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# TERRESTRIAL CRITICAL HABITAT FOR SEA TURTLES UNDER UNITED STATES JURISDICTION IN THE PACIFIC REGION

-An overview of existing knowledge-

by

### George H. Balazs

The concept of "critical habitat" for species designated as Endangered or Threatened is set forth in Section 7 of the Endangered Species Act of 1973 (Public Law 93-205 87 Statute 884). Entitled "Interagency Cooperation", Section 7 states: "The Secretary shall review other programs administered by him and utilize such programs in further-

utilize such programs in furtherance of the purposes of this Act. All other Federal departments and agencies shall, in consultation with and with the assistance of the Secretary, utilize their authorities in furtherance of the purposes of this Act by carrying out programs for the conservation of endangered species and threatened species listed pursuant to Section 4 of this Act and by taking such action necessary to insure that actions authorized, funded, or carried out by them do not jeopardize the continued existence of such endangered species and threatened species or result in the destruction or modification of habitat of such species which is determined by the Secretary, after consultation as appropriate with the affected States, to be critical."

Those sea turtles presently listed as Endangered include the hawksbill, Eretmochelys imbricata, the Kemp's ridley, Lepidochelys kempi, and the leatherback, Dermochelys coriacea. Three other species, the green, Chelonia mydas, the loggerhead, Caretta caretta, and the olive ridley, Lepidochelys olivacea, have been proposed for listing since April of 1974. Final rulemaking on this matter is due to become effective during the latter part of August, 1978. At present no terrestrial or marine critical habitat has been legally designated for any of the species of sea turtles.

Except for the unique land basking behavior exhibited at select locations by Hawaiian Chelonia, the most apparent uses of terrestrial habitat by sea turtles are: 1) nesting by adult females, 2) incubation and hatching of eggs, and 3) movement of hatchlings to the ocean. It should be noted, however, that except for Dermochelys, sea turtles reside principally in shallowwater areas adjacent to land masses. The importance of the land in establishing suitable conditions for the turtles' marine habitat should not be overlooked. For example, land masses play an integral part in the formation of sheltered underwater areas (e.g. lagoons, bays) where some turtles regularly retreat for periods of quiescence. Additionally, freshwater runoff from land enhances the growth of certain algae, seagrasses and invertebrates used by turtles for food. In this context, there is no clear division between terrestrial and marine habitats for sea turtles. The two areas are interdependent in providing the proper living space, and activities that adversely affect one component could easily influence the other.

In July of 1977 a Memorandum of Understanding was finalized between the Fish and Wildlife Service (Department of the Interior) and the National Marine Fisheries Service (Department of Commerce) which gave the former agency jurisdiction over sea turtles while they are on land, and the latter agency jurisdiction while they are in water. Consistent with this agreement, the Fish and Wildlife Service is currently assembling data on land areas under United States jurisdiction which serve as critical habitat for each of the six species.

The purpose of this paper is to provide information on such terrestrial aspects for the Pacific region.

### HAWAIIAN ISLANDS

Except for Midway, which is a U.S. territory administered by the Navy, all islands in the Hawaiian Archipelago (18°55'N, 154°49'W to 28°15'N, 178°20'W) are part of the State of Hawaii. Three kinds of turtles regularly occur in Hawaiian waters, and two others (olive ridley and loggerhead) have been recorded as accidentals.

Dermochelys - No records of nesting exist.

Eretmochelys - A low level of nesting has been documented on the Island of Molokai at Halawa Beach, and on the Island of Hawaii at Punaluu and Kawa (Kau District), Orr's Beach (6 km NW of Cape Kumukahi), and Kalapana (Puna District). Circumstantial evidence suggests that nestings may also have taken place in recent years on the Island of Oahu at Malaekahana and Kailua Beach.

Chelonia - Nesting and basking are not known to occur on any of the eight major islands (Hawaii, Maui, Kahoolawe, Lanai,



Adult Hawaiian green turtle nesting in the center of East Island, French Frigate Shoals. A numbered identification tag is present on the right front flipper. *Photo by the author*. Molokai, Oahu, Kauai, Niihau) or their associated offshore islets. The known locations of nesting and basking in the Archipelago are listed as follows:

Necker Island (23<sup>0</sup>35'N, 164<sup>0</sup>42'W) - Basking occurs on a small lava rock ledge and occasionally on a water-worn boulder beach, both within the confines of Shark Bay.

French Frigate Shoals (23°45'N, 166°10'W) -This is the only colonial breeding site of green turtles in the Hawaiian Islands. Nesting occurs over the entire land area of the islets of East, Whale-Skate, Trig, Little Gin and Gin, as well as on the south of Tern. Basking takes place along the shores of all of these islets, as well as at Mullet, Round, Shark, Disappearing and several unnamed seasonally occurring sandbars.

- Laysan Island (25<sup>°</sup>46'N, 171<sup>°</sup>44'W) A low level of nesting and basking takes place, principally on the west and north shores.
- Lisianski Island (26<sup>0</sup>04'N, 173<sup>0</sup>58'W) A low level of nesting and a moderate level of basking have been recorded; however, insufficient information exists for this location.

.rl and Hermes Reef (27°55'N, 175°45'W) -A low level of nesting occurs on two (Southeast and North) of the atoll's nine islets. Basking also takes place on these two islets, as well as on Little North, Bird and Sand. Insufficient information exists for this location.

Midway Islands (28°13'N, 177°21'W) - A
single occurrence of nesting on Sand Island
and a single occurrence of basking on
Eastern Island have been recorded.
Kure Atoll (28°25'N, 178°20'W) - A low

Kure Atoll (28<sup>25</sup>'N, 178<sup>20</sup>'W) - A low level of basking occurs on the shores of Green and Sand Islands. Several nestings have been recorded on Green Island.

Although there are no reports of basking at Nihoa  $(23^{\circ}03'N, 161^{\circ}55'W)$  or Maro Reef  $(25^{\circ}25'N, 170^{\circ}35'W)$ , this could be due to the low number of observations made, rather than an absence of such activity.

Nihoa, Necker, French Frigate Shoals, Maro Reef, Laysan, Lisianski, and Pearl and Hermes Reef (as well as Gardner Pinnacles at 25<sup>°</sup>00'N, 168<sup>°</sup>00'W) are all part of the Hawaiian Islands National Wildlife Refuge. However, there is currently disagreement between the State and Federal governments as to the boundaries of the area. Green and

### JOHNSTON ATOLL

Johnston Atoll (16<sup>0</sup>45'N, 169<sup>0</sup>31'W) is a U.S. territory administered by the Defense Nuclear Agency. The atoll contains four islets (Johnston, Sand, Akau, Hikina) and is designated as a National Wildlife Refuge. Only one sighting of a turtle on land has been recorded. This involved an adult green turtle on Sand Island, but it is unknown if nesting or basking took place.

#### PALMYRA

Palmyra (5<sup>0</sup>53'N, 162<sup>0</sup>05'W) is a U.S. territory that is privately owned. The atoll contains approximately 50 islets, and green turtles are known to reside in adjacent waters. Information on the occurrence of nesting is lacking for this location.

### KINGMAN REEF

Kingman Reef  $(6^{\circ}23$ 'N,  $162^{\circ}18$ 'W) is a U.S. territory administered by the Navy. The area contains one small islet, but it is unkown if nesting takes place.

### HOWLAND, BAKER AND JARVIS ISLANDS

Howland (0°48'N, 176°38'W), Baker (0°13'N, 176°28'W) and Jarvis (0°23'S, 160°01'W) are U.S. territories that were designated as National Wildlife Refuges in July of 1974. Information on the occurrence of nesting is lacking for all three of these locations.

### WAKE ISLAND

Wake (19<sup>0</sup>18'N, 166<sup>0</sup>35'E) is a U.S. territory presently administered by the Air Force. Green turtles occur in adjacent waters, but nesting is not known to take place.

### AMERICAN SAMOA

American Samoa is a U.S. territory with local self-government. The area consists of eight islands which are listed as follows:

Tutuila (14°16'S, 170°45'W) and Aunuu

(14<sup>0</sup>16'S, 170<sup>0</sup>35'W) - A low level of nesting by green and hawksbill turtles sporadically takes place. Manua Group: Tau (14<sup>0</sup>15'S, 169<sup>0</sup>30'W), Ofu (14<sup>0</sup>11'S, 169<sup>0</sup>40'W), and Olosega (14<sup>0</sup>12'S,

169<sup>9</sup>30'W) - A low level of nesting by green and hawksbill turtles is known to occur; however, insufficient information exists for these locations. Rose Atoll (14<sup>9</sup>33'S, 168<sup>9</sup>09'W) - This area

- Rose Atoll (14 33'S, 168 09'W) This area contains two islets (Rose and Sand) and both are used for nesting by green and, to a lesser extent, hawksbill turtles. In July of 1974 the atoll was designated as a National Wildlife Refuge. Insufficient information exists for this location.
- Swains Island (11<sup>0</sup>33'S, 171<sup>0</sup>05'W) Nesting of green and hawksbill turtles is known to occur; however insufficient information exists for this location.

### GUAM

Guam (13<sup>o</sup>27'N, 144<sup>o</sup>45'E) is a U.S. territory with local self-government. A low level of nesting by green, and possibly hawksbill turtles is thought to occur along the south and east shores. Insufficient information exists for the north shore of the island which is under Air Force jurisdiction.

### PHOENIX ISLANDS

Canton and Enderbury, the two northernmost of the eight islands in the Phoenix group, are administered jointly by the United States and the United Kingdom. The U.S. Air Force presently maintains a small facility on Canton. Canton  $(2^{\circ}50'S, 171^{\circ}43'W)$  - Nesting of green

Canton (2 50'S, 171 43'W) - Nesting of green turtles, and possibly other species,



Adult Hawaiian green turtles basking on a beach at Whale-Skate Island, French Frigate Shoals. Photo by the author. occurs principally along the northeast and southwest shores.

Enderbury (308'S, 17104'W) - Nesting of green turtles, and possibly other species, occurs principally along the west and east shores.

Insufficient information exists for both of these locations.

#### NORTHERN MARIANA ISLANDS

This island group is a U.S. common-wealth located from 14°10'N, 145°10'E to 20°30'N, 144°54'E. The area contains 14 islands consisting of Rota, Aquijan, Tinian, Saipan, Farallon de Medinilla, Anatahan, Sarigan, Gaguan, Alamagan, Pagan, Agrihan, Asuncion, Maug, and Farallon de Pajaros. Nesting is not thought to occur on any of these islands except for Rota, where a low level of activity (genus unknown) has been reported.

### U.S. TRUST TERRITORY OF THE PACIFIC ISLANDS

This area encompasses most of Micronesia and consists of approximately 2,200 islands distributed over three million square miles. Although not a U.S. territory (except for the recently-acquired Northern Marianas), the area is nevertheless governed by the U.S. under a United Nations trusteeship. Green and hawksbill turtles are the major species present; however for the most part, definitive information on nesting areas is lacking. Large concentrations of nesting hawksbills are not known to occur. The following locations are thought to be the most important sites of green turtle nesting:

- Palau District Helen's Island (2'59'N, 131<sup>0</sup>49'E) and Merir Island (4<sup>0</sup>19'N, 132<sup>0</sup>19'E)
- Yap District Ulithi (10<sup>°</sup>00'N, 139<sup>°</sup>48'E), Ngulu (8<sup>°</sup>30'N, 137<sup>°</sup>30'E) and Pikelot (8°05'N, 147°38'E)
- Truk District East Fayu (8<sup>°</sup>34'N, 151<sup>°</sup>21'E) Ponape District Oroluk Island (7<sup>°</sup>38'N, 155<sup>°</sup>10'E)
- Marshall Islands District Bikar Island (12<sup>0</sup>13'N, 170<sup>0</sup>05'E) and Jemo Island (10<sup>°</sup>8'N, 169<sup>°</sup>32'E)

#### UNSETTLED PACIFIC CLAIMS

In addition to the areas listed above, the U.S. also has unsettled claims to 23 Pacific islands that are counterclaimed by other countries. These disputed areas include the following:

Counterclaimed by United Kingdom:

- Line Islands Christmas (2°00'N, 157°30'W) Green and hawksbill turtles are reported to occasionally nest; however, insufficient information exists.
- Malden (4 03'S, 154 59'W), Starbuck (5 37'S, 155<sup>5</sup>55'W), Vostok (10<sup>5</sup>55'S, 152<sup>2</sup>23'W), Caroline (15<sup>0</sup>0'S, 150<sup>1</sup>5'W) and Flint (11<sup>2</sup>4'S, 151<sup>4</sup>8'W) - Status of nesting unknown.
- Phoenix Islands Birnie (3<sup>3</sup>35'S, 171<sup>0</sup>32'W) Concentrated nesting occurs along the south shore; however insufficient information exists.
- Sydney (4°28'S, 171°15'W) Nesting occurs along the northwest shore; however insufficient information exists.
- Hull (4 30'S, 172 14'W) Nesting occurs along the south and west shores; however insufficient information exists.
- Gardner (4 40'S, 174 32'W) Nesting occurs along the south shore; however insufficient information exists. McKean (3°35'S, 174°04'W) and Phoenix (3°43'S,
- 171 25'W) Status of nesting unknown.

### Tuvalu (formerly Ellice Islands)

Funafuti (8 31'S, 179 13'E) - Green turtles are reported to occasionally nest; however insufficient information exists. Nukufetau (8 00'S, 178 30'E), Nukulaelae 20'S, 179<sup>5</sup>0'E) and Nurakita (10<sup>5</sup>6'S, (9) 179<sup>0</sup>29'E) - Status of nesting unknown.

Counterclaimed by New Zealand Tokelau Islands Atafu (8<sup>3</sup>33's, 172<sup>°</sup>30'W), Nukunono (9<sup>°</sup>10's, 171<sup>°</sup>55'W) and Fakaofu (9<sup>°</sup>25's, 171<sup>°</sup>15'W) -



Hawksbill turtle, illustrating the elongated beak which is the most distinguishing characteristic of this species. Photo by the author.

Green and, to a lesser extent, hawksbill turtles are reported to nest on these islands; however insufficient information exists.

#### Cook Islands

Cook Islands Penrhyn (900's, 158°00'W), Rakahanga (10°03's, 161°06'W), Manihiki (10°24's, 161 01'W) and Pukapuka (10 53'S, 165 49'W)-Green turtles are known to nest at these locations; however insufficient information exists.

### Acknowledgements

The information presented in this paper was derived from: (1) literature listed in the following section; (2) my own unpublished field observations, and (3) personal communications kindly provided by Mr. and Mrs. J. Bradley, Mr. and Mrs. R. Carroll, Mr. J.B. Giezentanner, Mr. and Mrs. A.L. Howard, Ms. N. Johnson, Mr. and Mrs. B. Johnson, Mr. E. Kridler, Mr. E. Kubo, Mr. and Mrs. G. Means, Captain G.L. Naftel, Mr. and Mrs. J.B. Orr, Dr. C.J. Ralph, Mr. and Mrs. F. Riggs, Mr. P. Sekora, Dr. E. Shallenberger, Dr. S. Swerdloff and Mr. H. Takata.

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# A FLOATING HAWAIIAN STILT NEST

# by Richard A. Coleman

An active nest of the Hawaiian Stilt, or Ae'o (*Himantopus mexicanus knudseni*), with four eggs was found floating at the Punamano unit of James Campbell National Wildlife Refuge, Oahu, on 16 May 1978. The eggs were being incubated by one of the two attending stilts. The nest was made entirely of water hyssop (*Bacopa monnieria* (L.) Wettst.), woven tightly and floating free from the surrounding vegetation, which consisted solely of *Bacopa* (Fig. 1).

Beginning 1 May 1978 the water level at the unit was 10-40 cm above normal throughout the summer. This nest was found floating in 30 cm of water. The nest was not evident on an inspection trip two weeks later.

Another stilt nest with four eggs was found on a large mat of *Bacopa* (10 m diameter) at the Kii unit of the James Campbell National Wildlife Refuge on 29 June 1978. This nest consisted of loosely woven twigs on top of the *Bacopa*.

This is the first known record of a floating stilt nest and the use of *Bacopa* as nesting material or a nest platform.

U.S. Fish and Wildlife Service Honolulu, Hawaii



Fig. 1. Hawaiian Stilt nest floating atop a mat of *Bacopa monnieria* at Punamano, near Kahuku, Oahu. Richard A. Coleman

### AUGUST FIELD TRIP: MANANA ISLAND

The Hawaii Audubon Society held its annual Manana Island (Rabbit Island) trip on August 13, 1978, with 35 members and guests spending the day on the island, observing and photographing seabirds. The party stayed together, circling the island along the crater rim, taking care to minimize disturbance to the nesting seabirds. Personnel from Sea Life Park provided expert transportation to and from the island over relatively calm waters.

The vegetation on Manana was dry and brown, indicating no recent significant rainfall. Sooty Terns had completed their breeding cycle on the island, but Brown Noddies, Bulwer's Petrels, and Wedge-tailed Shearwaters were still nesting. A Red-tailed Tropicbird nest, containing a chick, was found during the visit. Accounts of the animal species seen on Manana during the visit follow.

Sooty Tern. The nesting season of this tern on Manana was completed by the time of the visit. We saw only one apparently fledged immature. Most of the terns were in small groups of about a hundred individuals scattered on the outer slopes and the rocky crater rim. Less than a thousand birds were on the island.

Brown Noddy. Noddies were in the middle of their nesting cycle, with eggs and chicks ranging in age from less than a week old to nearly fledged. Birds were mostly on the rocky outer slopes and crater rim. The HAS party observed a chick pipping out of its egg. Possibly as many as 20,000 noddies were preent.



Brown Noddies on Manana Island, August 13, 1978. Photo by Peter Galloway

Bulwer's Petrel. Party members located four nests in small holes or crevices in the low rock cliffs on the southwestern part of the island. Three of the nests contained downy chicks; two adult petrels, possibly with an egg, were in the fourth nest. There undoubtedly were other nests in the sea cliffs, but a thorough search was not possible.



Hawaii Audubon members filing up the crater's rim on Manana Island during trip. Photo by Peter Galloway

Wedge-tailed Shearwater. We noted shearwater burrows in the sandy portions of the island, mainly in the outer grassy slopes and the crater floor. Adults appeared still to be incubating eggs. We did not hear characteristic shearwater groans and moans. Shearwater numbers probably were in the several thousands.

<u>Red-tailed Tropicbird</u>. The group observed as many as five Red-tailed Tropicbirds flying over the island. The non-red coloration of the bills indicated one or more of the birds were immatures. A Red-tailed Tropicbird nest containing an older chick was discovered on a ledge about 20 feet from the top of a 100-foot sea cliff at the northern end of the island. This is one of the few nesting records for this species on Manana.

Other birds. HAS members observed Redfooted Boobies, Brown Boobies, and Great Frigatebirds flying close to Manana. We also saw an adult Black-crowned Night Heron in the crater, perched on a coconut palm. Two migratory shorebirds, a Wandering Tattler and a Ruddy Turnstone, were on the rocky shoreline.

European Rabbit. Lucky party members caught glimpses of as many as five rabbits on Manana, one on the outer slopes and the rest in the crater. The animals were very wary of humans, dashing for cover at the first sight of the HAS group.

The Society extends its sincere mahalo

to Mr. William L. Thompson, Chairman, Department of Land and Natural Resources, and Mr. Kenji Ego, Director, Division of Fish and Game, for the special consideration and effort in granting permission for the Manana trip.

Lawrence T. Hirai

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# NOMINATING COMMITTEE FOR 1979 OFFICERS

In accordance with the current By-laws, the Hawaii Audubon Society Board of Directors, on September 13, appointed the following members to serve on the Nominating Committee to select candidates for officers for the year 1979: W. Michael Ord (Chairman), c/o Bank of Hawaii, P. O. Box 2900, Honolulu 96848; Dr. Sheila Conant, 3663 Alani Drive, Honolulu 96822; Dr. Carol P. Ralph, 3467 Alani Drive, Honolulu 96822.

The Committee's list of nominees will be presented at the November general meeting and voted on at the annual meeting in December. The list also will be published in the December 'Elepaio. Additional nominations, with the prior consent of the nominee, may be made from the floor at the annual meeting. Members may vote by mail or proxy if unable to attend the annual meeting.

Nominations will be made for the following: President, two Vice-Presidents, Treasurer, Corresponding Secretary, Recording Secretary, and two Directors.

Members wishing to suggest a candidate (including themselves) for a society office are urged to contact one of the Nominating Committee.

# NATURE AND KAENA POINT by Harry Whitten

### (Honolulu Star Bulletin, 21 Aug. 1978)

Kaena Point, the farthest tip of Oahu, looks dry and barren, a characteristic mentioned in Hawaiian chants. Those who have been there know, however, that it is an interesting place because of legends connected with it, archaeology, geology, good fishing in nearby waters, and interesting plants. The features of the area are described in a recently published book, "A Nature Walk to Ka'ena Point" by Edward Arrigoni, a teacher of marine science courses at Kaiser High School (159 pp, Topgallant Publishing Co., Ltd.).

The book is an abridgement of a booklet published in 1977 under funding from the Office of Sea Grant and the Hawaii Committee for the Humanities.

Arrigoni, who also teaches field trip technique courses at the University of Hawaii, has had considerable experience leading adults and children on field trips; he emphsizes safety factors as well as how to make field trips interesting

The book is written in simple language, easy to understand, has sketches by Maria E. Tseu, a few color photographs, and plant drawings from "Flora Hawaiiensis", the monumental series of books by Otto and Isa Degener.

The book tells some of the history of the area, gives some information on geology, archaeology, legends and about marine algae, invertebrates, fish and birds. It describes the three-mile hike to the point, either from Mokuleia or Keawaula (Yokohama Beach) beyond Makaha.

The bulk of the book is taken up with descriptions of coastal plants, their range



Kaena Point, Oahu Ahuimanu Productions

and use. For instance, it describes how ma'o, or Hawaiian cotton, was bred with commerical cotton to get a cotton that could better resist fungus. One of the plants mentioned is the endemic ohai (Sesbania tomentosa) whose range in Oahu is restricted to Kaena Point. The ohai has gray-green leaves and orange-red flowers. It grows into a small tree, stunted by the drying wind and heat, thus becoming a natural bonsai.

#### PUBLICATIONS OF THE SOCIETY

HAWAII'S BIRDS by the Society (1978). This is the best field guide to our birds, and includes colored illustrations of all native and well-established exotic species. \$3.25 plus postage: 48¢ (surface mail); or 67¢ (air mail. Hawaii residents add 13¢ for tax.

FIELD CHECKLIST OF BIRDS OF HAWAII by R. L. Pyle (1976). A pocket-size field card listing 125 species found in Hawaii with space for notes of field trips. (ten or more, 10¢ per copy)

GUIDE TO HAWAIIAN BIRDING by members of the Society and edited by C. J. Ralph(1977). Where to go and some idea of what you are likely to see. For the islands of Kauai, Oahu, Molokai, Maui and Hawaii. 

PRELIMINARY LIST OF THE BIRDS OF HAWAII by R. L. Pyle (1977). An authoritative compilation of all species naturally occurring in Hawaii as well as those introduced by man which are currently established as viable populations. Gives each species' status. (Postpaid) ..... \$1.00

# TYPIST NEEDED - - HELP!!

Despite the valiant efforts of our typists, we need some help in typing the exciting copy for the 'Elepaio. Our new IBM Selectric II makes even the most error prone person turn out perfect copy, using the correction key.

Hawaii Audubon's typewriter is kept at the editor's home in Manoa. If you have an hour or so a month and would like to help, please contact Carol Ralph at 988-6921. We need your help!!

### SURVEYING BIG ISLAND BIRDS AND PLANTS

(Excerpted from the Honolulu Star-Bulletin, August 28, 1978)

### by Harry Whitten

The U.S. Fish and Wildlife completed the third season of a survey of the birds and plants of Big Island forests in September, under the direction of Dr. J. Michael Scott and Dr. Cameron B. Kepler. Most of the field phase for this year has been completed, although some botanical work is still to be done.

This year's survey was started in early May and covered 311,000 acres on the west side of Hawaii, ranging from Hualalai to South Point. A survey was conducted last year on the Hamakua Coast and the previous year at Ka'u.

Eugene Kridler, endangered species coordinator of the service, says that next year survey teams will finish up with work in the Puna and Kohala areas, which will take care of the Big Island.

Kridler has released preliminary results of this summer's survey. He admits the survey teams had hoped to find remaining individuals of species considered extinct, such as the Hawaii 'O'o, Mamo, Kona Finch or Grosbeak Finch, but had no such luck. In recent years a few birds, once considered extinct, have been found on Kauai.

Kridler reported results on some of the endangered species:

Hawaiian Crow or 'Alala, 50 individuals seen or heard; this may indicate 125 to 200 birds, instead of 50 estimated previously. This does not necessarily mean more birds, but the survey is providing a more accurate estimate as it is the first systematic survey of this endangered species. There may be disjunct populations, one being west of the Pohakuloa training area, another on the north and west slopes of Hualalai, another in South Kona, and a fourth in the southwest part of the Ka'u forest.

Hawaii Creeper, widely scattered, usually in 'ohi'a-koa forests. Smaller numbers than in the Hamakua or Ka'u forests. The data must be analyzed before a population estimate may be made, but the number may be in the high hundreds. The creepers were found above the 5,000-foot elevation on Hualalai and in South Kona.

Hawaii 'Akepa numbers were disappointing. The 'akepa's range is more limited than the creeper's; it also was found in 'ohi'a-koa forests on the northwest side of Hualalai. 'Akiapola'au, also in disappointing

numbers, perhaps in the low hundreds. 'Io, or <u>Hawaiian Hawk</u>, far fewer found

than last year in the Hamakua forests. The endangered Hawaiian Bat was found in

low numbers throughout the survey area.

Kridler said the botanists conducted the most systematic sampling survey and collection of plants yet from the dry areas of Hualalai to the mountain rain forest of Kona.

The botanists also found some species in areas where they had not been known to exist; the data obtained will be useful to delineate new or expanded ranges.

One example is an endemic tree fern, a big tall plant which had previously been reported only in windward forests but which was found in central Kona.

Another was a very rare oha, *Cyanea* carlsoni, named for Norman Carlson, for many years land manager for the Bishop Estate on the Big Island. The plant was found in a middle Kona rain forest.

Kridler said that the mauka areas were showing the effects of sheep, goats and livestock, but that pig damage was limited to a few areas and was not as extensive as in the Hamakua forests.

He said mauka-makai clearing of land areas and grazing by hoofed animals are creating islands of forest. In other places the native shrub and tree sapling understory is being converted to exotic grasses, so that forest regeneration is being lost.

Kridler said the information being obtained should be useful in determining the extent and stability of native forest ecosystems and in determining what should be recommended for critical habitat.

The survey teams covered 243 miles of transect runs, about 20 percent more than they covered at Hamakua last year. They made counts at 2,900 stations for a total of 5,800 count periods.

The teams included, from Fish and Wildlife, 10 biologists, 3 transect cutters, 3 botanists, 1 statistician, plus one biologist from the State Fish and Game Division.

The survey received cooperation from the Fish and Game Division, State Forestry Division, U.S. Forest Service and National Park Service.

Kridler said the survey could not have been conducted without the cooperation of private landowners who gave access to their land. They included the Bishop Estate, Sher-

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wood Greenwell, Robert Greenwell, Norman Greenwell, Puu Waawaa Ranch, McCandless Ranch, Kahuku Ranch, Hualalai Ranch, Huehue Ranch, Alfred and John Medeiros, George Shattauer, Melvin Miranda, Ray Wall and Bill Paris.

# OAHU 'O'O IS SUBJECT IN PLAY

The extinct Oahu 'O'o is the 'aumakua of a Hawaiian family torn between choosing life in the forests or staying in the rapidly changing shoreline villages of post-Cook Hawaii in this play, *The 'O'o*, written by Peter Charlot. The drama promises to be an interesting artistic expression of the aloha 'aina we all share. It will be performed at Leeward Community College on October 6,7,8,12, 13,14 and 15. Tickets may be obtained at the theater box office.

Sheila Conant

# NATIVE BIRDS IN SOUTH KONA, HAWAII

### by Nicholas J. Mitchell

While driving through South Kona on August 7, 1978, I stopped in the middle of the Kipahoehoe Forest Reserve and was rather shocked to hear a number of 'Apapane calling. This species was very numerous along with fair numbers of 'Amakihi and an occasional 'Elepaio. The interesting thing was that the posted elevation for the area is 1,500 feet, and the forest is swarming with mosquitoes. This appears contradictory to Dr. Richard Warner's theory on avian malaria and bird pox carried by the mosquito. According to Dr. Warner, no bird of the family Drepanididae can live below 3,000 feet, the mosquitoes' highest limit, because they will be bitten and thus die from one of these two diseases. It appears that these birds thrive well below 3,000 feet, and I would say possibly down to at least 1,000 feet. Of course the native forest is in reasonably good shape, and at present the 'ohi'a-lehua blossoms are very abundant. Perhaps these birds are building up some sort of immunity to these diseases. Another good thing is that this forest reserve is one of the newly nominated natural area reserves which should protect it completely in the future.

I would like to thank Dr. Charles van Riper for his preliminary review of this paper.

> P.O. Box 648 Kealakekua, Hawaii 96750

## PELICANS REACH PALAU!

(From Harry Whitten, Honolulu Star Bulletin, 21 August 1978)

Word comes that the people in Palau have been excited by the mysterious arrival of about 150 Australian Pelicans /*Pelecanus conspicillatus*7, probably by way of New Guinea and the Southwest Islands of the Palau District.

The Palauans had never seen birds as large as these pelicans, which are five feet from tip of bill to end of tail and with wing-spread of seven to eight feet.

Several of the birds were shot, either because people were afraid of the birds or because their size made them good targets.

Radio broadcasts have been made to tell the Palauans that the birds are no threat, that the number of fish they eat are of small consequence and also that a Palau District law protects all bird species, with five exceptions.

There is speculation as to whether the pelicans will fly back to Australia or fly on to other parts of Micronesia, such as Truk or Ponape.

### URGENT ALASKA UPDATE - ACT NOW !

The Senate Energy and Natural Resources Committee has crippled the Alaska National Interest Lands Conservation Act. The House bill (H.R. 39), which was passed after extensive hearings, sought to keep entire ecosystems intact and put them under control of strong management agencies. The Senate committee has fragmented natural units and has proposed division of management among three different agencies in two separate Federal departments. Of 13 National Park units, 12 were reduced in size or given weaker protection than was approved in the House bill. The amount of land to be included within wildlife



refuges was reduced by nearly 40%, and those lands classified as "wilderness areas" were reduced by over 65%. All of the conservation units of H.R. 39 have been affected to some degree.



The only hope for the bill will be on the Senate floor, where strengthening amendments could restore its value. When this issue of the '*Elepaio* went to press, it was not certain when the bill would reach the Senate floor, but we know it will be soon - VERY SOON. Ea h of us can influence the outcome of the Senate debate by writing our senators and urging a committment to passage of a strong Alaska bill. By the time you read this, it will probably be too late to write long letters, so we urge you to send telegrams or mailgrams IMMEDIATELY to Senators Inouye and Matsunaga, at the U.S. Senate, Washington D.C. 20510. If you wish, you can also phone them at (202) 224-3121.

There are four major points to cover in your communication with the Senators. Urge them to:

- take strong leadership in insuring passage of a strong Alaska bill;
- (2) vote for cloture in the event of a filibuster;
- (3) support strengthening amendments to restore acreage, boundaries and wilderness designations; and
- (4) oppose multiple use of national conservation system units.

A similar campaign in California has struck a very responsive note in Washington, and our combined efforts in Hawaii could prove very worthwhile.

> Robert J. Shallenberger Vice-President: Conservation

### DONATIONS

MAHALO NUI LOA to Dennis Abbott, Laurence Nobles and Lester Walls who have generously sent donations to the Society.

# LYON ARBORETUM CLASS ON BIRDS

Sheila Conant and Maile Stemmermann will teach a short course on birds at the Lyon Arboretum in Manoa on Mondays (3:30-5:30 p.m. from October 16 to November 20. The course is designed to acquaint the beginner with the hobby of birdwatching and to help him learn to identify Hawaiian birds. There will be indoor sessions and field trips on Arboretum grounds. For information about tuition and registration, call 988-7378 between 8 and 12 a.m.

# NOTE TO CONTRIBUTORS TO THE 'ELEPAIO

All contributions concerning natural history and conservation are welcomed, especially those pertaining to the Pacific area. The Editorial Committee wishes to encourage material from the Pacific Islands, such as the Trust Territory, Guam, American Samoa, and other areas. Articles on all natural history subjects are solicited.

It would facilitate the processing and review of your contribution if it could be submitted typewritten and double spaced, although this is not a requirement. All articles of a scientific nature are sent out for comments to at least two reviewers familiar with the subject.

To insure proper handling and rapid publishing of your contribution, it should be mailed to the Editor: C.J. Ralph, 3467 Alani Drive, Honolulu, HI 96822.

### ALOHA TO NEW MEMBERS

We welcome the following new members and encourage them to join in our activities.

Joint (National and Hawaii): Eben Dale, Honolulu; Joe Davis, FPO San Francisco; Philip Day, Kailua; Ben Gerald, Kihei; Mr. & Mrs. D. Gray, Honolulu; Hui O Laka (Dr. G. Falshaw), Kekaha; Claire Inouye, Kailua; Lois Kemble, Honolulu; Mrs. David McCauley, Honolulu; Grant Merritt, Honolulu; Ralph Penner(family with Marlee Penner), Waimanalo.

Local Regular: Laura Carter, Richard Gould, Brenda Katekaru, Jennie Peterson, all of Honolulu.

Subscriber: Dennis Abbott, Stratham,NH; William Boesche, Boonton,NJ; Elizabeth and Roger Davis, Dallas,TX; Paul Julian, Boulder,CO; Laurence Nobles, Evanston,IL; Margaret Thornburgh, Spring Valley, CA.

# 

### HAWAII AUDUBON SCHEDULE OF EVENTS

Oct. 8. The *Poamoho Trail* field trip will take us to the area where the Greysided Laughing thrush and 'I'iwi have been seen. Meet at 7 a.m. at the Hawaii State Library on Punchbowl. Bring water, lunch, and be prepared for muddy conditions. Leader: Mike Ord (737-3323).

Oct. 9. Board Meeting at the home of Rob Shallenberger, 169 Kuulei Rd., Kailua, 7 p.m.; all members are welcome.

Oct. 15. Hawaii Island Field Trip to Fish and Game facility at Pohakuloa ---Nene, Koloa, Laysan Duck and 'Alala with Barbara and Ah Fat Lee; also to a Saddle Road kipuka. Meet at Pohakuloa State Park parking lot at 9:30 a.m. or at Mo'oheau Park in Hilo at 8:30. Leaders: Bill and Mae Mull (967-7352).

Oct. 16. Chasing Australian Wildlife, a slide presentation by our entertaining Vice-president, Rob Shallenberger, will feature various animals from a recent trip to our southern neighbor. 7:30 p.m. at the Waikiki Aquarium Auditorium.

### HAWAII AUDUBON EXECUTIVE BOARD

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