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### History of Sea Turtles at Polihua Beach on Northern Lanai

by George H. Balazs

The only site in the main Hawaiian Islands with a well-documented history of nesting sea turtles is Polihua, a mile-long white sand beach on the northern shore of Lanai, just east of Kaena Point (Fig. 1). This is also the only location where the traditional Hawaiian place name is descriptive of eggs on a beach (Poli-hua, literally "eggs in bosom," Pukui et al. 1976). The available information suggests that Polihua was an important breeding site for the Hawaiian green turtle, Chelonia mydas, until the late 1800's or early 1900's. At present, very little nesting has been reported there or anywhere else in the main Hawaiian Islands. Most of the extant nesting by green turtles in Hawaii takes place at French Frigate Shoals, 300 miles to the northwest of Kauai. Green turtles seasonally migrate to this small isolated site from resident coastal foraging pastures throughout the Hawaiian Archipelago (Balazs 1980). Before 1786, French Frigate Shoals appears to have been unknown, and therefore unexploited, by the people of Hawaii. The area is currently protected as a National Wildlife Refuge. The hawksbill, Eretmochelys imbricata, is a second species of sea turtle that nests in the Hawaiian Islands, but solely in the main islands, in small numbers, on a few black sand beaches (Balazs 1978).

There are no reports summarizing the existing knowledge about Polihua and sea turtles, although the significance of the beach has been pointed out in recent publications (Balazs 1975, 1980). In view of the protected status of sea turtles under the U.S. Endangered Species Act, a synthesis of historical information about Polihua and the adjacent coastline of northern Lanai may be helpful to the recovery of the Hawaiian stock. For example, Polihua could prove to be one of the best places in Hawaii to do experimental restocking of green turtles aimed at reestablishing a nesting colony.

### Hawaiian Folklore

Hawaiian folklore relates that Polihua played a key role in the arrival of sea turtles to Hawaiian waters. Beckwith (1970) tells the legend of Aiai, the fish demigod, "marking" a stone at Kaena, the northwestern point of Lanai. This stone then turned into the first Hawaiian sea turtle, thereby explaining why turtles come to nearby Polihua to lay their eggs (see also Pukui et al. 1976). Tabrah (1976) lists part of an ancient Hawaiian chant as "Ua ono o Pele i kana i'ia o ka honu o Polihua," which is translated as "Delighted, the Fire Goddess (Pele) feasts on flesh of turtles from Egg-nest Cape." The lines of this chant are said to "... celebrate the fame of the turtles who lay their eggs at that point of the coast called Polihua" (see also Emerson 1915; Fornander 1919-1920; Emory 1924). A traditional hula based on this ancient chant has recently been composed by Elaine Kaopuiki, a native resident of Lanai.

Pukui (1983) records the Hawaiian proverb "Na honu ne'e o Polihua," translated as "The moving turtles of Polihua."

#### Archaeology

Emory (1924) describes two archaeological sites on the east side of Polihua Valley that are believed to be fishermen's shrines (koa). Except for their proximity to the beach and ocean, no direct evidence was given to relate either of these stone structures to sea turtles. At Kaena-iki, just south of Kaena, Emory (1924) lists a religious stone platform (heiau) said to be one of the largest of its kind on Lanai. Emory (1924) was unable to determine a name for the heiau, since no one had lived in this region of the island for many years.

### Exploitation

A series of Hawaiian newspaper articles by Kahaulelio (1902), later translated into English by Mary K. Pukui, contain information about Polihua from the mid-to late-1800's, following abolition of the Hawaiian "kapu system." The relevant sections of the Kahaulelio (1902) account are as follows:

"Polihua at Lanai was a very famous place for turtle catching. The natives catch them on the sand shore if they need meat. Strangers do too, when they want to visit and see for themselves and if they wanted some to eat. It was a good thing to see this famous fish of the birthplace of my beloved mother who has preceded us yonder when your writer was but a wee child. This was the fish that Pahulu asked the gods not to allow it to have any irritation in its flipper or tail.... Yes, when you get to Polihua to catch turtles, you need all your strength. It is done thus—go to



Figure 1. Aerial view of Polihua taken in July of 1977. Photo by G.H. Balazs

Polihua in the evening and sleep there and in the early morning, in the twilight, draw close to the edge of the clumps of grass adjoining the sands and there you will see large female turtles returning to the sea. Run as fast as you can to reach a turtle and turn the turtle over with your hands with all your might. If you succeed in turning it over, you are going to eat some turtle meat but if you fail, you'll find yourself in the sea. Your writer has been accustomed as he went to sea frequently to seeing turtles gathered close to the reef. At the time that you see the turtles coming up to breathe, paddle softly until you are very close. The turtle will dive downward and then you'll distinguish it clearly. Dive down and catch it, turn it over as quickly as possible and it becomes very light and easy to land on the canoe. This seems to be the method used by most of the people who relish the greenish luau meat in a turtle. Still the easiest way to catch a turtle is by spearing it and if one speared them at Polihua one caught several times four of them."

#### Species Confirmation

A description of turtles at Polihua is also given in Gay (1965) for the early 1900's. Gay (1965) states: "Polihua is located near Kaena Point on the northwest coast of Lanai. It was there that the turtles laid their eggs in the sand above the high-water mark. I have seen turtles that weighed in excess of five hundred pounds on this beach and were capable of carrying three medium-sized persons."

It is important to confirm that the species nesting at Polihua was the green turtle, since this is not clearly stated in the historical literature cited above. Evidence for the green turtle includes the chant quoted by Tabrah (1976) and proverb by Pukui (1983) referring to "honu", the green turtle, as opposed to "honu'ea", the hawksbill (Pukui and Elbert 1971). In addition, Kahaulelio (1902) and Gay (1965) mentioned the large size of the turtles at Polihua. This description is consistent with the known size of the adult green turtle, but not the smaller adult hawksbill. Kalaulelio (1902) also said that the turtles at Polihua were captured for food, a practice not usually carried out in Hawaii with the hawksbill since this species was considered poisonous (Malo 1951).

### Current Information

Since 1972, I have been able to gather various unpublished material about Polihua through personal correspondence and interviews with several longtime residents of Lanai. The names of these informants are kept anonymous herein to help insure a continuing flow of information, and also because some aspects may be culturally sensitive. The individuals involved include native Hawaiians, as well as other reliable members of the Lanai community. The following information comes from these sources.

The stone image of a "turtle god" is reported to be at Polihua. At one time, the exact location was known by at least one elderly person, but windblown sand has apparently covered up the stone. Efforts have been made to locate the stone in recent years since shifting sand may periodically expose it. The success of these efforts is unknown. There are also reports of a turtle petroglyph located at Polihua, on or near a rocky point at the east end of the beach. Sand was also reported to shift back and forth over this site. It is possible that the stone "turtle god" and the turtle petroglyph are, in fact, one and the same. However, stone "fish gods" (kuula) in the Hawaiian culture usually consisted of a smooth upright movable stone. In contrast, petroglyphs were mostly inscribed on large boulders or other stationary rock. Two of the best known Hawaiian petroglyphs depicting sea turtles appear on a boulder at Luahiwa in the interior of Lanai (Emory 1924).

Two persons recalled from memory the catching of turtles on Polihua Beach during the 1920's. The sharp decline in nesting during subsequent years has been attributed to the construction of roads, increases in traffic to the north shore, and easier access for taking turtles on the beach. A dirt road now leads directly to Polihua. Other possible adverse factors to nesting, which have also been speculated upon, include changes in coastal vegetation and heavy erosion at higher elevations (Balazs 1975).



Adult female Hawaiian green turtle.

Photo by G.H. Balazs

Known or attempted nesting during recent years are listed below. It is possible that some of these reports involve turtles hauled out to bask, rather than to nest. Terrestrial basking is common in the Northwestern Hawaiian Islands, especially at French Frigate Shoals, but rare in the main islands of Hawaii and most other areas of the world (Whittow and Balazs 1982). It should also be noted that several unpublished sightings exist for the Hawaiian monk seal, *Monachus schauinslandi*, both ashore and in the coastal waters of northern Lanai.

- -In 1954, a "turtle eggs nest" was reportedly seen at Polihua "behind a large sand dune near a keawe tree."
- -In 1968, a turtle was seen "up on a north shore beach."
- -In 1971, a turtle was seen right at the water's edge at Polihua.
- —On November 23, 1977 at 1000 h, two large green turtles were seen mating in the sea off Laehi, on the northeastern shore of Lanai.
- —On July 31, 1981 at 1300 h, two "very large turtles" were seen at Polihua "20-30 yards up the beach" near some boulders. No eggs were seen. The observer tried to turn the turtles over, but they proved to be too heavy. "Lots of turtles" were seen offshore. No signs of turtle tracks or digging could be found when the site was examined several days later. This, again, may have been due to the effects of windblown sand. It should be noted that the basking behavior previously mentioned almost always occurs on shore within a few yards of the water, and never 20-30 yards inland.

- —In the spring of 1983, a large turtle was seen during the early morning hours returning to the water at the west end of Polihua. The turtle's tracks were traced up the beach to a mound of sand (presumably a nesting site). The area was left undisturbed by the observer. A subsequent report indicated that a helicopter service from Maui used this same area of the beach to land tourists. The person who communicated the above information stated he is "convinced" that turtles are again nesting on Lanai.
- -During early August of 1983, a large turtle was seen during the daytime in the intertidal shoreline at Awalua, about 2 miles east of Polihua. The observer left the site to tell a nearby companion, but the turtle was gone when they returned.

#### Foraging Pastures

Rich coastal foraging pastures for green turtles are believed to occur along the northern and northeastern shores of Lanai. Gay (1965) mentioned that when he lived on Lanai, "turtles were plentiful along the windward side of the island." As quoted earlier, Kahaulelio (1902) said that: "... if one speared them at Polihua one caught several times four of them."

During the 1960's and early 1970's, green turtles were intensively captured off Lanai and Molokai for the restaurant trade and other commercial markets on Maui. Persons involved in this fishery commuted in small boats between Maui and the mostly remote coastal areas of Lanai. In 1968, a fisherman wrote on his monthly commercial catch report: "This area in 1948-1950 I used to catch at least 100 in 4 to 5 days fishing—for some reason there are no turtles there now." Another fisherman recently stated in a telephone interview that turtles caught during past years off Molokai could be recognized as having been ashore on Lanai's beaches by the tar stains on their undersurfaces.

Major algal food sources used by green turtles in Lanai's foraging pastures consist of *Amansia glomerata, Acanthophora spicifera,* and *Sargassum polyphyllum* (sometimes called "limu honu"). The sea grass, *Halophila hawaiiana,* has also been identified from the stomach of a 96.5-cm adult female green turtle speared by a fisherman in November 1978. This same animal was found to have large pieces of black and white plastic bags packed throughout its intestines (Balazs 1980).

On October 28, 1982, divers from Molokai visited Laewahie on Lanai's northern shore. An aggregation of green turtles was seen in about 6 m of water just west of a prominent ferroconcrete shipwreck. One of the turtles, a 56.5 cm juvenile, was captured by hand while it was sleeping under a ledge. The turtle was double tagged (No. 6569, 6570) and released (Bill Puleloa, pers. commun.).

The coastal foraging pastures of northern Lanai appear to be attractive habitat for the recruitment of young green turtles. For example, a 9-month old, 33-cm green turtle reared in captivity and released in 1974 off Oahu was speared 11 months later off northern Lanai. It was found with a group of other similar sized turtles. When the fisherman swam into view, all of the turtles fled except the captive-reared one (Balazs 1980).

#### Recommendations

No systematic surveys have been undertaken to ascertain the present status of sea turtles on the beach or in nearshore habitat of Polihua and the adjacent coastline. The effect of shifting sands from normally brisk tradewinds may be masking a greater level of nesting than is now being reported from chance sightings. Periodic nighttime searches by a trained observer need to be made from May through August to accurately quantify nesting activity. A series of scuba diving surveys should be carried out to gain a better understanding of the distribution and numbers of turtles dependent upon northern Lanai's nearshore habitat.

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### Seabird Survey of the Lana'i Pali Coast

by Ronald L. Walker, Lawrence T. Hirai, and David H. Woodside

The Island of Lana'i is the sixth largest of the Hawaiian Islands, with a shoreline that Wentworth (1925) has divided into a Beach Coast along the north and east half and a Pali Coast on the south and west from Kama-iki Point to Ka-'ena Point (Fig. 1). The Beach Coast is low and flat, with broad expanses of alluvium and beaches and no appreciable sea cliffs. The Pali Coast, on the other hand, consists of bays and headlands, sea cliffs, and offshore islets. Relatively low sea bluffs and rocky bays form the coastline from Manele Bay to Palaoa Point, with the only significant stretch of sandy beach being at Hulopo'e Bay. Northwestward of Palaoa Point the sea cliffs are almost continuous for three miles and reach heights greater than 1,000 feet at Kaholo Pali. Sea cliffs are found for seven more miles northward from Kaumalapau Harbor, but are less spectacular; only a few hundred feet high and interrupted by low sea bluffs and bays.

Hirai (1978) recorded a number of seabird species on Lana'i in 1975 and 1976, and felt that several species probably breed along this Pali Coast. However, he was unable to cover the entire coastline or land and census the birdlife on the offshore islets. Except for his record, there have been no publications documenting the status of seabirds on the coast or offshore islets (Fefer, pers. comm. 1984).

In May and August, 1979, we conducted surveys of the seabirds found from Manele Bay to the Nanahoa area and landed on some of the offshore islets and sea stacks. We were transported by a 20-foot long open boat that usually stayed within 0.25 mile of the coastline. The seas were calm on the survey dates, facilitating landings on the islets and observations of the seabirds.

#### SURVEY ITINERARIES

On 2 May 1979, Woodside and Hirai left Kaumalapau Harbor at 12:00 noon, proceeded northward along the coast to Nanahoa, returned southward to Palaoa Point, eastward to Manele Bay, and then back to the Harbor by 3:30 p.m. We landed and searched for nesting seabirds on Ki'ei, Mokunaio, and Po'opo'o Islets and visually examined from the boat Pu'u Pehe Islet, the sea stacks at Nanahoa, and several sea caves (Fig. 1).

Walker and Hirai conducted the second field trip on 22 and 23



Figure 1. Map of Lana'i, showing survey routes.

By R.L. Walker.





August 1979. On the first day we covered the coastline between Kaumalapau Harbor and the Nanahoa area from 1:153:15 p.m., landing on Ki'ei Islet and the outermost sea stack at Nanahoa. On the second day we censused the shoreline from Manele Bay to Kaumalapau Harbor, starting at 9:20 a.m. and ending at 12:00 noon, with a landing on Po'opo'o Islet and visual surveys of Pu'u Pehe and Moku-naio Islets.

### SUMMARY FINDINGS

We found Wedge-tailed Shearwaters (Puffinus pacificus chlororhynchus) and Bulwer's Petrels (Bulweria bulwerii) nesting on the off-shore islets and observed Red-tailed (Phaethon rubricauda rothschildi) and White-tailed (P. lepturus dorotheae) Tropicbirds flying near, and probably nesting in, the high sea cliffs. Black, or Hawaiian, Noddies (Anous minutus melanogenys) were seen along the shoreline and at the entrance to a sea cave at the foot of the bluffs. Our findings are discussed below in more detail.

#### Offshore Islets and Sea Stacks

Pu'u Pehe, Po'opo'o and Ki'ei Islets provided nesting habitat for Wedge-tailed Shearwaters and Bulwer's Petrels. Other smaller islets appeared too low in elevation for use, being periodically covered by storm waves. We saw no evidence of seabirds on the sea stacks at Nanahoa, although breeding species may be utilizing the grassy, flat tops. During the May survey we did not find Bulwer's Petrels on the offshore islets and noted only a few Wedge-tailed Shearwater adults in burrows but without eggs or chicks. In August, burrows contained adult shearwaters on eggs or downy chicks. In accessible nest chambers, we located downy Bulwer's petrel chicks but no adult birds.

Pu'u Pehe Islet or "Sweetheart Rock" (Lit.: Pehe's Hill) (Area: 1.1 acres; Ht.: 110 feet) (Fig. 2). We did not land on this sea stack, located off the point between Manele and Hulopo'e Bays, but visual inspections on both surveys revealed significant deposits of guano on the flat, grass-covered top. Peter Connally (in Pyle, 1978) recovered the remains of a Bulwer's Petrel near this point in March 1977 and Hirai (1978) observed Wedge-tailed Shearwaters circling and landing on Pu'u Pehe Islet in 1976. Hirai also discovered two shearwater burrows, with adults incubating single eggs, on the Lana'i cliffs facing this sea stack on 14 July 1978. Walker and Hirai likewise located two nests, one with a downy shearwater chick and the other with a probably abandoned egg, during a search of these same bluffs on 22 August 1979. This strongly suggests that Pu'u Pehe Islet and the nearby Lana'i sea cliffs are being utilized for nesting by shearwaters and probably Bulwer's Petrels.

Po'opo'o Islet (Lit.: Hollow) (Area: 1.6 acres; Ht.: 40 feet) (Fig. 3). This is the largest of the Pali Coast islets, located about two miles west of Hulopo'e Bay. On our August survey of the sandy and grassy top we probably located most of the active shearwater burrows, a total of 61 sites containing 18 eggs and 43 chicks. Because Bulwer's Petrels often utilize chambers deep in crevices or holes, we found only nine sites with chicks and likely overlooked many other active nests. We estimated that from 50 to 75 shearwater and 25 to 35 petrel pairs breed on Po'opo'o, the most important of the Lana'i offshore islets for these nesting seabirds.

Ki'ei Islet (Lit.: Peer) (Area: 0.1 acre, Ht.: 25 feet) (Fig. 4). This small islet is usually shown on maps as connected at the northern entrance to Ki'ei Bay, but it is actually separated by 50 feet of ocean. During the August survey, we located six Wedge-tailed Shearwater burrows containing one egg and five chicks, and two Bulwer's Petrel chambers, with chicks. Besides containing small nesting populations of shearwater and petrels, we found guano deposits characteristic of Brown Boobies (Sula leucogaster plotus) on both surveys. Because we did not find adult boobies, their eggs, or young, this islet is probably used only as a roosting site by this seabird.

### Sea Cliffs and Sea Caves

Lana'i is one of the few locales in the main Hawaiian Islands where both Red-tailed and White-tailed Tropicbirds occur together. We observed both species flying back and forth along the three-mile stretch of coastline between Kaumalapau Harbor and Nanahoa and at Ka-holo Pali (Fig. 5). These species presumably nest in holes or on ledges several hundred feet above sea level. On the May survey we saw two White-tailed and 19 Red-tailed Tropicbirds; on the August trip we counted four to nine Whitetailed and did not positively identify Red-tailed Tropicbirds. These observations are similar to those of Hirai (1978) and possibly indicate that the breeding season of the Red-tailed Tropicbird occurs earlier in the year or is shorter in length than that of the White-tailed Tropicbird. Kepler (pers. comm. 1984) suggests there may be a reasonably synchronized breeding season for the Red-



Figure 4. Ki'ei Islet, viewed from the south and with Lana'i in the background.

#### Photo by L.T. Hirai.

tailed Tropicbird based on a few records of juveniles (Lahaina, 7/28/83 and Manele, 8/1/83) reported to him. We estimated that the breeding populations along the Pali Coast consisted of ten pairs of White-tailed and eight pairs of Red-tailed Tropicbirds.

Woodside conducted field work on Lana'i, dating back to the early 1950's. He suggests that the Red-tailed Tropicbird population has increased significantly since then, with a possible decline in the White-tailed Tropicbird population.

A number of sea caves provide a few hundred Black Noddies with roosting and/or nesting habitat, although we found scant evidence of such activities. On the May survey we observed two noddies sitting on the guano-stained ledges at the entrance to Kolokolo Cave. However, we did not see other noddies in the sea cave when the boat was steered close to the surface. Hirai(1978) has observed as many as 30 noddies at one time fishing in the nearby waters or resting and preening themselves on the ledges to the cave entrance.

### DISCUSSION

Except for harbor and beach facilities at Kaumalapau and Manele-Hulopo'e, the Pali Coast of Lana'i is largely undeveloped.



Figure 3. Po'opo'o Islet, viewed from the southwest and with Lana'i in the left background. Photo by R.L. Walker.



Figure 5. Ka-holo Pali, viewed from Moku-naio and toward Kaumalapau Harbor.

Photo by L.T. Hirai.

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### MAY MEETING REPORT

At the 20 May 1985 general meeting, principal speaker Peter Stine, one of Hawaii Audubon's vice presidents, gave an illustrated (slide) narration on "Alligators in Everglades National Park". Currently Stine is an Endangered Species Biologist in Honolulu, but in the past he has worked for the National Park system on a study of Black Bears, and spent two years on an ecology study of alligators in Everglades National Park.

His slide presentation/talk began with pictures and digrams of the wetlands of the Everglades, and especially Sharks Slew, where many of the alligators live. The major problem has been flooding, so that the Army Corps of Engineers has built many, criss-crossing canals to channel and otherwise control the waters during the wet season and periods of heavy rainfall. The wet season is from May to December, and the dry season from the winter through April. Water in Sharks Slew ranges from one ft. to two-to-three ft. in depth, punctuated by tree islands with hardwood trees. Tree islands and trees are oriented in the direction of the flow of water.

Alligators are important to the total ecosystem of the Everglades, as they dig holes, varying from five ft. to twenty ft. in diameter. While only a single alligator occupies each hole, it serves as a refuge, especially during the dry season, for many birds, turtles, insects, small fish, and especially wading birds for which the Everglades are famous.

weuge-talled Sileal water.

Photo by R.L. Walker.

At present it is utilized for fishing activities and adjacent areas are managed for public and private hunting. These activities apparently have not had a significant adverse effect on the seabird populations. Future plans for the area are unclear. It has been suggested that the land adjacent to the coast could be used for resort and subdivision developments or for diversified agriculture.

Although the diversity and numbers of seabirds are not as impressive as other places in Hawaii, when related to the geological and natural beauty of the area the seabirds contribute significantly to the uniqueness of the Lana'i Pali Coast. Proposals for the possible uses of the Pali Coast should consider the potential impacts on the seabird species and the scenic beauty of the area. As a result of these surveys, Pu'u Pehe, Po'opo'o, Moku-naio, and Nanahoa Islets were included in the Hawaii State Seabird Sanctuary on November 28, 1981. Protection against camping, introducing alien plants or animals, or otherwise harming the habitat at these islets is thus afforded by Title 13, Chapter 125 of Hawaii State Department of Land and Natural Resources rules.

### SUMMARY

Our findings show that at least four, and probably five, species of seabirds regularly nest along this coastline. We found the Ki'ei, Po'opo'o, and Pu'u Pehe Islets provided suitable nesting habitat for small populations of Wedge-tailed Shearwaters and Bulwer's Petrels, with Po'opo'o Islet being the most important of the offshore islets. Stretches of the high sea cliffs were used by both Red-tailed and White-tailed Tropicbirds, and sea caves were probably utilized by Hawaiian Noddies. The seabird populations contribute to the uniqueness of the Pali Coast of Lana'i.

#### ACKNOWLEDGMENTS

John Tullis was our pilot on the first survey trip and Ron McOmber on the second. We thank them for their expert seamanship and good company. We are also greatly indebted to Mr. McOmber for the generous use of his boat on both trips. We wish to thank Peter Connally, William Kwon, Albert Morita, Sam Shin, and Patrick Conant for their assistance and warm Lana'i aloha. Ms. Betty Stracke and Mrs. Charlotte Walker graciously provided typing and proofreading services.

The July 1978 Lana'i trip was partially funded by a grant from the Hawaii Audubon Society to Hirai and Charles van Riper, III. The two surveys in 1979 were conducted under the auspices of the Hawaii Division of Fish and Game.



Interesting slides depicted apple snail- eating herons, Great and Little Blue Herons, White Ibis, Great Egrets, Louisiana Herons, an Anhinga (shown drying its spread wings after diving for food), Purple and Common Gallinules, coots, and Brown Pelicans. Among mammals pictured there was a small subspecies of Whitetailed Deer (the Florida Key Deer), Raccoons, and Manatees (off the coast of Florida). Spiders, crickets, and pig frogs abound, the latter two being very noisy. Invertebrates included tree snails and 2" long grasshoppers.

Stine also made a comparison with the American Crocodile, a very endangered species with perhaps only 200 in the southern part of the Everglades, which is distinguished from the alligator by a longer, slimmer snout. In contrast, the alligator has made a comeback and is in some places no longer listed as endangered.

Telemetry and radio collars have been used to study alligators. Willow "heads" are used for their nests, where 25 to 30 eggs, 3" long, are laid and covered by vegetation. A threat to alligators, which range from New Jersey to Texas, has been the poachers, many using air boats. These boats run at night without lights, and are difficult to identify. They are also, with or without poachers, a danger to the Everglades, since they are frequently used as pleasure boats, for fishing, and other purposes, but leave deep tracks which can last for decades.

Fires, Stine pointed out, are natural, and part of the Florida ecosystem, especially during the dry season. In conclusion, he stressed the great problem of regulating water flow, and controlling torrential rains; the natural flow has been greatly disturbed and inhibited (e.g. with man-made canals), all in attempts to balance the water and ecology system. A question and answer period followed his presentation.

Betty L. Johnson

### HAWAII WILDLIFE PLAN AVAILABLE

The "Hawai'i Wildlife Plan" has become available for distribution by the State of Hawaii, the Division of Forestry and Wildlife. Single copies of this 113 page publication are available by request from: Ronald L. Walker, Division of Forestry and Wildlife, 1151 Punchbowl St., Honolulu, Hawaii 96813. The publication is primarily suitable for libraries, conservation and hunting groups, legislators, agency personnel, and biologists. There is no charge for the publication.

### PAIKO LAGOON FIELD TRIP REPORT

### -MAY 1985-

On the Sunday, May 12 HAS field trip to Paiko Lagoon, 14 participants sighted a Hawaiian Stilt, Ruddy Turnstones, Wandering Tattlers and a Golden-Plover. Since it was the end of the breeding season, there were few birds. Also found were tracks of a Black-Crowned Night-Heron in the mud flats near the mangrove. Non-bird sightings included mongoose tracks along the water's edge, an old tire with numerous opae, and sand crabs.

The surprise find of the day was a handbag pulled from the water by a participant. Upon examination it contained a large amount of cash. The participant who found it was given the responsibility of taking it to the police station.

Suzan Harada

## TWO MORE HAWAIIAN PLANTS PROPOSED FOR ENDANGERED LIST

During March, two more Hawaiian plants were proposed by the U.S. Fish and Wildlife Service (USFWS) to be added to the federal list of endangered species; these are the Mauna Kea silversword, or 'ahinahina (Argyroxiphium sandwicense var. sandwicense) and the Lanai sandalwood, or 'iliahi (Santalum freycinetianum var. lanaiense). Both of these species are extremely rare, numbering 35 and 39 known individual plants, respectively.

One of the primary causes for the Mauna Kea silversword decline is believed to have been the introduction of nonnative goats, sheep, pigs, cattle, and horses in the late 1700's; these ungulates altered and degraded habitat by trampling and browsing, and dispersed nonnative, competing plant species.

The sandalwood's decline is also caused by habitat modification and degredation, although the sandalwood trade and export from 1790 to 1820 likely had a negative impact on its numbers. Introduced rats consume its fruits and seeds, and appear to have halted natural reproduction of this species.

There are currently only eleven Hawaiian plant species on the federal endangered species list.

For more information on these two proposed listings, see the March 6, 1985 Federal Register or the April 1985 (Vol. X, No. 4) issue of the Endangered Species Technical Bulletin published by the USFWS.

Based on the article in the April 1985 Endangered Species Technical Bulletin

# JULY FIELD TRIP:

### HONOLULU ZOO

The Sunday, 14 July field trip will be to visit the Bird Section of the Honolulu Zoo at Kapiolani Park. The Zoo's avian specialist, Peter Luscomb, will conduct the "behind the scenes" tour.

The Zoo and vicinity also has a good representation of the nonnative birds which have become established on Oahu.

Participants should meet at 7:30 am at the State Library on Punchbowl St. in Honolulu or at 8:00 am at the <u>front</u> entrance of the Honolulu Zoo.

This promises to be an interesting and enjoyable field trip! Call Suzan Harada at 845-6704 or Ray Tabata at 948-8191 if you need more information.

### VOLUNTEERS NEEDED

#### CONSERVATION ASSISTANTS

Person(s) needed to assist Conservation Committee by gathering needed information. Volunteer(s) would attend public hearings, obtain copies of public documents, etc., as his/her time permits. This is a good opportunity to greatly assist the conservation activities of the Hawaii Audubon Society and to observe the workings of government. No experience necessary. Retirees welcome. Interested? Contact Wayne Gagne (847-3511 extension 154) or Carl Christensen (373-3457).

### TYPISTS/PROOFREADERS

Typists and proofreaders are needed for the monthly production of the 'Elepaio. The time required can be whatever you can donateas little as one or two hours per month. Free cookies! Call Marie Morin (533-7530) or Peter Galloway (531-2490).

#### MAILING ASSISTANTS

Volunteers are needed to help with the monthly mailing of '*Elepaio* (usually on the last Sunday of each month). No experience necessary. If you can help, please call Alan Ziegler (247-5318).

### ALOHA TO NEW MEMBERS

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

New Local Members: William Adams, Kailua, HI; Donald Bradshaw, Kobe, Japan; Mary Miho Finley, Volcano, HI; Keith Fukumoto, Honolulu, HI; Daniel D. Gibson, Fairbanks, AK; John D. Gunther, Honolulu, HI; Loren R. Hays, Huntington Beach, CA; C.C. Herzfeld, San Diego, CA; Ann Hitch, Kaneohe, HI; Margaret B. Hodge, Kailua, HI; James F. Hunter, Tasmania, Australia; Rodney King, Fairbanks, AK; Cynthia Krakowski, Honolulu, HI; Patricia Lee, Honolulu, HI; Alan J. Littau, New York, NY; Diane Little, Honolulu, HI; Arthur A. McCornack, Captain Cook, HI; Jeanne R. Morris, Lansdowne, PA; Dana Newman, Laie, HI; Carol S. Okamura, Minneapolis, MN; Richard Pang, Waimanalo, HI; Joshua Rasor, Waimanalo, HI; Francis A. Ritchey, Kailua, HI; Barbara Roland, Oxnard, CA; Clarence Rosling, Jr., Springfield, OR; Peter Russell, Kaneohe, HI; David Seals, Sunnyvale, CA; Michael R. Sherwood, San Francisco, CA; Saniye Schwalbaum, Honolulu, HI; Maxi Tanaka, Honolulu, HI; Katie Vaughan, Newport Beach, CA; Nancy J. Werner, Newport Beach, CA; Dennis Wysong, Kailua, HI.

### JULY PROGRAM:

### TROPICAL STUDIES IN COSTA RICA

The 15 July (Monday) general meeting will feature a free talk and excellent slide show program by Michael Buck on "Tropical Studies in Costa Rica."

Michael has just returned from a leaveof-absence during which he obtained a Master's degree in the Forestry program at the University of Florida. Part of his time was spent in Costa Rica studying the complex, tropical ecosystem.

The meeting will be held at McCully-Moiliili Library at 2211 S. King St., Honolulu, beginning at 7:30 pm. Everyone is welcome to attend, bring a friend!

### HELP WITH 'ELEPAIO

The August issue of the '*Elepaio* will be put together 20 July (Sat.) at 1415 Victoria St. beginning at noon. Call Marie at 533-7530. Help is always needed and welcome! Proofreaders and typists are especially needed to help out prior to the 20th, even if you have only an hour or two to share.

### July 1985

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Individual\$	30.00
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installments)	150.00

All Local Memberships and Subscriptions are for a calendar year January through December. New Local Members and late-renewing members who send in dues through September may obtain all previous issues of 'Elepaio in that calendar year, upon request and reimbursement to the Society for mailing costs. Dues received after September are applied to membership extended through the following calendar year, but do not include previous issues of 'Elepaio in the current year.

### July 1985

- CALENDAR OF EVENTS
  THERE IS NO BOARD MEETING SCHEDULED FOR JULY DUE TO LACK OF A QUORUM.
  July 14 (Sun.) Field trip to Honolulu Zoo, see page 8 of this issue for details. Call Ray at 988-2958 or Juzan at 845-6704.
  July 15 (Mon.) General meeting at McCully-Moiliili Libbrary with Mike Buck on "Tropical Studies in Costa Rica" 2211 S. King St., meeting begins at 7:30 pm. See page 8.

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