also added, "It would be safe to predict, following our koa forest replanting project, a similar sandalwood project should follow."

The stripping of sandalwood trees by early visitors to Hawaii is considered a major calamity by many people. So rapidly were the stands of sandalwood depleted that by the time the missionaries arrived in 1820, the wood was nearly gone. No sandalwood was exported after 1840.

In past years, there have been some discussions on bringing back the sandalwood trees. In 1967, then Lt. Gov. Thomas P. Gill headed a 12-man expedition into the Mauna Loa area of the Big Island where sandalwood trees grew.

Several State and federal officials said that commercial forests of sandalwood and koa could be developed on the Big Island if cattle grazing were controlled. The cattle, they explained, eat the seeds falling from the trees, halting new growth.

The great sandalwood forests in Hawaii were chopped down with no thought of reforestation. Sandalwood was a principal item of trade and much of the fragrant wood was sent to China. It was prized for furniture and ornamental woodworking.

Letter to William W. Thompson, Deputy Chariman, Department of Land and Natural Resources from Acting President Wayne Gagne, 23 October 1973

The Hawaii Audubon Society wishes to congratulate you and the DLNR for the program to re-establish a 1,500-acre Koa forest on the Big Island and a possible similar project for Sandalwood trees. The demise of the Koa forest and its associated biota, birds among them, has been a continuing concern of our Society. We have urged State officials to emphasize native species, especially Koa, in reforestation programs. We have also requested the State to look closely at expiring pasture leases in the Koa zone to see if the land might be more profitably returned to Koa forest.

May we suggest some prime areas on Hawaii, Maui, and Kauai that merit attention? On Hawaii, the abandoned pasture unit near the Kulani Honor Camp and the Hoesa-Kaau area (an expired pasture lease above Honokaa) are distinct possibilities. On the south slopes of East Maui, at Kahikinui, a Koa forest seriously damaged by feral goats and cattle ranging into the State Forest is a prime candidate for rehabilitation. The Koa forest of leeward Kauai, as on Puu Ka Pele, need maintaining rather than replacement with exotics because of its rich assemblage of endemic plants and birds. None of these areas has banana poka infestations.

Several entomologists in our Society, myself among these, are of the opinion that the State Department of Agriculture should look much closer at the possibility of biological control of banana poka, the insidious exotic, smothering vine in our Koa forests you mentioned at the 15th Annual Forestry Conference. This possibility seems to have been dismissed at an early stage for fear that the biological control agents would not be sufficiently specific and might affect passion fruit growers. However, we have been in contact with Brazilian entomologists who inform us that there are many host specific natural enemies of the extensively developed passion fruit family (Passifloraceae)

in Central and South America. Some of these, as an added attraction, are the caterpillars of quite spectacular tropical butterflies. The Division of Entomology of the Department of Agriculture needs prompting and funding for this problem. ...

Plover Watching

From Aileen M. Ichijo, 27 November 1973

Location: Roof, Hokulani School, St. Louis Heights, Kaimuki; Number: One plover; Plumage: Black spottings; Date & time, weather, and behavior: 28 Sep 1973 @ 1220, warm, standing on one foot. 1 Oct 1215-1245, 2 Oct 1235-1345, 5 Oct 1015-1020, 9 Oct 1015; humid; preening. 10 Oct 1015, humid, sitting. 11 Oct 0825, humid, preening. After a long absence the/a plover returned for a few minutes on 4 Dec @ 0800, clear weather, standing, no black spots-plumage.

The children often see plovers in Kanewai Park, Dole Street. Occasionally we hear them on the wing.

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From Erika Wilson

- 10 October 1973: Sunny, windy, light clouds
0947 Ala Wai Golf Course--Grass courses, 2 individuals--1 feeding, 1 standing
0951 Liholiho Elementary School--Grass field, 1 individual--standing
1031 Ala Wai Golf Course--Grass courses, 5 individuals--all standing
1243 King St & Kapiolani Blvd--Grass lawns, 1 individual--feeding
- 11 October 1973: Sunny, windy, clouds
1424 Ala Wai Golf Course--Grass courses, 3 individuals--all standing
- 12 October 1973: Sunny, hot, scattered clouds
1457 Ala Wai Golf Course--Grass courses, 2 individuals--all standing
- 13 October 1973: Sunny, occasional showers, windy
1200 Koko Head Marina vicinity--Open & grassy ground. Small groups up to 5 in number, also individuals. One individual with injured left leg; bird did not use leg in walking, rather hopped on good leg; in wind gusts opened wings slightly to maintain balance. Calls often given, usually followed by short flights at approach of observer.
1240 Waialae-Iki Park--Grass field, 5 individuals--all standing
- 24 October 1973: Sunny, windy, light clouds
0940 Ala Wai Golf Course--Grass courses, 5 individuals--3 feeding and running short distances, 2 standing
0945 Kapaolono Field--Grass field, 1 individual--standing
1003 Kapaolono Field--Grass field, 2 individuals--feeding & moving about as a pair
- 26 October 1973: Sunny, no wind, clear
1120 King St & Kapiolani Blvd--Grass lawns, 1 individual--feeding & preening
- 30 October 1973: Sunny, no wind, cloudy
1430 University of Hawaii, Hamilton Library--Grass lawns, 1 individual--feeding, defecated once.
- 1 November 1973: Raining, windy
1730 University Ave & Dole St--Grass lawns, 1 individual--standing
- 2 November 1973: Sunny, light clouds, windy
1435 King St & Kapiolani Blvd--Grass lawns, 1 individual--standing

Field Notes from Aileen M. Ichijo: Leiothrix

I saw and heard three leiothrix at the 6,000' elevation, Mauna Kea, 21 October 1973. I was at the KeanaKolu Orchard Farm.

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From Charlotta Hoskins, 4 December 1973: Please identify

For the past four months Priscilla Harpham has heard a new bird calling and singing in her garden and around her house at Aukai and Kahala Avenue. She describes the call as very pleasant and the song as melodious. Finally she sighted two all-black, crested birds, in size between a mynah and a Kentucky cardinal. She saw them against the light at a distance of about 20 feet. She says they call and sing from tops of trees, but when she saw them they were in a Christmas-berry bush nearer the ground. She believes they may be escaped cage-birds. Can anyone identify them with this information?

Letter from Mae E. Mull, Volcano, Hawaii, 19 October 1973

Although we are far from being settled, Bill and I feel great joy and contentment to be in this house surrounded by a lush 'ohi'a-tree fern rain forest--in this place where we want to be for the rest of our lives. Bill has found 20+ predacious caterpillars on plants on our own property! 'Apapane are singing all around us from dawn until dark every day and rain doesn't discourage them. When I first awoke this morning and opened my eyes to the delight of 'ohi'a outside the window, an 'Apapane came to feed at a brilliant lehua blossom and my heart leaped. We've seen 'I'iwi several times in the yard and hear them daily. Their hoarse, raffish calls tickle our ears. We've watched 'Omao in our yard on two separate days and on a third occasion heard a pair singing and calling from the wooded adjacent lot. One 'Omao flew down to the lawn and hopped from place to place on the lawn, pecking and digging in the grass as if searching for insects. His behavior was reminiscent of the Robin on the mainland--except that 'Omao didn't run. 'Amakihi are here too, singly or in pairs.

Rick Warschauer, our Kalanihonua Loop neighbor $\frac{1}{4}$ mile away, saw a pair of 'Io circling above our area last week, so we'll be on the lookout for the Hawaiian Hawk above our house.

As for exotics, the White-eye is common and favors fuschia blossoms and lehua. Bill has seen and heard a pair of cardinals, close to the house. Gradually we'll replace much of the exotic plantings with native flora. We're eager to see if endemic Broussaisia will prosper as a border planting and take the place of the exotic Hydrangea that grows so well in this area. We are so pleased to discover native species in the buffer wooded areas of the property: 'olapa, Clermontia, 'ohelo, pilo, pukiaawe, kukae-nene, pa'iniu and kolea--and more to be identified, I'm sure. It is great fun to see these old friends in the 'ohi'a-tree fern understory. ...

Field Trip to Waipio Peninsula, Walker Bay, Paiko Lagoon, 14 October 1973 by Robert Shallenberger

Only nine members and guests met in Honolulu for this month's shorebird field trip. I expect that many were scared away by the rainy weather. Yet, despite the clouds all morning, it only sprinkled for a short time during the entire trip, and turned into a beautiful day in the afternoon.

We went directly to the Oahu Sugar Co. settling basins on Waipio Peninsula. In the basin closest to the road, we observed 125 cattle egrets, 60 stilt, 60 golden plover, 30 sanderlings, and 15 ruddy turnstones. Of more interest were 4 dowitchers, 3 black-bellied plover and 4 pectoral sandpipers. Five pintails and two shovelers, all in eclipse plumage, were also seen. In the vegetation, we spotted 10-12 black-headed mannikins, two strawberry finches, and an unidentified finch with brilliant red-orange and black markings. (Orange weaver from Africa--cage escapee) In the second basin, another 79 ruddy turnstones were spotted, along with a few more golden plover. Movement of birds prevented an accurate count of birds in the remaining basins. *Walker Bay

At 1100 we moved to the abandoned airstrip*on the west side of the peninsula, and spotted 22 stilt, 3 adult night herons, 10 coots, 3 wandering tattlers, 8 golden plover, 32 shovelers (all in eclipse) and one mallard drake (reported on earlier trips as well).

After lunch, we drove to Paiko Lagoon, which, unfortunately was quite windy and full of water. Five immature night herons, and 3 adults were fishing along the shore. Also seen were 4 stilt, 10 ruddy turnstones, 4-6 sanderlings and at least 2 wandering tattlers.

Everyone but myself missed the most exciting bird watching of all when I went home around Makapuu Point and watched two hang gliders chasing frigatebirds along the pali.

To Kealia Trail, 11 November 1973 by George-Ann Davis: 8 participants led by Wayne Gagne

We had intended to walk the Poamoho trail, but on that particularly rainy day we faced a drenching rain and an almost impassable road. So we headed for one spot certain to be dry and sunny--Kealia trail, above Dillingham air strip. It didn't start raining until we'd almost reached the top of the pali. We enjoyed a fine, misty view with lunch and were entertained by the acrobatics of a glider. We slid most of the way back, down a rivulet-ridden Peacock Flats trail.

Birds: 1 White-tailed tropicbird, 1 Frigatebird, 3 times flushed a gallinaceous bird (Francolin?), heard Red-crested and Kentucky cardinals, White-eyes, possibly an

'Elepaio. Identified many native dry habitat plants. Noted an abundance of African snails.

Excerpts: Minutes of Hawaii Audubon Society general meeting, 17 September 1973 by Sandra Guest, Acting Recording Secretary

...August (Manana Island) and September (West Loch to Sand Island) field trips: Robert Shallenberger (who will fill in for J. Yoshida as Vice President in charge of Education for the rest of the Year) reported on the August field trip. This has been a very dry year, and Dr. Shallenberger feels that this may adversely affect rabbits on Manana Island. The day before the trip 10 Red-tailed tropicbirds were seen, but only two on the day of the trip. Sooty terns had finished nesting and the chicks were flying. Some Noddy terns were still sitting eggs; Shearwaters had chicks.

William Mull reported that nine people attended the September field trip, from West Loch to Sand Island, that concentrated on shore birds. Stops were made at West Loch, Walker Bay, and the settling basins. ...

Wayne Gagne announced that there would be a public hearing on regulations concerning the Green Sea Turtle in Hawaii, Friday at 7:00 at the Bishop Museum Conference Room. Members and interested people were urged to attend.

President and Mae Mull will be moving to the Island of Hawaii at the end of the month. His term as president will be completed by Wayne Gagne. Wayne Gagne, Florence Hendrycy, and John Obata presented leis to the Mulls and thanked them for their service to the H.A.S. President Mull turned the meeting over to Wayne Gagne. ...

William Mull presented a slide show--"Hawaii's Basic Nature--exploration of Hawaii's native ecosystems through close-up color slides of unique insects, snails, and other endemic life forms that evolved here as part of the real Hawaii." ...

Because of ENERGY CRISIS, Audubon activities may be curtailed. Please send in suggestions as to what we can do.

ALOHA to new members:

Joyce M. Arakawa, 605 Hunalewa St, Honolulu, Hawaii 96816
 Omer Bussen, 1519 Nuuanu Ave, K24, Honolulu, Hawaii 96817
 Mr. & Mrs. William Greig, 4026 Harding Ave, Honolulu, Hawaii 96816
 Mrs. George Ikinaga, 2013 Aamanu St, Pearl City, Oahu 96782
 Dr. & Mrs. Kenneth L. McKinnon, 72 Lochinvar Road, San Rafael, Calif. 94901
 John Obata, 1337 Ala Aolani St, Honolulu, Hawaii 96819
 Hawaiian Humane Society, 2700 Waiialae Ave, Honolulu, Hawaii 96814
 Koloa Comm School Library, 4344 Hardy St, Lihue, Kauai 96766

To the outgoing and incoming officers and members who kept the society functioning as normal: MAHALO NUI LOA

HAWAII'S BIRDS, a field guide, is available for \$2.50 postpaid, Airmail 50¢ extra. Send in orders to: Book Order Committee, Hawaii Audubon Society, PO Box 5032, Hon., HI 96814

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JANUARY ACTIVITIES:

13 January - Please note: NO FIELD TRIP
 14 January - Board meeting at McCully-Moiliili Library, 6:45 p.m. Members welcome.
 21 January - General meeting at Waikiki Aquarium Auditorium at 7:30 p.m.
 Program: Reports on Honolulu and neighbor islands Christmas counts

HAWAII AUDUBON SOCIETY EXECUTIVE BOARD:

President: Wayne G. Gagne
 Vice Presidents: H. Eddie Smith (program)
 George-Ann Davis (education)
 Secretaries: Patricia Bloedon (recording)
 Erika Wilson (corresponding)
 Treasurer: C. Florence Hendrycy
 Board Members: Steven L. Montgomery (conservation)
 Mae E. Mull (Big Island representative)

THE ELEPAIO: Editors-Charlotta Hoskins & Unoyo Kojima

MAILING ADDRESS: P.O. Box 5032, Honolulu, Hawaii 96814

DUES for 1974 are now payable: Regular - \$3.00 per annum
 Junior (18 years and under) - \$1.00 per annum
 Life - \$100.00