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HAWAIIAN GEESE

By Jerome J. Pratt

Waterfowl that have evolved on remote islands possess many characteristics that are unique. The Hawaiian goose or nene (Branta sandvicensis) is an example of evolutionary phenomenon where a member of a genus of an aquatic nature has adapted to thrive on lava flows with little or no free water. Among their other individual differences is that they lay relatively large eggs--about seven per cent of the female's body weight. This is about twice as big as the compared weights of the species found on the large land masses.

The recent discovery of the intact fossil skeleton of a Molokai goose, that lived possibly as long as 100,000 or more years ago, adds to our speculation on the evolution of island ecology, especially waterfowl.

According to Dr. Alan C. Ziegler, Bishop Museum vertebrate zoologist, there was an absence of a pronounced keel on the sternum, meaning the goose was possibly a flightless bird. However, Ziegler said, "The ancestors of this bird had to fly in."

Remnants of another fossil goose /Geochen rhuax/ were found on the Big Island in 1926. There is also an extinct goose recorded for New Zealand. Cnemiornis calcitrans is the scientific name given to the species that vanished from the land of the Kiwi.

Apparently there are no close living relatives of these extinct geese of Hawaii and New Zealand, although the genus Cereopsis of Australia is probably similar.

Cereopsis, known as the Cape Barren goose, is the only goose with an incubation period lasting longer than that of the nene. It takes 35 days for a Cereopsis egg to hatch and 30 days for a nene. Most other geese have an incubation period of from 25 to 28 days. Also the Cereopsis and the nene are the only geese that begin their breeding season as the hours of daylight grow less.

I mention the above facts because I believe the nene has been around for a very long time and it may not have evolved from one of the North American Branta as has been generally accepted as its source of origin. It may have been a competitor that helped those less-adaptive species become extinct in Hawaii.

It seems to be within the archaeological rules to cogitate in establishing factual scientific data on hearsay evidence if there is just a shread of possible fossil manifest to support a belief. It is often hard to produce acceptable valid biological evidence if there is no archaeological support. If the nene had vanished from the island of Hawaii before the European man had arrived would there be fossil evidence to prove it existed?

In my opinion it is reasonable to accept available circumstantial evidence as fact that the nene once visited all the islands of the Hawaii chain, and that it bred on both Maui and the Big Island.

As recently as 1950, three adult nene were identified by Joseph S. Medeiros on Molokai. H.W. Henshaw in 1902, mentioned it to have nested in past time in the crater of Haleakala over 7,000 feet. In Part 8, Volume 1, "Birds of the World," IPC, London, it states, "In the 18th century, the Hawaiian goose, commonly called nene, was widespread below 9,000 feet on the tropical islands of Maui and Hawaii."

An unpublished research report by Paul Ernest Schulz, Park Naturalist, Hawaii National Park, dated March 20, 1939, indicated that he was satisfied the nene nested on Maui. Another park naturalist, John E. Doerr, Jr., of about the same era, agreed.

Mr. James A. Caswell, born March 22, 1898, remembers seeing nene on Maui when he was a small boy. His father came to Maui from Australia in 1884, and married a Maui-born Hawaiian girl. The senior Caswells spoke of the nene nesting on puunene (goose hill), the site of the present community of Puunene on Maui.

To cast doubt on the more wide-spread range of the nene is not in the best interest of its survival. There has been hesitancy in authorizing an all-out restoration project for the species on Maui because a few ornithologists and biologists are still looking for what up until now has been missing archaeological evidence to prove it existed on other than the Big Island.

A bold approach is needed now to put the nene completely out of danger. For real security a second wild breeding population must be encouraged on Maui. There is enough circumstantial evidence available to show that Maui was within the ancient natural range of the nene.

A modified "Nene Park" project as proposed by Peter Scott appears to be the most logical method of returning semi-tame birds to the wild for successful natural reproduction. I shall deal with this proposal in another article for THE ELEPAIO in the near future.

REFERENCES:

Scott, Peter, 1962. A Project for a Nene Park in Hawaii, The Elepaio, 22(11).
Pratt, Jerome J. 1971. A Breakthrough for Maui Nene. The Elepaio, 32(3).

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READERS NOTES:

THE CONDOR, Volume 45, July 1943, pages 146-148: An Extinct Goose from the Island of Hawaii by Alexander Wetmore

In the course of engineering operations connected with the domestic water supply of Pahala on the Island of Hawaii, in 1926, fragmentary bones of a good-sized bird were obtained by W.O. Clark....The specimens were taken from a tunnel at a depth of about 100 feet from the surface at a point approximately 1000 feet to the eastward of the shoulder of the mountain peak called Kaumaikeohu....The bones were located on top of the ash bed or practically so, though there may have been a few (2-4) inches of ash above them....It was a depression in the ash; the lava did not fit down into this small depression. Thus, the bones lay in a small cavity perhaps one foot in length and five or six inches in height.

...It develops that the goose is an extinct species of the subfamily Cereopsinae, a peculiar form...interesting addition to the Hawaiian fauna. Geochen rhuax new genus and species...

The relationships of Geochen rhuax are highly interesting. From the skeletal evidence available, this bird appears to have been about as large as the living Cape Barren Goose (Cereopsis novachollandiae) of southern Australia and to have been more similar to that bird than to any other now known. Like that species, Geochen shows a considerable development of the external tubercle of the oblique ligament, although not to the degree that this is found in Cereopsis. In the latter species the tubercle forms a pronounced knob of bone 4 millimeters in length, placed external to the margin

of the tendinal bridge. In Geochen it is perhaps one-half as large and has a slightly lower position. This tubercle is also greatly developed in the great extinct goose of New Zealand, Cnemiornis calcitrans, a species that, from the leg elements, is close to Cereopsis.

Geochen shows no close alliance with the living Nene (Nesochen sandvicensis), /now Branta sandvicensis/ except that both belong to the family Anatidae. Its description introduces a distinctly new element in the ancient avifauna of Hawaii, a species that evidently was mainly terrestial in habit, and that...is to be placed in the subfamily Cereopsinae.

THE SUNDAY STAR-BULLETIN & ADVERTISER, 27 February 1972, pages A-6 & A-7: Ancient Molokai Goose Bones Stir World of Biology by Bruce Benson

The Smithsonian Institution is going to receive a 75-pound bundle of ancient history from the Bishop Museum this week. It contains the remarkably intact fossil skeleton of a Molokai goose that lived...possibly as long as 100,000 to 200,000 years ago.

The fossil goose, of a species that is now extinct, was discovered last year when Molokai resident Joan Aidem was beachcombing....Mrs. Aidem took the skull of the bird to Dr. Alan C. Ziegler, Bishop Museum vertebrate zoologist.

"There were several things I just couldn't believe about it," said Ziegler, a man to whom a bone is worth a thousand words. "One very interesting thing is the little projections along the edge of the mouth. They may be analogous in function to the teeth of earliest birds which came from reptiles." Another fascination with the fossil is the absence of a pronounced keel on the sternum, meaning that the goose was possibly a flightless bird. Additionally, the radius and ulna, two forearm bones of the wing are "little tiny things," indicating that the bird didn't fly, he said.

"The ancestors of this bird had to fly in," Ziegler noted. The rate of evolutionary change varies dramatically for different species in different circumstances, he said. But it is very conservative to assume that a minimum of 20,000 years was needed for the goose to change from a flying creature to one that was grounded. It could easily have been as long as a million years, he said. The horse required 20 to 30 million years to evolve from three toes to one. Somewhere on Molokai, he continued, the remains of the fossil goose's predecessors also may be buried.

In an expedition paid for by the Bishop Museum Associates, and with the permission of Samuel A. Cooke and Aka Hodgins of Molokai Ranch, Ltd., Ziegler and his daughter went to Molokai last week to extract the prize.

He dug around the skeleton, cut a deep trench, and coated about 65 pounds of sand and fossil with plaster. He then slipped the plaster bundle out of the cliff, turned it over, and put a jacket of plaster on the bottom too. The package will be sent to the Smithsonian Institution in Washington, D.C., where paleo-ornithologist A. Wetmore will conduct extensive studies on it. Some loose material from the fossil goose has already been shipped to Wetmore. In a response to Ziegler he wrote, "The goose material in the last sending is a marvel to the few experts in the field to whom I have shown it."

Remnants of another fossil goose were found by Wetmore on the Big Island in 1926. But he wrote in his recent letter, "My preliminary studies indicate that the species is completely distinct from the fossil goose from the Island of Hawaii."

In an earlier letter, Wetmore said, "The skull is truly remarkable. I have never seen a bird so strongly built."

Since her initial find, Mrs. Aidem has discovered other bones in the general vicinity of the intact skeleton. Ziegler said he now has the remains of a half dozen or more of the presumably flightless geese.

Their location is at a place where sand has blown into and piled up around high cliffs. Ziegler said one theory holds that during a period of glaciation, when the sea receded, much of the sandy sea bottom was exposed and blew up to the cliffs. The most recent glaciation occurred in the Late Pleistocene, about 40,000 years ago. If the fossil was deposited before then, it could have taken place in an earlier glaciation of about 100,000 to 200,000 years ago, he said. Radio carbon techniques will be able to place the age of the bones as far back as 40,000 years. If the bones

prove more ancient still, experts may turn to potassium argon technique, he said.

Ziegler is intrigued with the notion that descendants of the Molokai fossil goose may have been living when the first Hawaiians arrived. He doubts that the birds could have lived long after the arrival of man. "They would have been hunted and disappeared even before men made a legend out of them," he said. Rapid extinction has been the fate of flightless birds elsewhere in the world. As examples he mentioned the dodo bird, and elephant birds of New Zealand....

'Time Capsule' on Beach

A "time capsule" has been discovered at an isolated Molokai beach that can take people back into history to at least 40,000 years ago. The capsule is actually the sand of the beach itself, which has slowly accumulated to a depth of 500 feet or more, imprisoning in the process the remains of creatures living back at least to the Late Pleistocene. These are conclusions of Dr. Alan C. Ziegler....

Bones of extinct birds have already been recovered from the site and set the scientific community on its ear because of their importance.

The beach is at Moomomi on the windward side of Molokai's eastern section. In a letter to owners of the land who gave Ziegler permission to enter, he said, "As I looked back down over the half-mile wide strip of (sand) dunes to the ocean...it suddenly became clear to me that, through an incredibly fortunate set of geological circumstances, here directly beneath us, buried in the 500 or more feet of wind-blown sand that had slowly built up and finally covered the vertical face of the older sea cliff, lay a successive record of the entire Late Pleistocene and Early Recent zoological history of Molokai."

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Excerpts from letter from Alan C. Ziegler to Samuel A. Cooke, Molokai Ranch, 21 Feb. 1972:

...Everything went perfectly on the two-day trip and we were completely successful in removing the skeleton on the first day--apparently intact and still mostly encased in a 60-lb. block of consolidated sand matrix. Before applying the protective plaster-of-Paris and burlap jacket to the block, I removed just enough of the matrix from critical points of the skeleton to check on the theory that the bird may have been flightless.

We found a flat, instead of a keeled, sternum, and what we could see of the obviously reduced wing bones seemed to closely match the "stumpy", previously undetermined, isolated wing bones Mrs. Aidem had earlier found weathering out of other parts of the Moomomi dunes. In other words, it appears virtually certain this was indeed a flightless species of goose.

We spent the second day revisiting and plotting the other seven Moomomi sites from which Mrs. Aidem had previously collected additional goose-like bones, representing at least half a dozen or more individuals. (We added even a few more similar bones, including the partial mandible of, probably, the same goose species.) As you may recall me mentioning, she had also found at these same sites some bones of a yet-unidentified large hawk or small eagle as well as those of bird that, osteologically, looks suspiciously like a crow; now occurring only in a limited area on the Island of Hawaii....

We also chanced across a few of the several archeological shore sites in the immediate Moomomi dunes area, as well as at least six human burials in the sand being exposed by the wind. The site marked "A"...includes the rock foundation wall of, apparently, some sort of a three-roomed shelter with a burial a few yards away. At the habitation site...we picked up a couple of unpolished basalt adz "blanks" from among the chipping waste on the surface. We did not have time to visit the site... Mrs. Aidem said it was supposed to consist of a large quantity of burned turtle bone at a cliff base near the shore, probably indicating an old Hawaiian turtle-harvesting industry in this particular bay.

...As I looked back down over the ½-mile-wide strip of dunes to the ocean,...it suddenly became clear to me that, through an incredibly fortunate set of geological circumstances, here directly beneath us, buried in the 500 or more feet of wind-blown sand that had slowly built up and finally covered the vertical face of the older sea

cliff, lay a successive record of the entire Late Pleistocene and Early Recent zoological history of Molokai--safely preserved all these thousands of years and now just awaiting the arrival of future discoverers!

...Concerning plans for the plaster-jacketed goose skeleton, I plan to ship it now to Dr. Alexander Wetmore, Avian Paleontologist at the U.S. National Museum in Washington, for preparation and study (with arrangements to set aside a couple of bones for submission for radio-carbon dating)....

Excerpts from letter from Alan C. Ziegler to Rhys Walkley, Australia, 11 May 1972:

...Mrs. Joan Aidem has been doing all of the original finding and excavating. Actually, it's rather hopeless to just dig at random in the Molokai dunes hoping to hit a skeleton by chance. So, Mrs. Aidem uses the method of prospecting the area for bones being weathered out of the loose-to-consolidated late Pleistocene dunes.

Although Mrs. Aidem has looked at several different areas on Molokai for similar bones, the original site is the only area to yield bones so far--probably due to its windward shore location....Mrs. Aidem has so far found the remains of about eight geese in addition to the original, very completely preserved, skeleton I assisted her in digging out. But, she has also collected the remains of a short-legged falconiform of eagle size, a crow-like partial skeleton, and what appears to be a long-legged owl (not the present native Hawaiian Owl or recently-introduced Barn Owl). Also, in her last bunch of material brought over to Honolulu were the remains of a very small bird--possibly a passeriform and of about Loxops virens general size--no skull material of this small bird yet....

So far, no remains of humans seem to be associated with this materkal, but the old archeological site faunal remains should be re-examined, obviously, ffor any evidence of extinct birds....

There are apparently no marine shells in the goose, etc., bone material strata, but there are plenty of extinct (?) species of land snails of at least the genera Amastra, Partulina, and Newcombia. No one has attempted to take these present snail forms to species, although a search through the old literature would probably yield several names that have been applied to such snail remains from the general NW Molokai area.

The falconiform and other material above not yet been sent to Dr. Wetmore at the U.S. National Museum, so we presently have no idea if the birds other than the goose are newly discovered endemics or if they are residentals that flew in from various parts of the world....

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READERS NOTES:

HONOLULU STAR-BULLETIN, 30 May 1972, page A-20: Race with Extinction

Gov. John A. Burns has signed a bill that should assist efforts to save a number of Hawaii's indigenous birds from extinction. This is Act 49, /reference copy in Hawaii Audubon Society library/ which directs the Department of Land and Natural Resources to formulate a program to protect and restore endangered native birds, fish or wildlife. The law was pushed through the Legislature by State Sen. Kenneth Brown and State Rep. Richard Kawakami and received wide support from Hawaii's scientific community and conservation groups.

The need for the program is shown by the placement of 28 species of birds native to Hawaii on the list of 52 species of endangered birds in the United States. The list was prepared by the U.S. Bureau of Sport Fisheries and Wildlife.

Michio Takata, chief of the State's Fish and Game Division, says his office will get to w ork to see what should be done to put into effect the program to protect native birds or mammals now threatened with extinction. The division may ask for funds later after it sees what is needed. Act 49 does not appropriate money. Still, the new law sets up the basis for planning action.

William Mull of the Hawaii Audubon Society says it complements two laws passed by the 1970 Legislature, one of which provides for a Natural Areas Reserve System and the other of which established the Animal Species Advisory Commission.

With these three new laws, Hawaii is in better position to protect its interesting but endangered native wildlife and plants.

Letter to Governor Burns from William P. Hull, Vice President, 3 June 1972:

On behalf of the Hawaii Audubon Society, I wish to express our appreciation and congratulations to you on signing Act 49 into law. We commend you and the Legislature for this conservation policy and program to perpetuate in a natural and viable state the remaining native bird and mammal species that were here to greet the first Polynesian settlers--a natural heritage that is truly a part of the real Hawaii.

Those endemic species for which Act 49 was most particularly designed are the kana'aina nui. They evolved here as part of the land itself. We share them with no other state or nation. These unique creatures, and their equally unique floral and faunal ecosystems, are in every sense a State treasure.

As a consequence of Act 49, future generations of Hawaii's people may have the opportunity to share personally in this treasure--to see Ae'o or 'Alae nesting on the mudflats, or watch 'Apapane or 'I'iwi feeding among 'ohi'a-lehua. Thus later Hawaiians can sense the continuity of the land and feel an identity with the singular life systems it fostered and molded over thousands of years.

No other state has so much to offer--and so much to protect--in its natural heritage. Act 49 recognizes this truth, proclaims its significance and dedicates Hawaii to a conservation program for the benefit of our island people for all times. Truly, Act 49 is a piece of landmark legislation.

We are grateful to Senator Kenneth F. Brown and Representative Richard Kawakami for seeing the bill through with patience and determination. We are grateful to you for signing it.

The Hawaii Audubon Society will make specific suggestions for implementing Act 49. Initially, we recommend three measures that do not require new funding:

(1) Elevation of the status of Kanaha Pond to a permanent State Wildlife Refuge under the Department of Land and Natural Resources for the permanent protection of the endangered Hawaiian Stilt (Ae'o), Hawaiian Coot ('Alae) and native shorebirds.

(2) Promoting Alaka'i (Swamp) Wilderness Preserve to a permanent State Forest Sanctuary for the protection of Kauai's singular rain forest ecosystems and their intact endemic bird fauna, among which several species are barely surviving.

(3) Research studies with federal Pittman-Robertson funds (Federal Aid in Wildlife Restoration Act) on the biological requirements of endangered Hawaiian bird species in their natural habitat. ALOHA NUI and MAHALO !

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Excerpts from minutes of Hawaii Audubon Society general meeting, September 1971:

...Mr. Kaigler reported seeing one bristle-thighed curlew in the Kahuku sand dunes near the abandoned airstrip.

Mr. Kaigler reported on the meeting Hilde Kaigler had attended of the Parks Committee of the Outdoor Circle on plans for the new City and County Regional Park at Kualoa. In response to a question, Mr. Kaigler said that Molii Fish Pond and the spring adjacent to Kualoa Beach Park have not been purchased by the City and remain in private ownership. Molii Pond is the only old Hawaiian fishpond remaining in commercial operation on Oahu. The Society has recommended sanctuary status for Mokolii Island ("Chinaman's Hat") to protect the seabird nesting grounds, with no entrance to the island during the April-October breeding season, and with no improvement of boat facilities on the island or at Kualoa beach. Signs and interpretive displays on the natural history and Hawaiian heritage of Mokolii Island and Kualoa Beach Park would increase appreciation and respect of the area by visitors.

Mr. Kaigler attended a conference held by the State Department of Transportation on the displacement of water bird habitats by construction of the new reef runway at Honolulu airport. Areas that could serve as replacement habitat in the vicinity of Pearl Harbor were discussed.

A report was received from Mr. Eugene Kridler, wildlife administrator of the Hawaiian Islands National Wildlife Refuge. On a recent trip to the Refuge, 140 Laysan ducks were counted on Laysan Island, about double the number counted in 1970.

...Mr. Wayne Gagne, entomologist with the Bishop Museum, presented an informative program with color slides on endangered native flora and fauna. Because this information is most useful in understanding the unique biota of these islands, as

contrasted with the biota of a continental land mass, his talk is summarized here:

ENDANGERED HAWAIIAN FLORA AND ASSOCIATED FAUNA

(A review of talk given by Wayne Gagne, 20 September 1971)

Mr. Gagne described the major types of Hawaiian ecosystems with endangered plant communities in each type. They contain 200-300 species of endangered native flora. He gave examples throughout of plants and animals introduced by modern man into native ecosystems that are incompatible with the ecological balance of such systems and often have the consequence of creating biological deserts.

Among types of ecosystems, the beach strand community has been poorly managed by man. The rare "strand flora" at Kaena Point on Oahu needs protective status, for it is unique in the main islands. The headland flora above the beach at Kaena Point and rare lobelioids on the Na Pali coast of Kauai require protection.

Another type, the Hawaiian dry forest, has many endangered plant communities. Some examples of these are in the Waianae range in back of Mokuleia on Oahu, and particular areas there are now being considered for inclusion in the Natural Area Reserve System. Associated with plants of the dry forest are unique land shells. Many of these species have become extinct and others are endangered. Dry forest ecosystems are not amenable to multiple-use practices. Species deteriorate and die out with grazing pressure and there is little, if any, regeneration of native plant life in areas subjected to continuous grazing. The mining of volcanic pumice, a strip-mining operation, at Puu Waawaa on the Big Island for tourist industry construction is ruining the dry forest in that area. Heavy grazing in dry forest ecosystems has the same effect.

Wet 'ohi'a forests, the third type, are relatively in the best condition of any Hawaiian ecosystems. A "dieback" in some 'ohi'a forests is not well understood. Mr. Gagne speculates that it may be a root fungus killing the trees or it may be a cyclic phenomenon--part of a regeneration process distinctive of 'ohi'a. An introduced exotic, Clidemia hirta, is rapidly invading Oahu's Koolau rain forests but has not spread to other islands thus far.

The past destruction of native forests, particularly on the Big Island, by bull-dozing operations cannot be ignored whatever its significance may be in the total reduction of native ecosystems. Currently there are plans to replace 154 acres of essentially native forest with exotic timber species in the Hamakua Forest Reserve north of Honokaa on theBig Island. This forest is presently free of the wild pig, which makes it scientifically valuable. Conversion of native forests to exotic tree plantations makes for biological deserts--for example, with ironwood. Claims have been made that native birds are abundant in exotic eucalyptus plantations, but to date no concrete data have been presented for comparison with the situation in adjacent native forests.

Koa trees dominate the forest ecosystem at 4,000-6,000 feet elevation. Much of this forest ecosystem has been converted to grazing land for beef cattle in large segments of the Big Island. A part of Keauhou forest is currently undergoing this conversion to grazing land under a long-term lease. Mr. Gagne explained that excessive populations of wild pigs in native forests that are not sufficiently controlled by hunting churn up the soil by rooting and prevent plant regeneration by constant disturbance of the substrata. Banana poka, a passion fruit species, has invaded hundreds of acres of mixed 'ohi'a-koa forest on the Big Island. A controversy has developed between foresters, hunters and conservationists over the implications of this in the Laupahoehoe koa forest. Foresters claim that the native forest is endangered and action is needed in the form of salvage logging and clearing. Hunters value the banana poka for its attractiveness in sustaining high pig populations. Conservationists are not convinced that the banana poka will destroy the native forests and appreciate the fact that banana poka flowers are attractive to certain nectar-feeding endemic birds.

At higher elevations of 6,000-9,000 feet, the mamane-naio forest on the Big Island has been greatly reduced. Through feral sheep and goat damage, the understory has been lost and no regeneration of those native trees is possible. As the forest recedes, endemic bird populations lose their habitate, and species there, such as the palila and the 'akiapola'au, become increasingly restricted.

Above 9,000 feet, in the alpine scrub system, some native plants such as pukeawe can withstand considerable grazing while others are vulnerable. Mr. Gagne made a comparison between the abundance of silversword species on Haleakala in contrast to Mauna Kea, in terms of their protection from feral mammals.

Other distinctive ecosystems are endangered because of the small areas they occupy, such as Nihoa Island and the isolated gulches and valleys of steep mountain ranges, which make them vulnerable to complete obliteration by man. Some plants with naturally restricted distributions, in turn, have organisms such as insects specific to them. The latter are not salvaged if the plant species is saved from extinction in botanic gardens--for example, Hibiscadelphus.

Mr. Gagne spoke of the importance of the Hawaii Natural Area Reserves System in selecting unique and representative ecosystems for protection and preservation. The great need for including curricula on Hawaiian natural history in environmental education was also stressed. He explained that part of this lies in building an appreciation for native flora through encouragement of increased use of native plants and trees for ornamentals. Most of the ornamentals presently used in Hawaii are introduced plants which are standard material for the horicultural industry throughout the tropical world. Many native plants and trees have excellent potential for attractive and useful planting around homes and in gardens. Greater use of native flora in man's urban environment would stress the uniqueness of Hawaii's biota and halt the growing trend toward sameness everywhere.

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18 October 1971

...Mr. Kaigler reported on activities of the Society during the last month, including statements by the Society that were presented at the public hearing of the Senate Interim Committee on Ecology, Environment and Recreation on the subject of Environmental Education, at the public meeting of the Pearl Harbor Conference on Water Pollution, and at the meeting of theBoard of Land and Natural Resources on the lease renewal application by the U.S. Marine Corps for part of the Molokai Forest Reserve. The Society also sent replies to the Draft Environmental Impact Statements issued by the State Department of Transportation for the Kaena Point Section of the proposed extension of Farrington Highway and for the establishment of an energy corridor from Campbell Industrial Park at Barbers Point to Pier 40 in Honolulu Harbor....

The president introduced Mr. Eugene Kridler, Wildlife Administrator for the Hawaii District of the U.S. Bureau of Sport Fisheries and Wildlife. Mr. Kridler presented an informative program on the Hawaiian Islands National Wildlife Refuge and Endangered Species. He first discussed the action program for public acquisition of key wetlands contained in HAWAII'S ENDANGERED WATERBIRDS. The Kahuku Ponds, owned by the Campbell Estate, have first priority for acquisition. Also underway is assessment for public ownership of Menehune Fish Pond and Huleia Marsh on Kauai, Kealia Pond on Maui, and Opaeula Pond and Honokohau Pond on the Big Island. The Bureau is negotiating with the State Department of Transportation for mitigation of the loss of water bird habitat by construction of the reef runway for Honolulu Airport, with refuges in Pearl Harbor as replacement habitats. Whether wetland refuges will be set aside at Paiko Lagoon on Oahu and at Opaekaa Valley on Kauai will depend on action taken by the State of Hawaii.

A federal Task Force is at work on making a complete census of Hawaii's forest birds and the Bureau is requesting two additional biologists for this project.

President Theodore Roosevelt established the Hawaiian Islands Wildlife Refuge in 1909, a chain extending northwest of Kauai consisting of Nihoa and Necker Islands, French Frigate Shoals, Gardner Pinnacles, Maro Reef, Laysan and Lisianski Islands and Pearl and Hermes Reef. Because of the fragile ecology of these islands, the Refuge is closed to the public. Through Mr. Kridler's fine color slides the audience had exceptional views of the geology and birds of the Refuge.

Breeding colonies of seabirds in the Refuge include these species: black-footed albatross, Laysan albatross, wedge-tailed shearwater, Christmas Island shearwater, Bonin petrel, Bulwer petrel, sooty storm petrel, red-tailed tropicbird, blue-faced booby, brown booby, red-footed booby, great frigatebird, sooty tern, gray-backed tern, blue-gray noddy, brown noddy, white-capped noddy and white (fairy) tern.

Mr. Kridler told the tragic story of Laysan Island, the largest isle in the Refuge. Guano diggers, seabird plume hunters and the introduction of rabbits had drastic consequences on the ecology of Laysan in the first part of this century. Of the five endemic land bird species, three became extinct: Laysan rail, Laysan millerbird and Laysan honeycreeper. The Laysan duck population fluctuates widely, but 149 were counted this year. The Laysan finch population is estimated at 12,000 and one hundred of these birds were transplanted to Pearl and Hermes Reef to establish a viable population there.

The two endemic land birds of Nihoa Island, the Nihoa finch and the Nihoa millerbird, are classed as endangered speeies because of the small populations on that limited land area.

Biologists periodically make a census of bird populations in the Refuge, attempt to check the spread of exotic vegetation and reestablish native plants, tag Hawaiian monk seals and green sea turtles on French Frigate Shoals, and check on the effects of unauthorized landings in the Refuge.

The Refuge has been proposed for national Wilderness status that would give it permanent protection by an act of the U.S. Congress. Kure Island, formerly in the Refuge, was transferred to the State of Hawaii by the Executive Order of President Truman.

In response to a question, Mr. Kridler commented on the declining census population of the Hawaiian stilt. In counts made by the State Division of Fish and Game and the Bureau of Sport Fisheries and Wildlife, about 1200 stilts were counted in 1970, but only 1000 stilts were counted in 1971....

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15 November 1971

...Mr. Kaigler reported on the November 14th field trip to Poamoho Trail in which 28 members and visitors took part. No 'elepaio were seen or heard, only one 'amakihi was heard, but a number of 'apapane were observed and heard....

Mr. Kaigler introduced Captain Robert Yount, USN, who presented color slides and a tape recording on the Navy's pollution abatement program for the Pearl Harbor area. Of particular interest to the Society were the areas the Navy has set aside for refuges for the endangered Hawaiian stilt. The salt ponds on the ewa side of West Loch were mentioned as replacement habitat for Hawaiian stilts to compensate for the loss of the tidal flats in Keehi Lagoon when the reef runway is constructed.

Mr. and Mrs. Gerald Bolton, members of the Society and long-time residents of Hawaii, presented a fine series of color slides and a tape-recorded talk on native water birds and seabirds. Prominence was given to the Nene Restoration Project at Pohakuloa on the Big Island, Kii Pond for shore and water birds at Kahuku, the red-footed booby colony at Ulupau Head, and the August 1971 field trip to Manana Island to observe the nesting grounds of sea birds....

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13 December 1971

...President Kaigler reported his observations on a December 11 Keehi Lagoon boat trip with Mr. Ronald Walker, including the Fort Kamehameha area. Notable sightings were one black-bellied plover, two immature herring gulls, 105 stilts, six Bonaparte gulls. On December 1, two lesser scaup were on Salt Lake....

William Mull reported that he and his wife observed a bristle-thighed curlew, keeping close compahy with a dowitcher, for several hours at the Kii Pond settling basin at Kahuku on December 3, 1971....

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Field notes from Charles van Riper III, Kamuela, Hawaii, 19 April 1972:

As the 'Akepa (Loxops c. coccinea) has just been placed on the endangered species list, I thought you might be interested in some 'Akepa sightings I have made on the island of Hawaii.

15 February 1971: Two male 'Akepa in mamane forest. One had immature plumage. Sang with a typical low (Loxops) trill. Area was 6.4 miles west of Pohakuloa on the western slope of Mauna Kea at an elevation of 6,980 feet.

17 June 1971: One male 'Akepa gleaning and feeding on 'ohi'a. He gave a couple

of low tweets or chirps. Area was .8 miles directly south of the Puu Waawaa rain shed at an elevation of 5,500 feet.

5 August 1971: One male 'Akepa feeding on 'ohi'a leaves. The area was a kipuka alongside the Puu O'o trail between the saddle road and Kulani at an elevation of 5,800 feet.

9 August 1971: One male 'Akepa gleaning on leaves as well as lehua blossoms of the 'ohi'a. Area was two miles directly above the Shangri-la house on Puu Waawaa ranch. The elevation was between 6,800 and 7,000 feet just above the Koa belt and into the scrub 'ohi'a near the tree line.

11 August 1971: One male and one female 'Akepa both feeding on 'ohi'a. They spent from three to five minutes feeding on lehua buds and blossoms in each tree. The call used was a short high whistle and was infrequently given. The female followed the male from tree to tree as they fed. The area was 1.9 miles south-east of the Moanuia radio relay station, on the western slope of Hualalai, at an elevation of 5,500 feet.

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ALOHA to new members:

Life - Mrs. Violet Kuulei Ihara, 3162 Beaumont Woods Place, Honolulu, Hawaii 96822
Junior - Robert Clancey, 153 Pauahilani Way, Kailua, Oahu 96734
Regular - James R. Butler, Jr., 1112 Craigmont Drive, Lynchburg, Virginia 24501
Evan Ellman, Life of the Land, 899 Waimanu St, Honolulu, Hawaii 96813
Larry Hirai, 1526-1 Keeaumoku St, Honolulu, Hawaii 96822
Mrs. Annette C. Koon, Box 945, Gainesville, Texas 76240
Shirley H. Lewis, P.O. Box 10405, Honolulu, Hawaii 96816
John C. McCain, 1260 Mokapu Blvd, Kailua, Oahu 96734
Rusty Perry, 752-A S. Beretania St, Honolulu, Hawaii 96813
Kurt Steinwascher, 370 Halemaumau Place, Honolulu, Hawaii 96821
James A. Tucker, P.O. Box 4335, Austin, Texas 78765
Hawaii Loa College Library, P.O. Box 764, Kaneohe, Oahu 96744

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HAWAII'S BIRDS, a field guide, is available for $2.00. Send in your orders to Book Order Committee, Hawaii Audubon Society, PO Box 5032, Honolulu, Hawaii 96814.

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JULY ACTIVITIES:

9 July - Field trip to Peacock Flat, Waianae Range, to study native forest birds. Bring lunch, water, and if possible your car. Transportation cost ($1.00) to be paid to the drivers. Meet at the State Library on Punchbowl Street at 8:00 a.m. Leader: Alex L. MacGregor, 923-7122.

10 July - Board meeting at McCully-Moiliili Library, 6:45 p.m. Members welcome.

17 July - General meeting at the Waikiki Aquarium Auditorium at 7:30 p.m. Program: "Hawaii up Close"--an intimate glimpse of plants and animals of Hawaii via color slides by William P. Mull

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