POLIHUA - LANAI
1970s - 1980s G.H. BALAZS FILE

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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

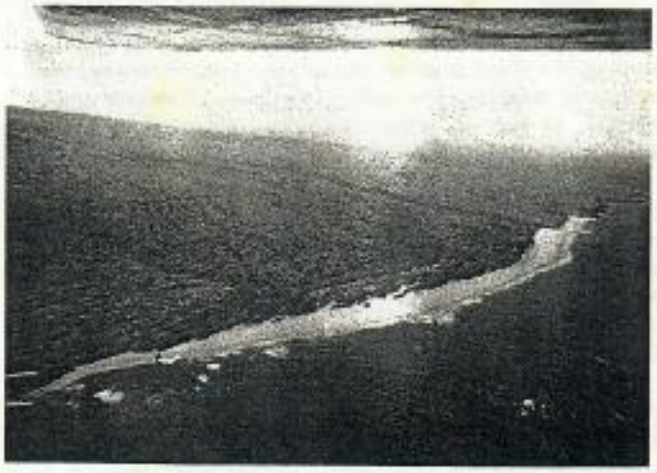


Figure 1. Aerial view of Polihua taken in July of 1977.
Photo by G.H. Balazs

> 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."

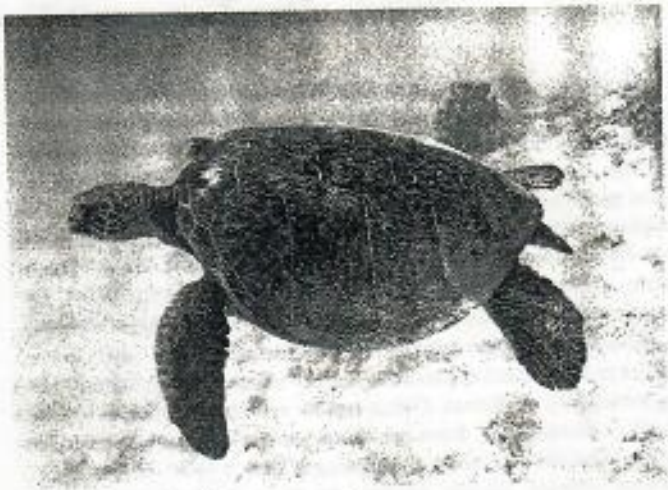
It is important to confirm that the species nesting at Polihua was the green turtle, since this is not clearly stated in the historical literature cited above. Evidence for the green turtle includes the chant quoted by Tabrah (1976) and proverb by Pukui (1983) referring to "honu", the green turtle, as 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.

Figure 2. Pu'u Pehe Islet, viewed from Lana'i.

Photo 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 White-tailed 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-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.

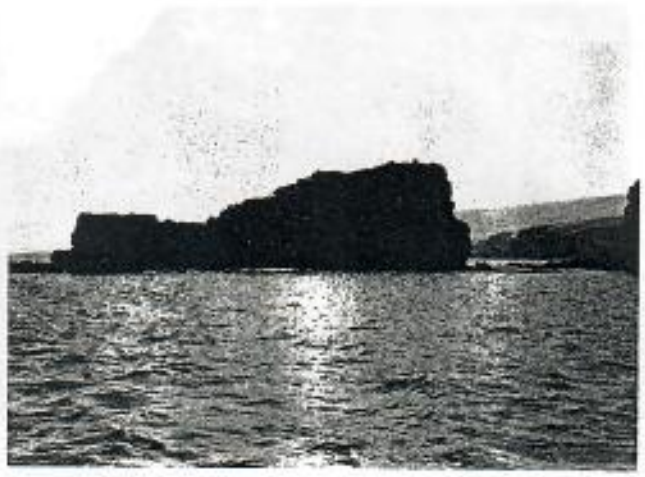

Figure 4. Ki'ei Islet, viewed from the south and with Lana'i in the background.

Photo by L. T. Hirai.

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.

Wedge-tailed Shearwater.

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

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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.

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 White-tailed 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 hand-bag 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 front 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 Gagné (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 donate- as 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 P. 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 leave-of-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.

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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.

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 Suzan at 845-6704.

July 15 (Mon.) General meeting at McCully-Moiliili Library 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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HAWAII AUDUBON SOCIETY

Southwest Fisheries Center Administrative Report H-84-15

HISTORY OF SEA TURTLES AT PŌLIHUA BEACH, NORTHERN LANAI

George H. Balazs
Southwest Fisheries Center Honolulu Laboratory
National Marine Fisheries Service, NOAA
Honolulu, Hawaii 96812

October 1984

This report is used to insure prompt dissemination of preliminary results, interim reports, and special studies to the scientific community. Contact the author if you wish to cite or reproduce this material.

INTRODUCTION

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 (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 (Fig. 1). 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 volcanic 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.

REVIEW OF HISTORICAL LITERATURE

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 (Fig. 1). 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). Pukui (1983) records the Hawaiian proverb "Na honu ne'e o Polihua," translated as "The moving turtles of Polihua."

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.

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 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, step with your left foot on the left flipper of the 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."

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."

VERIFICATION OF SPECIES

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

- In 1971, a turtle was seen right at the water's edge at Polihua.

- On November 23, 1977 at 1000, two large green turtles were seen mating in the sea off Laehi Point, on the northeastern shore of Lanai (Fig. 1).

- On July 31, 1981 at 1300, 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 and led 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.

COASTAL 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 for 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."

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 (Fig. 1). 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.[1]

The coastal foraging pastures of northern Lanai appear to be an 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.

---

[1] Bill Puleloa, Division of Aquatic Resources, Department of Land and Natural Resources, State of Hawaii, Kaunakakai, Molokai, pers. commun., 1982.

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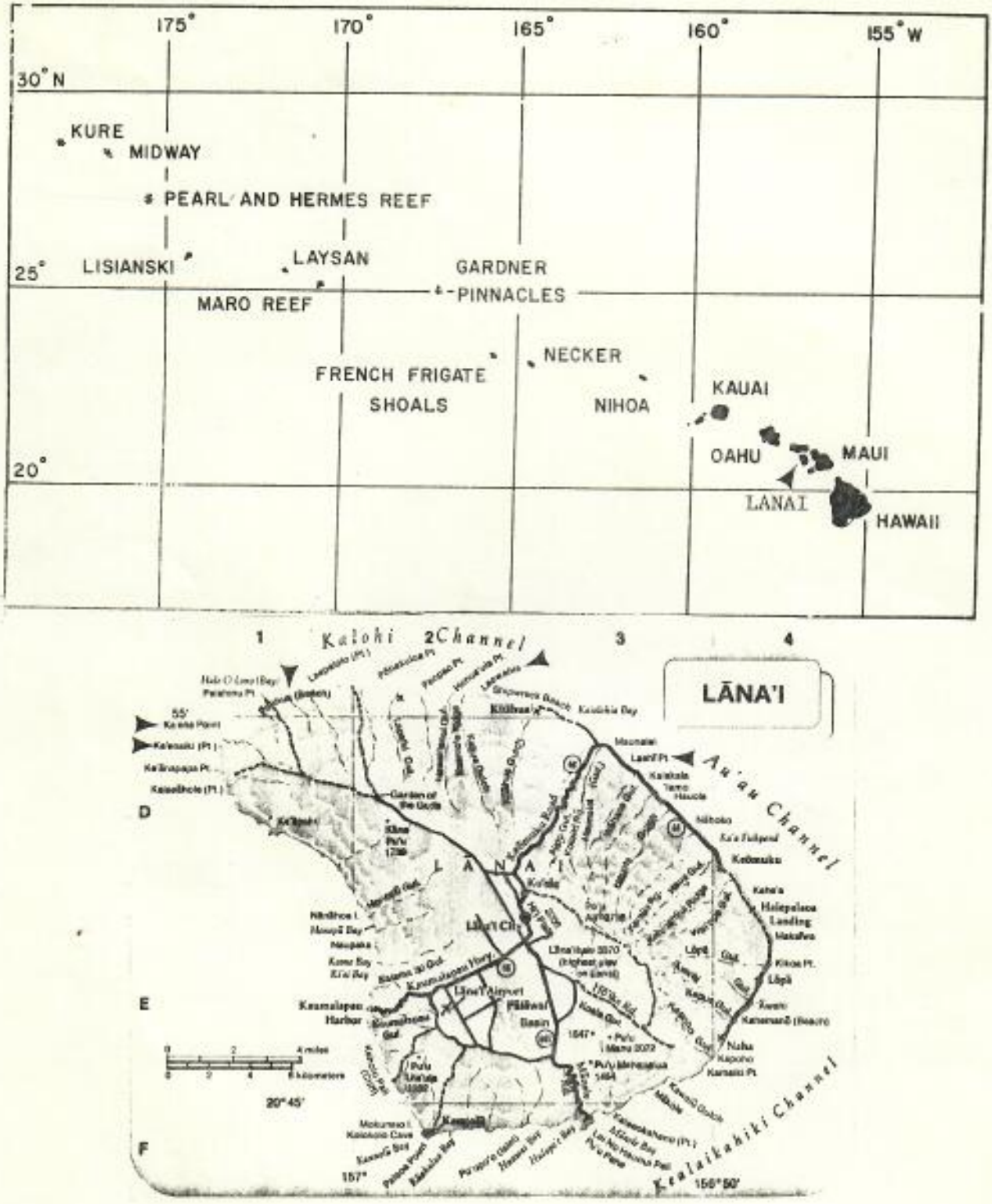


Figure 1.--The Hawaiian Archipelago and an enlarged inset of Lanai (Armstrong 1973).

Sept. 14, 1973

Dear Lin & George,

We enjoyed your short visit with us and Deane, as usual, whenever a guest leaves, feels so downhearted and lonesome. She says the house gets too quiet.

George, please forgive us for not even noticing the author of the article that appeared in the Audobon Society magazine! That evening, when we settled down and really started to read the articles you left with us - well, I was reading a quarter of the page down & I thought to myself, my goodness, this certainly is interesting & I wonder who wrote it [redacted] Then I looked up under the title & almost fell over. I forgot Lin had told us that you had written a paper on your study of the green turtle. Boy, you sure put a lot of work in that paper, huh? I gave it to Sol Kaopuiki, who gave me the info

that I passed along to you, and he was fascinated (sp.) with it - he read them all & gave it to Elaine Kaguiki, who still has it. As soon as she's finished I'll send it back.

Sol said that after reading it he went to his Father's house & talked to him about the turtles. He said that ~~he~~ ~~they~~ it never occurred to them to look for the turtle eggs - they only saw the turtles. Sol told me that in 1954 he actually saw a turtle egg nest in Polihua - behind the large sand dune near the keawe trees. I told him that you found no trace of turtles nesting on Polihua beach, tho.

His father told him tho of the turtle god (stone ~~god~~ God) that they saw - he knows the exact location of it but that it must be covered with sand by now. Sol says that one day when he has the time he's going to look

for it - I told him to take a picture of it. Next time you come over you can go look for it too. It's a "God" like the Fish God they make offerings to when they want fish - only this is the Turtle god.

We haven't taken Diane to see ~~the~~ Polihua Beach yet - she was sulking about it after you went back. But we're having some Kona weather now so we'll have to wait a bit.

We're still eating the cheese and sausages - they're so ono - the ham's all gone - thanks so much - next time no need the. And thanks for offering Lin's services as cook - I certainly appreciate that! Maybe I'll let her take over the whole kitchen, ha ha.

Since Robert's been operating the boat again (they're usually bumping him off jobs since he has a low seniority - he only worked 27 years for the Company but since they have

to have a license now - a couple of them didn't pass + one didn't even try - so he bumped this guy off, for once. He's studying now for a passenger carrying license, looking ahead for the time when he might take out tourists. We can't fight ~~prog~~ progress so might as well let ~~prog~~ progress work for us, too huh?

Anyway, getting back to the subject, since he's not as tired (from the heat mostly) we've been going fishing more often + made out pretty good. Next trip, we'll all go fishing o.k?

Oh, after George left I got to thinking about the ingredients that I use a lot to do my cooking with. Well this package of dry mix has those ingredients. If it's too bland, add a little more shoyu. Try it.

Will close here - hope you're not studying too hard Jim. Thanks again for everything! That cute little stuffed turtle is sitting on our T.V. Take when you have time. Dorothy + Robert

LANAI

Sept 7 Depart from Honolulu for Lanai via Molokai at 3:15 PM. 20mph trades - whitecaps - some clouds - Lanai 3:55

From Robert Amorell

9-8-73 Drove to Lapiki 8:45 - stuck in sand. 11:20 Pohakuloa Pt.

PHOTOS vinyl pages 7

narrow sand-red dirt beach with sand dune vegetated cliffs. Fringing reef offshore, fairly shallow with dirty water.
Much Limu along beach - red, green, sargassum, etc.
Less reef apparent after Pohakuloa Pt.
Awalua onward - some sandy coves, but also steep bank with thick Kiawe vegetation in some places. Wind eroded soil, also picks up sand.
Several small white with black spotted birds seen on beach.
Some areas with beach and lava rock at H2O edge.
Lots of small drift wood, litter (plastic, glass, wood from wrecks, etc.
1:00 PM Nice sand cove with steep back - lava rock point on West end, thereafter frequent lava rocks on beach.
1:10 another sand cove w/ Big Lava Rocks.
Small Frigate seen in the air!

Some plants (½ flower) but seems like smoother leaves. - beach morning glory, koa haole.

Polihua - about 150 yards wide at most places. Thick vegetation kiawe and koa haole - lots of litter in veg. zone. Western end - lava rock again. 2 people on beach fishing. 2 dead small sharks on beach. 1 ray caught. School of akule seen off beach. 1 Turtle seen offshore (100lbs? +).

Robert - saw turtle at H2O edge from boat last year.
Joe - Remembers catchin turtles on beach in 1920s.
Fishermans - saw seal at West end last year.
Kaupuiki -

Seems to be some sentiment against taking turtles on Lanai due to Maui people coming over taking for commercial use.

9-9-73

Dove for bottles at Harbor.
Drove to Keomoku - went diving to reef - Robert saw one small turtle -
Dove at second location - no turtle.
Robert says that many turtle have been seen here. Talked to Elaine Kaupuiki - her father dug for eggs and turned turtles at Polihua about 1915-1920.

325pm Depart for HONO via Maui

6 August 1978 SUNDAY

Dy flight over N Lanai - Shipwreck beach, to Polihua, observed silt-turbid streaks along shoreline - strong trades blowing.

Talked to Richard Morita - former Lanai/and Molokai FG warden.

He indicated -

1. 10 years ago people came from Maui regularly to take turtles - both for meat and shell commercially. Liked to take small turtles for shell - sell for ~$25 - more readily marketed than big ones for ~$125.
2. Morita used to take turtles in nearshore waters off of Manele - 3-4 at a time sleeping in cave; also seen feeding; they used to take a piece of reef and surround turtles close to shore - cook in imu.

"Turtles need to be dressed properly - most people, including Hawaiians, no longer know how to do this - His technique is as follows:

a.) Butcher at beach and rinse meat in saltwater
b.) when butchering, be sure to cut around four glands (two 'by shoulders, one each side) - if these are cut in to, bad smell will result which adversely affects taste of meat.
Renjke Glands? What about Gall(?) as per Cayman info - by kept?
c.) Remove GI. tract - give to Philipinos who like to prepare/eat it.

6 August 78
Sunday

d.) Remove fat from underside of upper shell - he doesn't like taste of this; however, states that some people might;
e.) Put meat back in shell and cook in Imu;
f.) Meat is done up until quivering stops.

Note that front muscles at joint just outside of body were cut to stop movement of limbs - prevent struggling.

Other places reported by R. Bista where turtles were/are

1. Shipwreck beach offshore (used to see many heads - now few)
2. Some off of Kaumalu

Mosita feels that all taking of turtles should stop - Doesn't believe statements that Hawaiian need turtle for food. No doubt in his mind that fewer are now present.

In afternoon, I walked over to Lanai School to photograph ceramic works by Kay Mura-Davidson that contains sea turtles. Tel. 565-6055
Later proceeded to Arnara's to talk to Dorothy and Diane - Hard feeling exist due to Conrad's/Bobby affair with large turtle taken

LANAI
by
Ruth Tabrah
1976

IS. Heritage Limited
NORFOLK IS., AUSTRALIA

p 29

3 Lanai Becomes Hawaiian

For the next five hundred years, perhaps from as early as 1200 A.D., grass houses and the long low stone walls that are *na iwi o ka aina*, the bones of the land, grew on Lanai.

How or when the thirteen *ahupuas*, those ancient districts running from mountaintop to sea were boundaried, no one knows anymore.

Kaa's nearly twenty thousand acres sprawl in a pie shaped wedge over most of that end of Lanai — around Kaena Point — big perhaps because that is the least promising land and most difficult coastline. The better lands of Paomai, Mahana, Kamoku, Kamao and Kaomai are less than half Kaa's size. So is the rich valley of Maunalei with its treasure of fresh water springs.

In size, Kaunolu and Kealiaaupuni rank next. The others of Lanai's districts are the traditional long knife-blade shape of an *ahupuaa:* Kalulu, Kealiakapu, Palawai, Pawili. Each one of all these districts was the special stewardship of a chief and the special names sing from the chants that are Hawaii's history.

Like this one:

"A Nana'i Kaulahea,
A Maunalei kua ka lei
Ua ono o Pele i kana i'ia
O ka honu o Polihua."

The translation of the first line of this chant, "On Kaulahea's cliffed Lanai," preserves the name of one of the island's kings. The second line, "At the Wreath Mountain plaiting leis," describes Maunalei, where *maile* and fern grew in abundance under the mountain with its summit garland of fog.

Pele is supposed to have been fond of visiting Maunalei. She used its ferns and vines and flowers in her lei making, flowers plaited into fern in the ancient way. The last two lines of the chant celebrate the fame of the turtles who lay their eggs at that point of the coast called Polihua: "Delighted, the Fire Goddess feasts On flesh of turtles from Egg-nest Cape."

KAUAI FILE

5/23/83

Ed Merdill P.O. Box 496
WAILUKU, MAUI 96793
1-879-5192

Green turtles previously caught on Molokai had tags on belly - that's how they know they know they come ashore on Kauai Beach -
Sold to Pineapple Hill/Sheraton

~~LANAI COMMUNITY ASSOCIATION~~
~~P.O. Box 705~~
Lanai City, Hawaii 96763

Box 318, Nov 16, 1984

Dear George,

Thank you for the report H84-15 about Polihua Beach. It has motivated me to ask around Lanai about other interesting turtle stories I've heard. Will keep you posted.

I don't remember if I told you, but I've received about 5 reports of a seal sighting near Kaena on Lanai. A Volunteer Officer for us named Ken Sabino saw a large seal hauled out on a rock beach between Keana and Polihua. He first thought the animal dead because of the flies around its head. However, after he proided it it wake up and moved out to sea. I showed him picutes from your book Hawaii's Seabirds, Turtles & Seals and he easily [redacted] identified his sighting as a Hi Monk Seal. We also looked over Marine Mammals of California.

A school teacher also asw a seal as did several highschool students. No i.d. because the seal was in the water.

Several trollers reported seeing a "reptile" swim under their boat off Keana. This reptile was 5-6 feet long and after listening to their description of how the "reptile swam, I concluded that they also saw a seal.

Nitta and others were here recently and I informed them of the i.d.

I put you down as a reference for the NMFS Special Agent job. I must be doing better this time because they have asked me for availibility information.

keep in totch,

Peter Connally

Box 318 LANAI CITY, HAWAII 96763

1-1-85

Dear George,

Happy New Year!!

I finally shot up my '84 roll of film, and what should appear but two turtle photos. This is the one that looked bitted. In slide #1 you can see a tire t rack for estimating the size of the turtle. As I recall it looked to be about 3 feet over the shell. Advanced stages of decomposition by the time I took the slides.

I am still trying to get collaborating stories to reinforce the one I heard: A retired supervosor told me that turtles were common at Polihua until the big labor strikes. He said that the union raided Polihua for turtles for their soup kitchen. Will try to get other poeople's view also.

I qualified for the NMFS Special Agent job with a rating of 91 (whatever that means). I really expect to get an interview soon. Your help appreciated.

alohas,

Box 318
Lanai City
HI 96763
JAN 198

DEPARTMENT OF THE NAVY
PACIFIC DIVISION
NAVAL FACILITIES ENGINEERING COMMAND
(MAKALAPA, HI)
PEARL HARBOR, HAWAII 96860

11015
Ser 24B:TE/ 8906

National Marine Fisheries Service
P.O. Box 3830
Honolulu, Hawaii 96812

Gentlemen:

The Marine Corps Air Station, Kaneohe Bay, 1st Marine Brigade, FMF is investigating the feasibility of utilizing a portion of northern Lanai for amphibious training exercises. The proposed training area is situated in the north/northwestern portion of the island as depicted on enclosure (1) and comprises approximately 7,000 acres. The area is considered particularly desirable in that it is relatively uninhabited and provides beach frontage and other land features ideally suited to the type of training intended. Marine Corps interest in northern Lanai is for long-term use; however, individual exercises will be confined to one or two days of operations conducted two to three times a year. Training activities are scheduled to commence at the first available opportunity after environmental, historical and legal requirements are satisfied.

Proposed training exercises are to consist of combined helicopter and amphibious assaults wherein marines will disembark and conduct follow-on day and night operations. Troops will proceed inland for a mechanized assault against enemy forces at higher elevations. Polihua Beach will be used for off-landing vehicles, supplies and troops and will serve as a primary site for service and logistical support detachments. No live ammunition will be used throughout operations. Pyrotechnics, if used, will be confined to select areas to avoid any risk of accidental wildfires. The number of participants in this exercise is estimated at 800 men.

To assess potentially adverse effects of training exercises on plant and wildlife species, an on-site inspection of the proposed Lanai training area was conducted on June 14, 1984 by representatives of this Command, State and Federal personnel and MCAS Kaneohe civilian and military representatives. Survey findings as documented by the Fish and Wildlife Service are provided as enclosure (2). Although no proposed, candidate, threatened or endangered plant or animal species were observed during this survey, there was some concern that Polihua Beach may on occasion provide nesting and basking areas for sea turtles, and coastal waters off-shore may be used as calving areas for whales.

In view of the above-noted concerns, we are requesting your comments on this training proposal as regards probable effects of the exercise on marine species specifically, reptiles, mammals and reef communities under your jurisdiction. Should your Service determine a more intensive assessment is

11015
Ser 24B:TE/8906

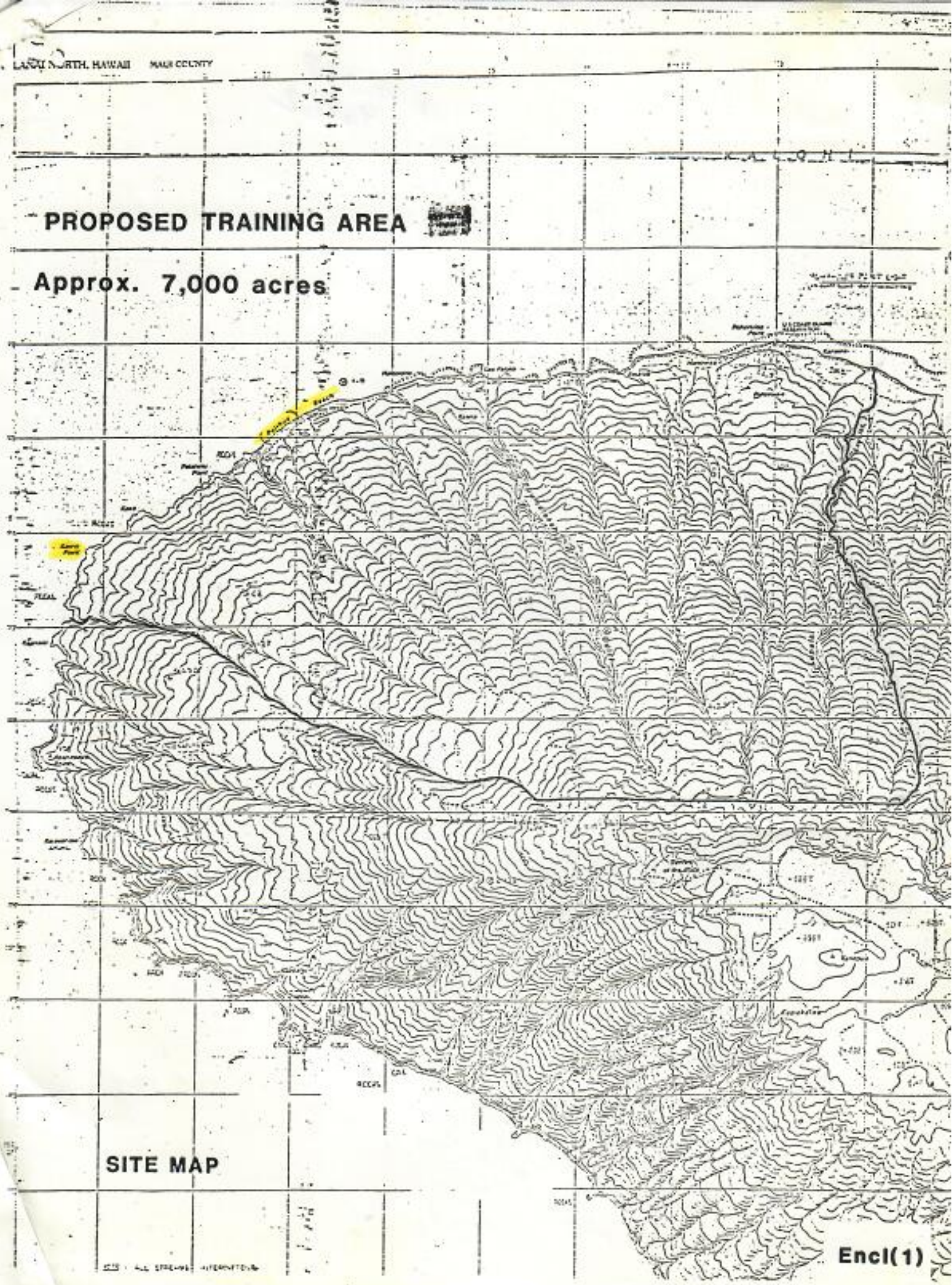
required of the coastal area bordering Polihua Beach, please reveal specific survey requirements (location, man-days, cost, etc.) and your availability to perform said work.

Your cooperation in this matter will be greatly appreciated.

Sincerely,

Y. HIRONAKA
Head, Facilities Planning Dept.
Acting

Enclosures:
(1) Site Map-Proposed Training Area
(2) FWS Survey Report


PROPOSED TRAINING AREA
Approx. 7,000 acres
SITE MAP
Encl(1)

December 17, 1984 F/SWC2

TO: F/SWR1 - Doyle E. Gates

FROM: F/SWC2 - Richard S. Shomura

SUBJECT: Comment on the draft biological opinion for proposed use of northern Lanai as a Marine Corps amphibious assault training area

The following specific comments are provided:

1. Page 5, para. 4 - The adverse effects of electrical lights and likely petroleum leakage on the beach and in the water should also be included.

2. Page 7, line 3 - Training exercises will preclude any experimental restocking effort, as well as the natural recruitment and re-establishment of the breeding colony that may be expected to occur with the gradual overall recovery of the population.

3. Page 7, lines 11-12 - According to periodic newspaper reports, beaches at Kahoolawe, Barking Sands, Kauai, and Bellows, Oahu are already being used for Marine Corps amphibious training exercises. Why is it necessary to expand such training to a new location like Polihua, Lanai?

4. Page 7, conservation recommendation #2 - In view of the available information, this recommendation appears to be entirely valid and therefore should be retained.

5. Page 7, conservation recommendation #3 - Vehicle and other electrical lights should be included along with pyrotechnics.

The major point here is that considering item 2, above, and other information presented in the opinion, item 4 is consistent with the intent of the Section 7 process and certainly warranted based on the potential of this area to contribute to recovery of the species.

cc: Gilmartin
DO
HL

2-6-85

from Peter Carvalho
To GHB
ILWU strikes -
~1959

"Soup kitchen"

person in management said turtles from Polihua were used there. Person who ~~ran~~ Kitchen has talked yet.

---

fishermen recently saw large (~4' turtle & while coming by Kawaiki from Cabalka - IW

The Hawaiian Shrimp Company has experienced quality control problems at sea with discoloration of the frozen product and a loss of an estimated 42,500 pounds of shrimp. Company representatives claim that the losses were due to refrigeration problems which have been largely resolved, along with marketing and quality control problems. The company is optimistic about developing a successful shrimping venture and is actively recruiting replacements for the 35 crew members who had been laid off. The company hopes to attract highly-qualified west coast fishermen for its shrimping operations.

Habitat Protection - On October 29 a 659-foot Navy tanker went aground on a reef on the east side of the entrance channel to Pearl Harbor, Oahu, and spilled 103,000 gallons of JP-5 jet fuel from the ruptured hull. Naughton, as the NOAA representative on the Regional Response Team, advised the Coast Guard and Navy on sensitive ecological areas and potential impacts from the spill on those areas and fisheries in and adjacent to Pearl Harbor.

Naughton met with the Corps of Engineers concerning a large-scale dredge and fill project to create a harbor for a power plant and fuel storage facility at Aimeliik, Palau. There is evidence that the project has begun without the proper environmental assessments and Corps permits. A letter will be sent from the Corps to the Palau government in an attempt to clarify the situation before taking legal action.

Protected Species - Gene Nitta, Lew Consiglieri, and Naughton conducted two site inspections on Lanai. The Navy proposes to use Polihua Beach on the north side of the island for Marine Corps amphibious landing exercises, and a private developer plans to widen the turning basin at Halepalaoa Landing on the east side. Possible effects on sea turtles and humpback whales were noted. (?)

Fishery Development - Gates and Milone attended a meeting of the Hawaii Fisheries Coordinating Council. Items discussed at the meeting included the NWHI Refuge management plan, 1985 S-K proposals from the state of Hawaii, proposed artificial reef projects in Hawaii, and the ongoing S-K project to establish a Hawaii seafood promotion committee.

Fisheries Development Division

Howard Ness and Sunee Sonu attended a meeting of the National Marketing Committee in Danvers, Mass., on October 17. The fishery trade officer (FTO) program, coordinated marketing programs, the surimi labeling issue, and a new approach to fishery development policy were discussed.

On October 18, Ness and Sonu attended a meeting on FTOs and fishery co-operators in Boston, chaired by John Byrne, administrator of NOAA. The main topics of discussion were 1) whether or not the FTO program or a similar version of it would be effective, 2) where FTOs should be located, 3) what should be the duties of FTOs, and 4) what would be the best method of implementation.

Industry Analysis and Information Section - The 1984-85 edition of Seafood Dealers of the Southwest Region is being distributed. This year's edition was published as a Southwest Region administrative report. It includes several new sections, such as listings of processors, wholesalers, and other government agencies involved in importing and exporting.

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
Southwest Region
300 South Ferry Street
Terminal Island, California 90731

November 5, 1984 F/SWR:MAR

STAFF MEETING MINUTES

A regional staff meeting was held today at 2 p.m. in the small conference room. Attendees were: C. Fullerton, W. Craig, P. Donley, S. Fougner, G. Hiu, G. Marshall, H. Ness, M. Rodriguez, L. Roth, R. Scheltens, J. Slawson, S. Sonu, and T. Beuttler (GCSW).

Regional Director's Office

Charlie Fullerton was in travel status for most of the latter part of October, attending the following meetings: Inter-American Tropical Tuna Commission annual meeting, La Jolla, Calif., October 17-18; Operations Council meeting, Williamsburg, Va., October 24-25; meeting with Dick Potter of the President's Council on Management Improvement, October 26 at Terminal Island; Pacific Fishermen's Conference, Trinidad, Calif., October 27; Pacific Fishery Management Council committee meeting, Portland, Oreg., October 30-31; and the California Seafood Institute fall meeting, Reno, Nev., November 2-4.

Bill Craig, Doyle Gates, and Bob Iversen attended a Pacific Fisheries Development Foundation workshop for fisheries officers in Honolulu, Hawaii, October 30—November 1. The workshop was well attended and several excellent papers were presented. Gates discussed the Saltonstall-Kennedy (S-K) process, including regulations, funding, and probable deadlines, and he requested input from the attendees on FY85 priorities for the central/western Pacific area.

Western Pacific Program Office

Agents of several west coast boat owners were in Honolulu recently to investigate the possibilities of harvesting lobster, shrimp, and bottomfish stocks in the Northwestern Hawaiian Islands (NWHI) and tuna and other resources in Micronesia. As many as 10 crab vessels are planning to head westward within the next 60 days. One new lobster permit was issued to the Seattle-based vessel KONA KAI which is scheduled to fish 500 traps.

Gates, Iversen, and Peter Milone met with Robert Agres, executive assistant to the mayor of Maui County, to discuss a proposed new baitfish culture facility. Agres stressed that county officials are strongly interested in proceeding with the facility. Apparently, the county wishes to purse a live bait production facility even if such a facility were to operate at a loss initially. The county also seems to want to expand the role of the facility to include other aquacultural research and development activities. Agres wants to meet with Fullerton in mid November to discuss the matter and to seek the Southwest Region's support for the proposal.

vere completed, the "new" Tern Island ncompassed 57 acres of packed coral and and held in place with iron pilings. I have stimated that this single project destroyed 9 percent of Hawaii's total acceptable reen turtle nesting habitat.

Further degradation of the ancestral reeding grounds was yet to follow. In 944, a radio-transmitting navigation sta- ion was established on East Island. Per- anent buildings and roads were built, and n extensive antennae ground wire system as buried over much of the island. It is ifficult to understand why this important 1-acre piece of green turtle real estate in he Hawaiian chain was selected for such an ncompatible human use. Eight years later, n 1952, the station was completely aban- oned, and transmitting facilities were con- tructed on Tern Island, six miles to the orth. Rotting wood, rusting metal, and uried wire still interfere with turtle nesting t East Island.

In 1946, the killing of turtles at French rigate Shoals for markets in the major lands was greatly simplified. In that year, ern Island was opened to commercial fish- g interests. It would appear that the area's ildlife refuge status was all but forgotten. ver a three-year period, flights were made etween Tern Island and Honolulu to trans- ort fish and turtles. At least 200 turtles ere taken by one company involved, and rtle meat made up a large portion of the shing crew's diet. Exploitation at the reeding site was reduced after 1949, partly ue to economic reasons related to declining mbers of fish and turtles. Sporadic killing turtles for commercial purposes did, how- er, continue at French Frigate Shoals roughout the 1950s, and it is likely that her northwestern refuge islands were also volved.

The last recorded instance of turtles being ughtered at the breeding site took place 1959, exactly half a century after the fuge was established. In that year, a mmercial fishing company destroyed a inimum of 25 percent of the nesting males present for the season. One of the arvesting" methods involved clubbing the rtles on the head while they were in the ocess of laying eggs. Many shipments re made to Honolulu before the opera- n stopped abruptly, possibly because of a ne crash. Whole dead animals awaiting noval were left to rot on the beaches ngside the remains of the previously tchered turtles. In 1964, personnel of U.S. Fish and Wildlife Service were rmanently assigned to Hawaii to admin- er all of the refuge islands. Since that e, turtles in the area have enjoyed rela- e freedom from destruction and harass- nt.

IN THE MAJOR inhabited islands to the southeast, an important green turtle-breeding colony formerly nested on Lanai. This site last hosted animals in the 1920s and probably represented a more recent colonization than the geologically older area of French Frigate Shoals. Several select beaches on Molokai, Oahu, and Kauai were also used by *Chelonia* as recently as 40 years ago. Today, a single such nesting anywhere in the major islands would be a newsworthy event. Several factors are responsible for these losses of reproductive capability. Land development and advanced modes of transportation have made nearly all previously isolated beach areas accessible to exploitation and disturbance by man. Additionally, on Lanai in particular, native vegetation has been significantly altered by plant and animal introductions, and erosion has occurred. These factors have produced changes in the nesting habitat. Even if offspring of this breeding colony still remained alive, I seriously doubt that the characteristics of the present beach would be acceptable.

Over the years, hunting pressures have also steadily increased on all sizes of turtles in feeding pastures around the major islands. This was brought about by Hawaii's growing human population and by the dollar incentive of commercialization. No site could be considered safe from the fast boats launched from trailers, modern diving gear, high-powered spear and shark guns, synthetic turtle nets of great length, and even rifles. It is surprising to realize that before June of 1974, the only law relating to the capture of turtles around the major islands was a ban on the use of firearms, poisons, and explosives. Commercial fishing had always been permitted, and essentially no conservation regulations ever existed to help protect these unique native animals. In the early 1960s, turtle killing accelerated in order to satisfy the expanding tourist industry's desire to offer visitors an exotic luxury food. Green turtle meat was sold as "tasting something like veal." This description was well suited to the appetites of most tourists who had visions of Hawaiian food consisting of fish heads and seaweed. Visitors were able to return home satisfied at having sampled the native cuisine, restaurants turned a high profit margin, and weekend fishermen prospered. Everyone seemed to find the business rewarding except the Hawaiian green turtle who was being openly sold down the road to extinction.

In 1972, efforts were started to inform the general public about what was taking place and, hopefully, to obtain some form of legal protection. Public hearings on the matter were held over a one-year period and the gravity of the situation became fully known. Sport divers, conservation-minded fishermen, and longtime residents described the declines they had witnessed. I received one account from a pilot who had casually counted turtles in the water while flying over a comparatively remote coastal area for a ten-year period. His observations indicated that a 90 percent decrease had taken place.

In short, overwhelming evidence and support existed for the overdue protection. Among the few dissenters was a small group of efficient part-time turtle hunters who were supplying restaurants all over the state with tens of thousands of pounds of meat. In 1974, a state regulation was effected which prohibited the sale of Hawaiian green turtles, but still allowed capture for home consumption with restrictions on size and method of capture. The nearly extinct hawksbill (*Eretmochelys*) population was given full protection along with the rare open-ocean leatherback (*Dermochelys*) which occasionally wanders into local waters. However, proposals for a moratorium on all turtle killing and a systematic study of remaining animals were unsuccessful. At this late date in the turtle's dismal history, such a plan seems essential if viability is to be assured.

While waiting for turtles to finish nesting, I have had ample time during the long nights on East Island to think about what the future holds for these gentle creatures. Certainly the remaining numbers would not be able to tolerate any reoccurrence of the past abuses. Realizing full well the precarious survival status of all green turtles, I am nevertheless encouraged by recent events that have taken place. A policy statement issued in April, 1975, by the International Union for the Conservation of Nature and Natural Resources (IUCN) officially recognized *Chelonia* as being in danger of becoming extinct. Although carrying no legal power, this action will still serve as an important guideline in the formulation of laws in many nations. In addition to the decisive statement by IUCN, the U.S. Departments of the Interior and Commerce have recently proposed changes in the law that would give *Chelonia* full protection. While waiting for these necessary measures to be adapted, each of us can aid in the animal's survival by refusing to buy derived products and urging others to do the same.

George H. Balazs is a research biologist with the Hawaii Institute of Marine Biology. Supported by the Fish and Wildlife Service, he has studied the green turtle breeding colony at French Frigate Shoals.

DEFENDERS DEC 1975 GREEN TURTLE'S UNCERTAIN FUTURE

P

Poka 'Ailana. Ford Island, Pearl Harbor. *Ua pau ko'u lihi hoihoi i ka nani o Poka 'Ailana,* all my delight in the beauty of Ford Island is gone (expression of disenchantment or anger). Formerly called Moku-'ume'ume. *Lit.,* Ford Island.

Pō-ka-'ī. Land section, bay, beach park, boat ramp, and surfing place (Finney, 1959*a*:108), Wai-'anae qd., O'ahu; once the site of a *heiau* and famous coconut grove. Today it is commonly called Pokai but is sung Pō-ka-'ī. *Lit.,* night [of] the supreme one.

Pō-kele. Former name of the wharf at Queen and Nu'u-anu streets, Honolulu. *Lit.,* muddy night.

Poki. Street near the Puna-hou School campus, Honolulu, probably named for Boki Ka-mā'ule'ule (the one who faints), governor of O'ahu and husband of Liliha. He accompanied Ka-mehameha II to England. In 1829 he set off on an expedition to the New Hebrides in search of sandalwood, but his ship and all aboard disappeared. (RC 294–296.) Boki may have been named for Ka-mehameha I's pet dog, Poki (from English "boss"). At the time of Bokī's birth, many dogs were named Poki, including dog guardians (*kia'i*).

Pōki'i. Ridge, Wai-mea district, Kaua'i. The old name was Pōki'i-kauna (chanting youngest brother or sister). Kapo, Pele's sister, left her younger female relative, Moe-hauna (lie struck), here and she chanted a farewell. *Lit.,* youngest brother or sister.

Pōkole. Point and fishpond, Kaha-lu'u; street, Ka-imu-kī, Honolulu, O'ahu. *Lit.,* short.

Pola Iki. Land division, Lahaina qd., Maui. *Lit.,* small Pola (flap, as of a *malo*).

Pola Nui. Land division, Lahaina qd.; elevated land section (3,000 feet high), Mā'alaea qd., Maui. *Lit.,* large Pola.

Polapola. Land section (*'ili*), Kala-wao; village for lepers, Ka-laupapa peninsula, Moloka'i, a *heiau* for the goddess Kapo once stood here. *Lit.,* improved in health. (The word is cognate with Borabora, the name of the island in the Society Islands, but this is probably a coincidence.)

Pō-leho. Coastal area, northeast Ni'ihau. *Lit.,* cowry night.

Poli-'ahu. Well-preserved *heiau* in a State park near Wai-lua, Kaua'i, associated with Malae *heiau.* Land division on Mauna Kea, Hawai'i (UL 251), named for the snow goddess. *Lit.,* garment [for the] bosom (referring to snow).

Poli-hale. State park, beach, ridge, *heiau,* and land division, Wai-mea district, Kaua'i, famous for its seaweed *(pahapaha)* used in leis (For. Sel. 102), a practice said to have been introduced by Pele's older sister, Nā-maka-o-Kaha'i. *Lit.,* house bosom.

Polihiwa. Place, Dowsett Highlands, Honolulu; perhaps a garble of Polohiwa (glistening black). (TM.)

Poli-hua. Beach area, north Lā-na'i. *Lit.,* eggs [in] bosom (turtles lay eggs here; see Ka-'ena).

Poli-o-Keawe. Cliff, Puna qd., Hawai'i. *Lit.,* bosom of Keawe.

Polipoli. Peak, spring, cabin, campground, and park, Mākena qd., Maui.

Poli-wai. Gulch, Wai-kele, O'ahu. *Lit.,* water bosom.

P

Poloke. Place, Tantalus, Honolulu. (TM; see Indices 740 for an award.)

Pololū. Large valley, Wai-pi'o qd., Hawai'i. *Lit.,* long spear.

Pō-lou. See Ka-huku.

Polū-lani. Place, Pauoa, Honolulu. *Lit.,* sky blue.

Polynesian Cultural Center. Center built at Lā'ie, O'ahu, by Mormons and opened in 1963; there are six model villages (Fijian, Hawaiian, Maori, Samoan, Tahitian, and Tongan). Most construction materials were brought from the various island groups, and native carpenters constructed the houses. In return for educational expenses, students from the Pacific islands who attend neighboring Church College of Hawai'i, talk to visitors about their island cultures, and participate in evening pageants. See Church College of Hawai'i.

Ponaha-wai. Land division, Hilo qd., Hawai'i. *Lit.,* water circle.

Ponimō'ī. Road, Diamond Head, Honolulu. *Lit.,* carnation.

Po'o. Ancient surfing areas, Ka-pa'a and Wai-mea districts (Finney and Houston 30); coastal area, Hanapēpē, Kaua'i. See Ka-iwi-o-Pele. *Lit.,* head.

Po'okela. Church at Maka-wao, East Maui. *Lit.,* foremost.

Po'o-kū. Land section and former *heiau,* Hanalei district, Kaua'i. *Lit.,* upright head.

Po'o-lau. Beach and gulch, 'Īlio Pt. qd., Moloka'i.

Po'o-lolo-'ole. Land area, Wai-mea district, Kaua'i. *Lit.,* head without brains.

Po'o-mau. Canyon and stream, Wai-mea district, Kaua'i. *Lit.,* constant source *or* constant head.

Po'onahoahoa. Stream, Wai-luku qd., Maui.

Po'o-oneone. Point, southeast Ni'ihau. *Lit.,* sandy head.

Po'opo'o. Islet (0.5 acres, 40 feet elevation), south Lā-na'i. *Lit.,* hollow.

Po'opo'o-iki. Valley, northwest Kaua'i. *Lit.,* small depression.

Po'o-pueo. See Kūkae-'ula'u a.

Pope. Elementary school, Wai-mānalo, O'ahu, built in 1965 and named for Mrs. Willis T. Pope, commissioner of education 1928-1930, cofounder and first president of Hawai'i Congress of Parents and Teachers. The environmental laboratory in the St. John Plant Science Building (completed in 1971) at the Mānoa campus, University of Hawai'i, Honolulu, was named for Willis T. Pope, as was a nearby campus road. Pope was a dean of the College of O'ahu and (1908–1909) professor of botany and horticulture.

Popo-i'a. Flat islet off Kai-lua Beach Park, O'ahu (less than 4 acres in area and about 10 feet elevation), a bird refuge. *Lit.,* fish rot (so called because of fish bones left there; Sterling and Summers 5:283).

Pōpō-'ie. Ancient surfing area, Lahaina qd., Maui. (Finney and Houston 28.) *Lit.,* *'ie* vine cluster.

Pōpō-kī. Land section, Maku'u qd., Hawai'i. (For. Sel. 256.) *Lit.,* ti leaf bundle.

Populars. Surfing area, Wai-kīkī, O'ahu, where beginners learn to surf. (Finney and Houston 80.)

Port Allen. See 'Ele'ele.

K

Ka'ākau-pōhaku. Ancient surfing area, Wai-luku qd., Maui. (Finney, 1950*b*:345.) *Lit.*, the north (*or* right-hand) stone.

Ka-'ako-pua. Land section, part of which is now occupied by Central Intermediate School, Honolulu. Princess Ruth's home, Ke-ō-ua Hale, was here. *Lit.*, the flower picking.

Ka'ala. Mountain (3,938 feet), Wai-pi'o qd. (see Pu'u-ka'ala); land section and stream, Hāmākua and Mauna Kea qds., Hawai'i. Gulch and highest mountain (4,020 feet) on O'ahu, Wai-'anae range (PH 100; UL 242); playground and elementary school, Wahi-a-wā. Street, place, and way, Mānoa, Honolulu, probably named for Mt. Ka'ala (TM).

Ka-'ala'ala. Land sections and gulch on the southwest slope of Kī-lau-ea, in Kī-lau-ea, Mauna Loa, and Pāhala qds., Hawai'i. *Lit.*, scrofulous scar.

Ka-'alaea. Land division, Ha'i-kū qd., Maui. Coastal area, Hālawa qd., Moloka'i. Valley, land division, and stream, Wai-Kāne qd., O'ahu. *Lit.*, the ocherous earth.

Ka-'alā-iki. Land section, Honu-'apo qd., Hawai'i. *Lit.*, small lava rock.

Ka'alaina. Gulch, Mā'alaea qd., Maui.

Ka-'alā-kei. Valley, Koko Head qd., O'ahu. *Lit.*, the proud water-worn stone.

Ka-'alā-wai. Land division, former fishing right, street, and place, Diamond Head, Honolulu. (RC 135.) *Lit.*, the water basalt.

Ka-'ali. Cliff, northeast Ni'ihau. *Lit.*, the scar.

Ka-'ali'ali-nui. Valley, northeast Ni'ihau. *Lit.*, the greatly scarred.

Ka-'alo. Bend in the coast west of South Point, Hawai'i; fishing is good here in calm weather; a pier built here some years ago against the advice of local Hawaiians was soon destroyed by the elements. *Lit.*, the avoidance.

Ka'a-loa. Street, Mō-'ili'ili, Honolulu, named for Samuel K. Ka'a-loa, a clerk with the law firm Marx, Prosser, Frear and Anderson for 40 years. He died in 1945. (TM.) *Lit.*, much traveled.

Ka-'alu'alu. Bay and point east of Ka Lae, Hawai'i, a surfing area with tradewind and summer south swell. (For a saying, see Appendix 8.1.) *Lit.*, the wrinkle (seen from out at sea, the fissures in the rock suggest wrinkles).

Ka'amola. Land division, Ka-malō qd., south Moloka'i. *Lit.*, loose, unsteady.

Ka'ana. Land section, Wai-mea district, Kaua'i. Hill, Airport qd., Moloka'i, famous for *lehua*. According to Emerson (UL 45), a rock here is the body of Kapo, a hula goddess and sister of Pele. The hill is said to be the site of the original school where the ancients learned hula dancing of every kind. Above the hill lived Kū-a-Pāka'a, the punster and hero; he taught men to farm, build houses, and fish. (*Ka Nupepa Kuokoa*, September 14, 1922.) *Lit.*, division.

Kā'ana-pali. Landing, village, district, and golf course, Lahaina qd., Maui. Also called Pōhaku-Kā'ana-pali and Kā'anapali-pōhaku. (PH 83.) *Lit.*, Kā'ana cliff.

Kā'anapali-pōhaku. Old name for Pōhaku-Kā'anapali.

K

Ka-'āpahu. Stream, Hanalei district, Kaua'i. Land area, central Lā-na'i. Hill on the eastern rim of Ka-malō gulch, south Moloka'i, known as the Camel's Back (Stearns and Macdonald, 1947:Plate 2). *Lit.*, the truncation.

Ka'a-pīpā. Point near Kī-pahulu, Hāna district, Maui. *Lit.*, passing edge.

Ka-'ā-poko. Stream, Hanalei district, Kaua'i. *Lit.*, the short stone.

Ka'a-puna. Land section, village, and ranch, Hōnaunau qd., Kona, Hawai'i. *Lit.*, wipe pumice (as in cleaning gourd containers).

Ka'au. Crater near the head of Pālolo Valley, Honolulu, said to have been formed when Māui's hook fell there after dropping Pōhaku-o-Kaua'i at Ka-'ena Point (PH 104); perhaps named for Ka'au-hele-moa, the supernatural chicken of Pālolo that flew to Helu-moa. See Helu-moa. Street, Pālolo, Honolulu. (TM.) *Lit.*, forty.

Ka-'auhuhu. Land section, Kohala and Wai-pi'o qds., Hawai'i. *Lit.*, the *'auhuhu* plant *(Tephrosia purpurea)*.

Ka-'aumakua. Peak, Honouliuli, O'ahu. *Lit.*, the family god.

Ka-'auwai. Place, Ka-pā-lama section, Honolulu. *Lit.*, the watercourse.

Ka-'awa-kō. *Helau* at summit of Wai-'ale'ale, Kaua'i. *Lit.*, the kava drawn along.

Ka-'awa-loa. Village, land section, point, lighthouse, and site of the monument to Captain Cook, Hōnaunau and Kai-lua qds., Hawai'i. *Lit.*, the distant kava (runners went to Puna or Wai-pi'o to get kava for chiefs).

Ka-'awa-loha. Gulch, Kohala qd., Hawai'i. *Lit.*, the drooping kava.

Kā'awe-iki. Valley, Wai-mea district, Kaua'i. *Lit.*, tie a little.

Ka-'āwikiwiki. Land section and stream, Hāmākua qd., Hawai'i. (For. Sel. 116.) *Lit.*, the *'āwikiwiki* vine.

Ka'ea. Cape, southwest Lā-na'i. Point, Honolua qd., Maui. Also called Ka-lae-o-ka'ea.

Ka'ele-huluhulu. Rocks in the sea at Mahai'ula; land section and fishpond, Ke-āhole qd., North Kona, Hawai'i, belonging to Ka-mehameha I and destroyed by Pele who wanted the *aku* fish there. (For. Sel. 287; Westervelt, 1963:148.) *Lit.*, frayed hull (canoes were dragged over the rocks at Mahai'ula at low tide, fraying the keels; they were used in fishing for bonito).

Ka-'ele-ki'i. Point, Lahaina qd., Maui. *Lit.*, the image blackness.

Ka-'elekū. Land section near Hāna, Maui. *Lit.*, the basaltic rock.

Ka-'ele-pulu. Pond (former fishpond), stream, and playground, now called Enchanted Lake, Kai-lua, O'ahu. *Lit.*, the moist blackness.

***Kaelua.** Islet (0.9 acres, 40 feet elevation), Ke-'anae qd., Maui.

Ka-eml. Islet (2.5 acres, 120 feet elevation), Ka-haku-loa qd., Maui. *Lit.*, the ebbing.

Ka-'ena. Point and land section, Puna qd., Hawai'i. Northwesternmost point, Lā-na'i (see North End). 'Ai'ai, the fish demigod, marked a stone here that then turned into the first Hawaiian turtle. (HM 22.) See Poli-hua. Land division, quadrangle, and northwesternmost point, O'ahu, said to be named for a brother or cousin of Pele who accompanied her from Kahiki. (PH 100, 106, 157.) See Kua-o-ka-lā. *Lit.*, the heat.

Place Names of Hawaii

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REVISED AND ENLARGED EDITION

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FISHING LORE
by
A.D. Kahaulelio
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Poli hua

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came all together on the canoe's starboard side, the men shoots their oars at the same time at the side and killed the fish. These are how a'ua'u fish are caught. The Gilbert Islanders here among us in Kahaina hotted the sea outside of Keawaiki with their canoes with poeses fish poles for a'ua'u and with opelu fish to chew and spew into the water when schools of the a'ua'u came in. They never missed with their fish poles and barbed fish hooks bought in shops, with bits of rope similar to olona fibers. You will then see strings of a'ua'u being peddled on the roads, selling for three or four a'ua'u for a quarter. That was reasonable and was eaten after a cup of awa to remove the bitter taste, according to the people of Ulu. Perhaps so.

Turtle Fishing --- Polihua at Lanai was a very famous place for turtle catching. The natives catch them on the sand on 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 flippers or tail. When strangers go there to Lanai to visit. Polihua and Ke-ahi-a-Kawelo where a famous chiefess of the land of ours lived was warned. John Nakihei, Knapuiki, F. Kealakaa and Judge Kahoohalahala gave us some weke-aa and other fish with the warning, "Don't eat it (weke) lest Pahulu will get you." It was an irritation of the throat and when you are asleep you are lifted up in the air and rocked. Pahulu was the last ghost that Kaululaau pursued into the sea. Kaululaau held on as hard as he could but it slipped through his hands into the sea. The tale was a theme for a song composed by one of my nephews, now passed to the other side, who learned music. It was for the benefit of the Girl's School at Makawao, twenty-six years ago. Ilio, Heber 'Ipai and Junior Ihihi are the survivors today that were called professors of singing of these days by Governor John M. Kapena. Here are the lines of the song that the writer remembers:

Chorus: Pele makes a rustling

A rumbling noise in the Pit.

The goddess looks askance

While Pahulu ran and dived into the sea.

Verse I. Bring us some money

To assist Makawao.

We have a hundred

To help her with.

There are two more verses but this is enough about Pahulu and Kaululaau who fought the ghosts of Lanai and killed them. He was a handsome and good person who was vexed at the ghosts for chasing the fishermen of Lanai a very long time ago, so he ran away from his parents. If some singers wish to learn the tune of this song let him come to the writers home and it will be given to him free of charge. This was a song that roused a great deal of enthusiasm and if I am not mistaken the amount received for the concert that was opened for the benefit of the Maunaolu Girl's School of that day was almost two hundred dollars.

Say, the writer has been digressing, but no matter, Hawaiian meles are enjoyed when one knew the verses. Yes, when you get to Polihua to catch turtles you need all your strength. It is done thus -- go to 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, stop with your left foot on the left flipper of the turtle and turn the turtle over with your left foot on the left flipper of the 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. It is better to let you go or your clothes will get a soaking in the sea. The other way is by diving into the sea. Your writer has been accustomed as he went to see 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

A Repeated SENTENCE

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 Kolihua one caught several times four of them. In the year 1850, there were many natives of Borabora here in Lahaina that came from the whaling ships. Because breadfruit, coconuts and other fruits were numerous, they wanted to stay. At a place called Puehuehu-nui directly mauka of the home of the writer there was about thirty of them. One of them was called Piope and he was the cleverest, number one spearer of turtles. He went often to spear them and when he returned the canoe was loaded with them. He could spear turtles from five to ten fathoms away. Because we wanted to know of the skill of Piope, the Borabora native in turtle spearing, one of our boys named Iona Makaole went to see for himself and assured us of his skill; he sometimes sent hisspear straight forward, or upward, or downward to pierce it in a distance of ten fathoms. Who among us is a skilled Hawaiian turtle spearer. I have heard of the "mahimahi" of Kona, that the lads of the calm seas of Ehu who are skilled in turtle spearing are the prominent gentlemen J. K. Nahele, G. P. Kamauoha and S. W. Keal. They did not use a regular spear but the real harpoons such as were used by whalers to stab at the fins and get enough to weight down the hips of Hilo's multitude. They wouldn't miss in their spearing for they are of the calm seas sung of in a mele --

It is Kona of the peaceful seas;
The horizon clouds tell of the calm.
The icy dewdrops are falling,
The sun light stream over the sea.
As the children play at na-u,
To hold back the rays of the sun.
Warm indeed is the land,

Fondly loved by the host of Hooluhi.
Drooping and wilted stands Kona in the sun,
The sea of Ehu, the beloved flows on,
Smitten by the tear drops shed by the clouds.
Poured on the upland of Alona so,
The rainy mist darken the breadfruit of Keli.
This is a threat by my loved one to me,
But a daring thought tells me to remain,
Oh how I am hurt by him.

This is a famous mele of the land of these heroes of Kona. How my affection goes out to them.

Fishing with a Fine Spear --- At Kuamcaloa, Kaupo in the year 1776, your writer went swimming and fish spearing with a good friend, Mr. Lohiau. Lohiau did the diving and spearing while I held the cord on which the fish was strung. If you watch a person diving down to the seafloor you will notice how quick his hand is in spearing a fish. If it appears outside of its hole it is a fish that is not missed by the thrust of the spear and is done quickly. It seemed that we had not been fishing more than a half hour when we had enough on our string. There was nenue, kala, palani, panuhunuhu and so on but the trouble with that kind of fishing is that it is fearful and terrifying. It is clear that you are practically placing your body between the teeth of sharks. While we were swimming about, the sea was reddened by the blood of the stabbed fish and the string of fish was trailing behind us. Therefore I said to my fellow fisherman, "Let us go home," but I did not express my fear of the small headed tiger shark of the ocean and that man-eating shark the ihuwaa.

I remember a story told me by a native of Kaupo who lived here in Lahaina a long time. He is now gone. He told how he fought a shark on the beach of Honowainui near Kahikinui Ranch. He was doing this very thing, fish spearing. He fought the shark from the deep blue waters from the outside limit to the

ever a high ranking leader of a group passed away, the immediate members of the family, together with the kahuna or priest, met and selected something very important to the life of that person. The selected object was given to a closely related blood relative for safekeeping, including the story of his life. This was passed along from one generation to the other through hereditary connections.

The story that was told by Mrs. Awili Shaw, a Lanai-born resident connected with the old Kealakaa family of Lanai, was about the two Makole Princesses. They were sisters who lived in the vicinity of Naupaka and Honopu gulches, near the pillars of Nanahoa, located a few miles to the north of Dole's Pineapple Harbor at Kaumalapau.

According to Mrs. Shaw, these two princesses were very fond of canoe races. They usually viewed them from the top of the cliff overlooking the little bay of Honopu, to watch their retainers make preparations for the day's event. The small double canoe was let out with its sails up in the path of the overland trade wind and before the sails disappeared from sight, several big canoes with strong able-bodied crewmen were dispatched in the race toward the small double canoe. The first canoe to retrieve it was considered the winner of the day's event. Mrs. Shaw did not elaborate beyond this point.

Mrs. Shaw asked my mother to accompany her to the place where the canoe was kept. Mrs. Shaw, my mother, Moke Kane, and a few others went on horseback to the vicinity of Honopu, where Mrs. Shaw and Moke Kane went down the hillside to a cave and returned with the small double canoe and presented it to my mother for safekeeping, including the story of the two Makole Princesses.

It would be fitting at this time to give a brief account of these two princesses. The mere fact that they had many retainers, canoes and followers, placed them in a very high standing among chiefs. The small double canoe preserved in their memory was the symbol of much travel by water. These two princesses were close kin of the king of Maui, under whose sovereignty Lanai was a part.

The above story seems to give us supporting information in our quest into the past history of Lanai. We know today that people could not have lived in that locality without a moderate rainfall, which was necessary to raise their basic food crops including fresh water for household use.

The visit of Palekaluhi (youngest son of Princess Liliha) seemed to have convinced Mrs. Shaw of mother's lineal connections which originated from Maui. This gave her the right to keep that memorial double canoe.

Polihua

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. The translation of Polihua means: Poli (cove or bay)—hua (eggs).

Kamoa

"Kamoa" is a forest where the old time residents claimed they could hear a phantom rooster crowing at dawn. Believe it or not, there was no trace of chickens in this forest. "Kamoa" means "The Chicken."

foul smelling. The leaves, fruit and bark were useful as medicine. Many of the Hawaiians of today are still using these medicinal herbs, although they are becoming scarce.

Fishing

The early Hawaiians had strict rules concerning fishing. If they were preparing to go fishing, no one was to ask them where they were going, because they believed the evil spirits would go ahead of them and scare the fish away. Whenever they went fishing in canoes, they would take a ku'ula, which was in the form of a stone, to represent their fish god, a symbol of good luck. When they had a good catch, which they always did, they would set aside a few fish as offering to the fish god. Bananas were not allowed on a fishing expedition; neither were unnecessary noises and conversation. These were some of the rules that the fishermen had to abide by.

Fish such as Moi, Mullets, Ulua, Papio, Ku'mu, Oio, Ene'nue, Uhu, Ahole'hole, Moa'no and many other varieties were plentiful in all parts of Lanai. Turtles were plentiful along the windward side of the island.

Ma'nini, Ko'le, Pualu and Kala were found outside of Kaunolu harbor. Along the shores, Hawaiians fished for Aku and Kawa'kawa. Schools of small fish called Pi'ha used to come close to shore to evade the Aku (Tuna) and the Kawa'kawa. The "Noio" bird would pick the tiny fish from the air and the Aku from the ocean.

Method of Fishing

The Hawaiians had many ways of fishing. They did pole fishing, which was done by standing in the ocean close to shore. They also used throw nets, surrounding nets, trolling and trap fishing. Early Hawaiians used

bone hooks; and in later years metal hooks were used and reshaped to catch certain kinds of fish.

The Akia plant was used to stupefy fish. The bark, roots and leaves were pounded and placed in a piece of coconut fibre, and lowered into salt water pools to help catch fish by temporarily paralyzing them. They were then placed in cool salt water to remove the narcotic effect, before they were eaten.

Auhu'hu was another plant that was used to stupefy fish.

Animals

Wild animals such as goats, pigs, cattle, horses, sheep, donkeys, turkeys and peacocks were found in different sections of Lanai Hale and the rugged slopes of Manele.

Domesticated horses, cattle, sheep, pigs, turkeys, chickens and ducks were raised by the Gay family.

My father introduced wild chickens that were brought from the Waimea and Makaweli Mountains. They were smaller than the Leghorn chickens of the Mediterranean class. The deer, quail and partridge were introduced in recent years.

Birds

Native birds such as the Noio, Ko'ae, Ua'u, Ne'ne (Hawaiian goose) were found in all parts of the island.

There were also owls, skylarks, Ake'ke'ke, pheasants, mynah birds and doves.

Bats made their homes in the cliffs.

The Elepaio and I'iwi were very colorful birds that lived in the mountains. Their feathers were used for cloaks and helmets for kings and high chiefs.

Wild turkeys and birds lived on the top of Maunalei, Puhi'ele'lu and in the Mahana gulch.

Pili-hawawa and to save the family of his friend he drops the kuula stone into a pool and the fish swarm into the pool. The first fish that the chief eats slips down his throat whole and chokes him to death.

LEGEND OF AIAI

The first fishing ground marked out by Aiai is that of the Hole-of-the-ulua where the great eel hid. A second lies between Hamoa and Hanaoo in Hana, where fish are caught by letting down baskets into the sea. A third is Koa-uli in the deep sea. A fourth is the famous akule fishing ground at Wana-ula mentioned above. At Honomaele he places three pebbles and they form a ridge where aweoweo fish gather. At Waiohue he sets up on a rocky islet the stone Paka to attract fish. From the cliff of Puhi-ai he directs the luring of the great octopus from its hole off Wailua-nui by means of the magic cowry shell and the monster is still to be seen turned to stone with one arm missing, broken off in the struggle. Leaving Hana, he establishes fishing stations and altars along the coast all around the island as far as Kipahulu. At the famous fishing ground (Ko'a-nui) in the sea of Maulili he meets the fisherman Kane-makua and presents him with the fish he has just caught and gives him charge of the grounds, bidding him establish the custom of giving the first fish caught to any stranger passing by canoe. Another famous station and altar is at Kahiki-ula.

At Hakioawa on Kahoolawe he establishes a square-walled kuula like a heiau, set on a bluff looking off to sea. On Lanai he fishes for aku at cape Kaunolu and there (some say) finds Kaneapua fishing. At cape Kaena a stone which he has marked turns into a turtle and this is how turtles came to Hawaiian waters and why they come to the beach to lay their eggs, and this is the reason for the name Polihua for the beach near Paomai. On Molokai he lands at Punakou, kicks mullet spawn ashore with his foot at Kaunakakai, and at Wailau where Koona lived and where he finds the people neglecting to preserve the young fish, he causes all the shrimps to disappear and then reveals their retreat to a lad to whom he takes a fancy. This is a rocky ledge called Koki and hence the saying "Koki of Wailau is the ladder to the shrimps." Kalaupapa is still a famous fishing ground be-

cause of the stone Aiai left there. A good place for fishing with hook and line on Molokai is between Cape-of-the-dog and Cape-of-the-tree.

On Oahu, Aiai lands at Makapu'u and makes the stone Malei the fish stone for the uhu fish of that place. Other stones are set up at grounds for different kinds of fish. The uhu is the common fish as far as Hanauma. At Ka-lua-hole the ahole fish run. The fish still spawn about a round sandstone (called Ponahakeone) which Aiai placed outside Kahuahui. It is Aiai's son Punia who, instructed by Aiai, sets up the Kou stone for Honolulu and Kaumakapili; the kuula at Kapuhu; a stone at Hanapouli in Ewa; and the kuula Ahuena at Waipio. The fishing ground outside Kalaeloa is named Hani-o; grounds for Waianae are Kua and Maunalahilahi; for Waimea, Kamalino; for Laiemaloo, Kaihukuuna. The two, father and son, visit Kauai and Niihau and finally Hawaii, where the most noted fishing grounds are Poo-a, Kahaka, and Olelomoana in Kona; Kalae in Kau; Kupakea in Puna; I in Hilo.[15]

STORY OF PUNIA-IKI

(*a*) *Thrum version.* At Kakaako, Aiai lives with a friendly man named Apua. The chief Kou is a skilful aku fisher at his grounds from Mamala to Moanalua. At Hanakaialama lives Puiwa and she seeks Aiai for a husband and they have a son Puniaiki. One day while she is busy gathering oopu and opae the child cries and when he asks his wife to attend to it she answers him saucily. Aiai prays and a storm raises a freshet which carries away fish and child downstream. He sees Kikihale, daughter of Kou, pick up a large oopu from the stream and recognizes his child transformed into a fish. The chiefess makes a pet of it and feeds it on seamoss. One day she is amazed to find a man child in its place. She determines to have the child reared to become her husband, and this comes to pass. When she reproaches him for doing nothing but sleep, he sends her to ask for fishhooks from her father, but burns as useless the innumerable

15. Thrum, *Tales*, 215–249 (from the Hawaiian of Moku Manu); Thomas Wahiako, sheriff for Hana district, Maui, June 10, 1930 (and other local informants); For. Col. 6: 172–175; J. Emerson, *HHS Papers* 2: 17–20; Ellis, *Tour*, 88.

ʻŌLELO NOʻEAU

HAWAIIAN PROVERBS & POETICAL SAYINGS

Collected, Translated, and Annotated by

MARY KAWENA PUKUI

Illustrated by Dietrich Varez

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586 He hoapili o Mākālei.

A companion of Mākālei.

Said of an attractive person.

587 He hōʻike na ka pō.

A revelation of the night.

A revelation from the gods in dreams, visions, and omens.

588 He hoʻīlina ka make no ke kino.

Death is an inheritance for the body.

589 He honu ka ʻāina he mea paneʻe wale.

Land is like a turtle: it moves on.

Land passes slowly but inexorably from owner to heir.

590 He honu māeaea aku la ia.

It is a māeaea *variety of turtle.*

He is a stinker. A play on *māeaea* (unpleasant smelling).

591 He hoʻokāhi no wai o ka like.

All dyed with the same color.

Identical.

592 He hoʻokele waʻa no ka lā ʻino.

A canoe steersman for a stormy day.

A courageous person.

593 He hoʻolua pīkaʻo.

Food that has to be recooked.

Similar to the expression "half-baked."

594 He hou moe kāheka.

A hou *fish that sleeps in a sea pool.*

Said of a person who snores. The *hou* when sleeping makes a snoring sound.

595 He hou ʻoe, he iʻa moe ahiahi.

You are a hou, *a fish that sleeps in the evening.*

A small, inoffensive fellow—but one who will fight when annoyed.

596 He hua kāhi.

A single seed.

An only child.

597 He huakaʻi paoa, he pili i ka iwi.

An unlucky journey in which the body was wagered.

Suffering.

598 He huewai ola ke kanaka na Kāne.

Man is Kāne's living water gourd.

Water is life and Kāne is the keeper of water. To dream of a well-filled water gourd that breaks and spills its contents is a warning of death for someone in the family.

599 He hulu aliʻi.

Royal feathers.

Said of the adornment of a chief, or of an elderly chief himself who is one of a few survivors of his generation and therefore precious.

1355 Ka iʻa koʻekoʻe o ka ʻili i ka wai.

The fish that chills one's skin in the water.

The *ʻoʻopu*, usually found in upland streams.

1356 Ka iʻa kuehu ōkea.

The fish that scatters white sand.

The *ʻōhiki* (sand crab), which kicks out the sand as it makes its burrow.

1357 Ka iʻa kuhi lima o ʻEwa.

The gesturing fish of ʻEwa.

The *pipi*, or pearl oyster. Fishermen did not speak when fishing for them but gestured to each other like deaf-mutes.

1358 Ka iʻa lamalama i ka pali.

The fish caught by torching along the seacoast.

The *ʻaʻama*, a crab that is often caught at night by torching along the rocky shore.

1359 Ka iʻa lamalama i ke one.

The fish caught in the sand by torching.

The *ʻōhiki*, or sand crab.

Ka iʻa lau nui o ka ʻāina. 1360

Big-leaved fish of the land.

Lāʻau, or taro greens.

Ka iʻa lauoho loloa o ka ʻāina. 1361

The long-haired fish of the land.

Any vegetable eaten with *poi*, such as taro greens, *hoʻiʻo* or *kikawaiō* ferns, or sweet potato greens. Poetically, leaves are the *oho* or *lauoho*, hair, of plants.

Ka iʻa lauoho loloa o ke kai. 1362

The long-haired fish of the sea.

Limu, or seaweed.

Ka iʻa lawe mai a ka makani, he lāʻau ka ʻupena e hei ai. 1363

The fish brought by the wind, a stick is the net to catch them with.

Said of turtles that come to certain localities in the islands. They were driven ashore with sticks.

Ka iʻa lele me he manu. 1364

The fish that flies like a bird.

The *mālolo*, or flying fish.

Ka iʻa leo nui o ka pali. 1365

Loud-voiced fish of the cliffs.

Goats, which were pursued by shouting hunters.

Ka iʻa leo nui o Keʻehi. 1366

Loud-voiced fish of Keʻehi.

Said of friends who will laugh and play in the moonlight but who will not lend a hand when daylight and labor come.

2218 Na hono a Pi'ilani.

The bays of Pi'ilani.

The realm of Pi'ilani, a powerful ruling chief of Maui, included the islands of Moloka'i and Lāna'i, as well as all the bays of Maui whose names begin with *hono*.

2219 Na honu ne'e o Polihua.

The moving turtles of Polihua.

Polihua is a place on Lāna'i where turtles come to lay their eggs.

2220 Na 'ilina wai 'ole o Kohala.

The waterless plains of Kohala, where water will not remain long.

After a downpour, the people look even in the hollows of rocks for the precious water.

2221 Na 'ili puakea o Maleka.

The white-blossom skin of Maleka.

Said of fair-skinned Americans.

2222 Naio 'ai kae.

Dung-eating pinworm.

An expression of contempt for one who slanders, especially his own kin.

2223 Na kāhi ka malo, na kāhi e hume.

The loincloth of one, the other can wear.

A close relationship. As a general rule, Hawaiians would not wear the clothing of people other than blood relatives. In explaining genealogy to a young relative, this conveyed the idea that a relationship was near enough to warrant the wearing of each other's clothing.

2224 Na kai 'ewalu.

The eight seas.

The "seas" that divide the eight inhabited islands.

2225 Na kai haele lua o Kalae, o Kāwili lāua o Hala'ea.

The two sea currents of Kalae—Kāwili and Hala'ea.

The Hala'ea current, named for an evil chief who was swept away, comes from the east to Kalae and sweeps out to sea. The Kāwili (Hit-and-twist) comes from the west and flows out alongside the Hala'ea. Woe betide anyone caught between.

2226 Na ka 'ilio ka nānā pono.

Only dogs stare.

Said to a person who stares.

2227 Nakaka ka pua'a, nahā ka wa'a; aukāhi ka pua'a mānalo ka wa'a.

The pig cracks, the canoe breaks; perfect the pig, safe the canoe.

Whenever a new canoe was launched, a pig was baked as an offering to the

2705 Pūʻali kalo i ka wai ʻole.

Taro, for lack of water, grows misshapen.

For lack of care one may become ill.

2706 Pūʻali o Ka-hau-nui ia Ka-hau-iki.

*Big-*hau*-tree has a groove worn into it by Little-*hau*-tree.*

Said when a child nearly wears out the patience of the adult in charge of him, or of a large company of warriors discomfited by a small one. Kahaunui and Kahauiki are places just east of Moanalua, Oʻahu.

2707 Pua mai nei hoʻi ka lehua.

The lehua *is blossoming.*

The faces are red from drinking beer.

2708 Puanaiea ke kanaka ke hele i ka liʻulā.

A person who goes after a mirage will only wear himself out.

2709 Pūanuanu ka hale noho ʻole ʻia e ke kanaka.

Cold is an uninhabited house.

Said of an empty house, which lacks the warmth of love, or of the body after life is gone.

2710 Pua ʻohi.

Flower picking.

Chitchat.

2711 Puehu ka hulu o ka manu.

The feathers of the bird are scattered.

The person has gone off with haste.

2712 Puehu ka lehu i na maka o ka mea luhi.

Ashes fly into the eyes of the toiler.

One must endure the unpleasant in order to gain the pleasant, just as the cook at a fireplace gets ashes into his eyes when he blows on the fire.

2713 Puehu liʻiliʻi ka lehu o kapuahi.

The ashes of the fireplace are scattered in every direction.

Said of an angry person whose temper makes everybody scatter.

2714 Pue i ke anu o Haua*ʻiliki.*

*Crouch in the cold of Haua*ʻ*iliki.*

Said of an intense cold. A play on *hau* (ice) and *ʻiliki* (strike) in the place name Haua*ʻiliki.*

2715 Pueo maka ʻalaʻalawa.

Owl with eyes glancing here and there.

Said of one who looks about to see what he can steal.

2716 Pūhā hewa ka honu i ka lā makani.

The turtle breathes at the wrong moment on a windy day.

Said of a person who says the wrong thing at the wrong time and suffers the result.

2717 Pūhā ka honu, ua awakea.

When the turtle comes up to breathe, it is daylight.

Said when a person yawns. Sleeping time is over; work begins.

2718 Puhalu ka ihu, nānā i ke kāʻao.

When the scent reaches the nose, one sees the overripe hala *fruit [fallen to the ground].*

One only notices the many good things a person does when it is too late to show appreciation.

2719 Pūhi lapa i ka ʻale.

Eel active in the sea caverns.

Said of an overactive person, like a child with too much energy.

2720 Pūhi niho wakawaka.

An eel with pointed teeth.

A fierce and fearless warrior.

2721 Pūhi okaoka.

An eel [that chews] into bits.

An epithet applied to a *kahuna* versed in all branches of *kahuna* lore. He is not a person to be trifled with.

2722 Puhipuhi lāʻau a kahuna, ka maunu loaʻa a ka pupuka.

By blowing the medicine given by a kahuna, *can the ugly gain his desire.*

Said of one who resorted to the prayers and ceremonies of a *kahuna hana aloha* to gain the love of his desired one. The person consulting the *kahuna* ate *pilimai* and *manulele* sugar cane after the *kahuna* had dedicated them to Makanikeoe, the love god. Then he blew in the direction of the desired person. The god, who also had a wind form, bore the *mana* along, and when it touched the one desired he or she became very much in love with the sender. When used with evil intent—for revenge or to humiliate—the sender is spoken of as an ugly person who has no charm of his own, hence he must resort to sorcery.

Puʻipuʻi a ka lawaiʻa. 2723

Stout fishing lad.

Said of an energetic fisherman. ʻUmi was so called because of his skill in fishing.

Pūʻiwa i ka lāʻau pākuʻikuʻi a ka lawaiʻa. 2724

Frightened by the splashing stick of the fisherman.

Said of those who are suddenly frightened and flee in panic, like fish driven into the net by the stick that beats the water.

Puka ka lā, puka pū me ka hana, i ʻike ʻia ka lālā maloʻo me ka lālā maka. 2725

When day arrives, work time arrives too, for it is then that dry branches can be distinguished from green ones.

IV. INDEX TO BIRDS

[*By common names*]

V. INDEX TO FISHES AND OTHER AQUATIC ANIMALS

[*By common names*]

named and the relationship may be sensed purely through a study of the applications of the names.

Aside from the promise offered by place names in rediscovering pathways of culture, they have several other uses which need not await demonstration to prove their value. Polynesian folklore is permeated with place names and allusions to place names and unless the locations are known, much of its significance may be lost to us.

"A Nana'i Kaulahea,
A Maunalei kui ka lei. . . .
Ua ono o Pele i kana i'a,
O ka honu o Polihua."

On Lanai of Kaulahea,
At Maunalei (Pele) plaits her wreath. . .
And Pele eats with zest the flesh
From the turtle of Polihua.

Nana'i referred to in this *mele* (16, p. 115) is Lanai as it often sounds on the tongue of an old native. If one were not very familiar with the places on Lanai the first line might be translated "At Kaulahea, Lanai," and this has actually been done (19b, p. 493), but Kaulahea is an early king of Lanai. Maunalei means "Wreath Mountain" and so this is a fitting place to plait wreaths. Polihua is a beach on the north end of Lanai famous for its turtles which nested there, hence the name "Egg Nest."

Centering about many a place name is a tradition explaining the name which gives a glimpse into the life of the people. (See p. 20.) The distribution and application of the names disclose the geographic environment as it appeared to the native mind. The scattering of the Lanai names shows where the natives lived and moved on the island and such names as Wai-a-ke-akua, Water of the Gods; Ka-hili-ka-lani, Brushing the Heavens; Ka-imu-hoku, The Star Oven (a depression where a meteor fell); Kai-nehe, Murmuring Sea, express the environment in terms of native thought.

On the Hawaiian Government map of Lanai, of 1878, appear eighty names which by no means cover the places of importance in the early days. For convenience in referring to localities and because of the value of place names in ethnological study I sought every name obtainable, particularly since the people on Lanai wish to preserve them and many could still be readily had from a number of informants.

The list of names which I have prepared total 308, representing 324 places, 308 of which are shown in Plate I. Ten of the names are taken from the Index to Land Claims, 1861 and 1881, or from land titles; one name from Kamakau (31); and two names from the Government map of 1878. The other names were recorded directly from the present natives. I am indebted to fourteen natives for their active participation in forming the list as it now stands, namely: Kauhane and Jacob Apiki, Hoohuli, Keliihananui, Kauila, Henry Gibson, Kawelo (now dead), Pohano (now

16 = Emerson, N. B., Pele and Hiiaka: a myth from Hawaii. Honolulu Star-Bulletin Ltd., Honolulu, 1915 250 p.

LANAI by Ruth Tabrah
1976
Island Heritage

3 Lanai Becomes Hawaiian

For the next five hundred years, perhaps from as early as 1200 A.D., grass houses and the long low stone walls that are *na iwi o ka aina*, the bones of the land, grew on Lanai.

How or when the thirteen *ahupuas*, those ancient districts running from mountaintop to sea were boundaried, no one knows anymore.

Kaa's nearly twenty thousand acres sprawl in a pie shaped wedge over most of that end of Lanai — around Kaena Point — big perhaps because that is the least promising land and most difficult coastline. The better lands of Paomai, Mahana, Kamoku, Kamao and Kaomai are less than half Kaa's size. So is the rich valley of Maunalei with its treasure of fresh water springs.

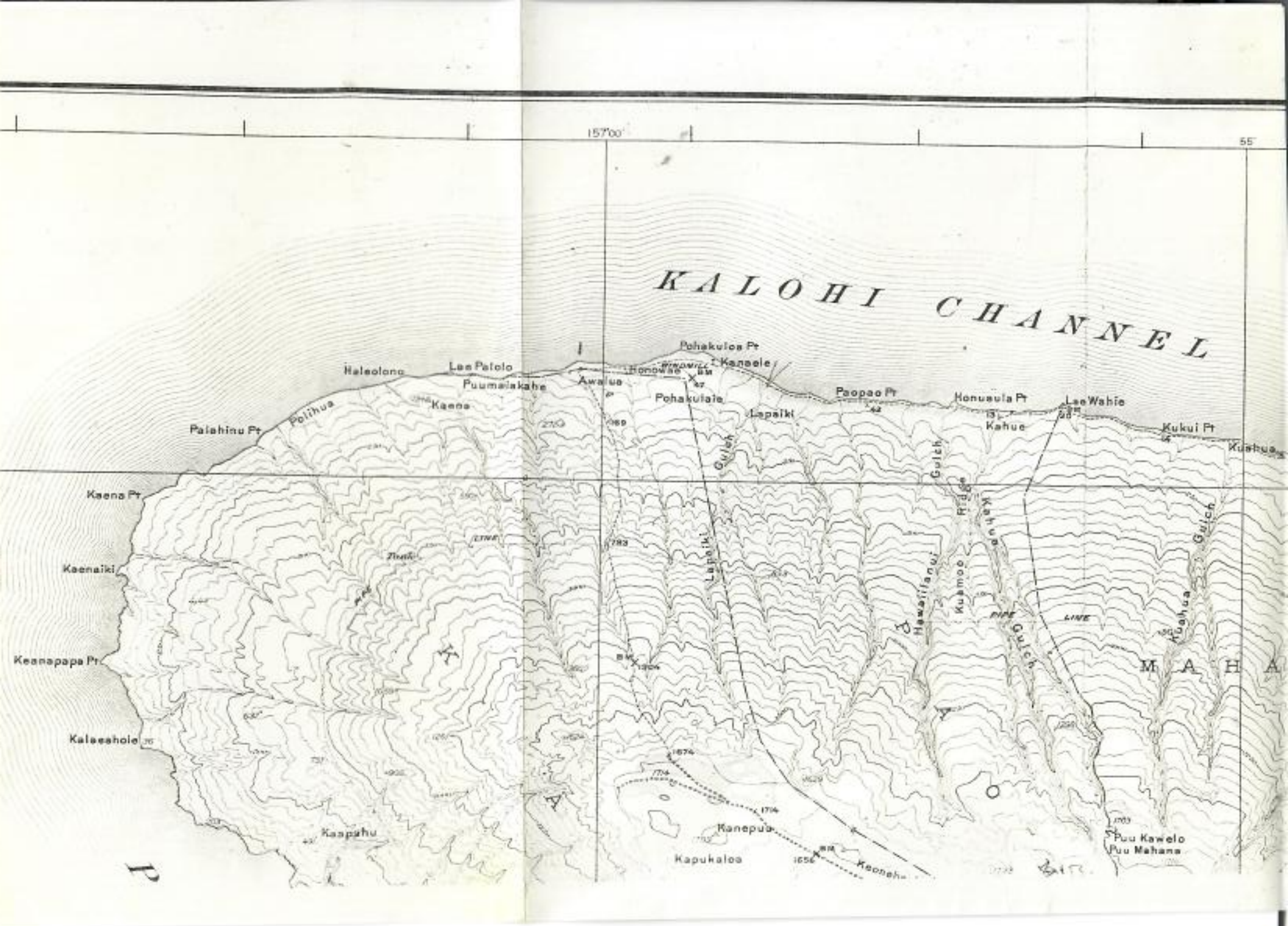
In size, Kaunolu and Kealiaaupuni rank next. The others of Lanai's districts are the traditional long knife-blade shape of an *ahupuaa:* Kalulu, Kealiakapu, Palawai, Pawili. Each one of all these districts was the special stewardship of a chief and the special names sing from the chants that are Hawaii's history.

Like this one:

"A Nana'i Kaulahea,
A Maunalei kua ka lei
Ua ono o Pele i kana i'ia
O ka honu o Polihua."

The translation of the first line of this chant, "On Kaulahea's cliffed Lanai," preserves the name of one of the island's kings. The second line, "At the Wreath Mountain plaiting leis," describes Maunalei, where *maile* and fern grew in abundance under the mountain with its summit garland of fog.

Pele is supposed to have been fond of visiting Maunalei. She used its ferns and vines and flowers in her lei making, flowers plaited into fern in the ancient way. The last two lines of the chant celebrate the fame of the turtles who lay their eggs at that point of the coast called Polihua: "Delighted, the Fire Goddess feasts On flesh of turtles from Egg-nest Cape."


15700'
55
KALOHI CHANNEL
Pohakuloa Pt
Kanaele
Honowae
Awalua
Pohakulaie
Lapaiki
Paopao Pt
Honuaula Pt
Lae Wahie
Kahue
Kukui Pt
Kuahua
Haleolono
Lae Patolo
Puumaiakahe
Kaena
Palahinu Pt
Polihua
Kaena Pt
Kaenaiki
Keanapapa Pt
Kalaeahole
Kaapahu
Kanepuu
Kapukaloa
Keoneh
Lapaiki Gulch
Hawaiianui Gulch
Kuamoo
Kahua Ridge
Kuahua Gulch
PIPE LINE
M A H A

The ISLAND OF LANAI - A SURVEY OF NATIVE CULTURE
BERNICE P. BISHOP MUSEUM BULLETIN 12, HONOLULU
by K. P. EMORY
1924
129p.

Pili-pohaku. Stones clinging (descriptive). Foot of ridge. 228.
Po-aiwa. Ninth night. Valley. 205.
Poha-ke-kui'a. Smites the club. Valley mouth. 96.
Pohaku-laie. Laie stone. Large stone. 10.
Pohaku-lalani. Rows of stone (descriptive). Plateau land. 100.
Pohaku-loa. Very stony (descriptive). Point. 202.
Pohaku-loa. (descriptive.) Ridge. 98.
Pohaku-loa. (descriptive.) Valley. 242.
Pohaku-loa. (descriptive.) Point. 285.
Pohaku-o. Pointed stones (descriptive). Section of ridge. 190.
Pohaku-pili. Stones touching each other (descriptive). Name of rock islet off Halawa, Molokai. Beach. 233.
Poho-ula. Red hollow (descriptive). Plateau land. 263.
Po-ka-i. Name of a celebrity from Kahiki (Thrum) (legendary?). Old village site. Name of a land section on Oahu. 117.
Poli-hua. Egg nest (descriptive). Beach. A place famous for sea turtles. 1.
Pookeana. Beach. 282.
Poo-lali-lali. Greasy head. Beach. 204.
Poo-poo. Oval shaped mass (descriptive). Islet. 162.
Poopoo-pilau. Sterile (applied to pigs). Ridge. 12.
Pueo. Owl. Arable land. (See 26a).
Puhi-elelu. Black with roaches. Ridge. Ridge issuing at Lopa. 112.
Pulehuloa. Big roasting (Thrum). Hill. 80.
Pulou. Covered out of sight (descriptive). Spring. Makakehau, lover of the girl, Puupehe, was killed here. 249.
Puu Aalii. Aalii (tree) hill (descriptive). Peak. 152.
Puu-alealea. Hill of rejoicing (descriptive). Hill. This hill marks the end of the long climb from Maunalei village. 264.
Puu Alii. Chief peak. Point on main ridge. 35.
Puu-kauila. Kauila (tree) hill (descriptive). Plateau land. 74.
Puu-kilea. Hummock hill (descriptive). Hill. Incorrectly given on the government map as Puu Kukai. 183.
Puu-koa. Koa tree hill (descriptive). Plateau land. 76.
Puu Kole. Red or barren hill (descriptive). Point on main ridge. Back of Waiakeakua. 111.
Puu Mahana. Warm Hill (descriptive). Hill. Government map gives name as Puu Kau-wela. 216.
Puu Laau. Wood hill (descriptive). Hill. 179.
Puu-mahana-lua. Doubly warm hill (descriptive). Hill. Highest point on rim of extinct crater. (See government map.) 59.
Puu-maia-kahi. Hill of dropping bananas (descriptive). Hill. Very prominent crater cone. Gibson, in story of Puupehe, refers to banana groves of Waiakeakua which is below this hill. 110.
Puu-mai-ekahi. Valley. 11.
Puu Mamani. Mamani hill (descriptive). Hill. 213.
Puu Makani. Windy hill (descriptive). Hill. Platform of heiau covers the top. 61.
Puu Manu. Bird hill (descriptive ?). Hill. 104.
Puu Nana i Hawaii. Hill to view Hawaii (descriptive). Hill. 77.
Puu Nene. Goose hill (once descriptive). Hill. Feeding ground for geese. 90.
Puu Nene. Goose hill (once descriptive). Hill. Feeding ground for geese. 130.
Puu-o-miki. Hill of Miki (descriptive). Hill. 142.
Puu-pehe. Owl-trap hill, the hero Puupehe, the girl Puupehe (legendary or once descriptive). Islet. (See pages 15 and 17 for traditions.) 238.
Puu Ulaula. Red crater (descriptive). Hill. 136.

terraces a foot high made of loosely placed stones are set in a rectangular recession of the back wall.

The wall of the heiau is perpendicular. Its maximum height is 8 feet and its width on top is 15 feet. Attached to the outside face of the wall on the north and on the south, is a bench, 3 feet high and 2 to 3 feet wide.

The main entrance to the heiau was probably the one which could be guarded on the north. The south side is open to a group of house sites, probably belonging to the priests. (See Pl. 11.) The great stone pavement on the floor of the valley (p. 53) may have been connected with the heiau.

Heiau at Kaena-iki

The stone platform, 55 by 152 feet, at Kaena-iki, is one of the two largest heiau foundations on Lanai.

The platform lies parallel and close to the edge of a bluff at the head of the bay, and on the north bank of the stream; the main part of the village is on the south bank. (See fig. 6, *a*.) The elevated pavement on the north is of very rough stones, in the northwest corner of which is a small hole probably intended for an image socket. The south pavement is of small, loose stones. Rock is abundant about the heiau, but smooth, water-worn stones from the shore below the bluff were found scattered through the structure. The walls are only two to three feet high; the small pen in one corner is two feet high. The south division of the heiau rests on bare ground. No natives have lived on this end of the island for a great many years, and no name for the heiau is remembered.

Heiau at Maunalei

In 1842 a Hawaiian Protestant church was begun on the site of the heiau at Maunalei. What remained of it was completely destroyed by Frederick Hayselden about 1880, who used the stone to build a cattle well. Judging from the amount of stone material, the heiau was not very large. It lay on a swelling of the coastal plain, 200 yards from the sea and parallel to it. Stokes (44) was told by natives on Hawaii or Molokai that the name of the heiau was Kahakunui. Kauhane Apiki, the last man living at Maunalei, gives the name Aikanaka.

Heiau at Lanaikaula

The heiau called Lanaikaula (fig. 6, *f*) is a fourth of a mile from the shore on the lower slopes of the ridge south of Keomuku and east a hundred yards from the graveyard. It is the smallest of the large heiau ruins.

The pavement of small, rough stones is less than 24 feet square and rises at the back into two small terraces. Towards the sea, the side walls of the platform continue for 30 feet, enclosing level ground. The small, three-sided enclosure on the north may be due to the activities of the Maunalei Sugar Company about the heiau. Only one native knew of this heiau.

HEIAUS OF FISHERMEN

On Lanai, fishermen's shrines, *ko'a*, are numerous and varied; some are rectangular enclosures or platforms, others are circular, and still others are simple heaps of stone. None are larger than 25 feet square. Coral, shells and fish bones are almost invariably associated with the ruins.

A typical and authentic *ko'a* stands at water's edge on the sandy point of Honuaula. (See fig. 7, *b*.) The irregular platform of stone and coral is six feet high, surmounted by low altar 6 by 12 feet, littered with shells, fish bones and fresh crabs. At the back of *ko'a* is an enclosure containing pine timbers suggestive of a recent shack.

Near Manele is a *ko'a* located at the foot of a ridge extending from Kaupakuea, about 35 feet from the sea. The shape of the platform is irregular, its sides measure 22 by 20 by 24 by 15 feet; its average height is 4 feet. At the back of platform are cowry shells, fish bones, crustacean remains, and bits of charcoal left from sacrifices. The cowry shells had not been broken to extract the meat. Most of the fish bones and crab shells are covered by a stone.

A *ko'a* located on the east ledge of the beach south of Kahue, consists of a low platform, 4.5 by 10 feet by 2 feet high, resembling a modern native grave. Its edges are of lava blocks and smaller rock, but its interior is filled with pieces of coral from 1 to 2 inches in diameter together with some larger lumps. A small pile of stones and coral rests against the west side. No human bones were found in the structure and no burial could have been made in the solid ledge beneath. The use of coral was intentional; there is no source of supply within a hundred yards, and stone in abundance is close at hand. Lobster shell-plates, spines of sea urchin, sea shells, and fish bones are scattered on the platform, and remains of lobsters and fish lie under a heap of stones next to the platform. Apparently small sacrifices of sea food were made on the coral area of platform, then covered with stone. Cockleburrs (*kikania, Xanthium strumarium*) are buried beneath the platform—plants supposed to be of recent introduction.

Two platforms are located near the east arm of Kahue Bay; one is on a sand dune a hundred yards from the beach, faced on the seaward side by large stones. Shells and fish bones found at either end of the pavement suggest that this structure is a *ko'a*. Two hundred yards from the beach is a similar structure, where no sign of fish bones were found. Nearer the mouth of Kahue valley is a conspicuous structure—an enclosure 8 by 15 feet, 5 to 6 feet high. On the pavement, which comes almost to the top of the enclosing wall, are shells, pieces of coral and charcoal, ashes, and fish bones. A low wall encloses a yard at the back. At the base of the north corner of the platform two stones a foot in diameter and three feet long have been set upright.

Two structures each having the appearance of a *ko'a* stand on the east bank of Polihua valley. One, erected on the sloping edge of gulch, is an enclosure 20 by 25 feet. Like the *ko'a* at Kaumalapa'u, this heiau is peculiar in that the wall maintains a uniform height even on the steep slope. The wall is six feet high and obstructs the view of the sea from the platform. The platform, made of large flat stones, is on a slope not so pronounced as that of the wall. An altar (one foot high) on the upper end of the platform is made of smooth stones and contains pieces of coral, sea shells (mostly unbroken cowry) and fish bones.

Twenty-five yards south of this structure is a pentagonal platform 10 by 15 by 10 by 14 by 6 feet, and 2 to 4 feet high. The pavement is depressed, but affords a view of sea. A hole in the pavement, 2 feet deep and 2 feet in diameter, is partly covered

with a slab. Calabashes with offerings may have been placed in hole, but no shells, bones, or coral were found.

Several hundred yards from Bay of Honowai is a stone platform 15 by 15 feet and 4 to 5 feet high in a prominent position among sand dunes. The platform has a concave surface. It is unlikely that a grave would be so marked in the sand dune area, and I know of no house platform of these dimensions on the north shore. These facts suggest that the platform is a *ko'a*, though no shell or bones are found. Their absence may be due to the high wind which sweeps across this country.

A platform 23 by 30 feet is located in the valley of Keanapapa (fig. 3, *b*). On it is a *ko'a* altar, rising in two steps. Cowry and other shells, pieces of coral, and fish bones lie on this altar. The cowry shells have not been broken to extract the meat.

On the edge of a cliff at the first indentation of the coast south of Kaumalapa'u is an enclosure 20 by 25 feet, with vertical walls from 4 to 6 feet high, 2 to 3 feet wide. Its walls are of uniform height even on slopes. Its floor is paved with flat stones, and littered with pieces of coral, shells, fish-bones, and charcoal.[1] Joining the enclosure on the north is a house platform 26 by 35 feet, with a sheltering wall 6 feet high on its eastern side; a square stone fireplace is sunk in middle of this platform, another in the ground 8 feet south of the platform. The presence of charcoal at this *ko'a* suggests recent use.

A wall, 5 feet high and extending south and west, forms a shelter on the summit of the rock island of Kaneapua (Pl. 11). The floor (15 by 24 feet) is paved with rough stones plentiful here. It is said that this steep rock was climbed to offer the first fish of a catch, but no fish bones are found, though pieces of coral are scattered on top of the island. The shelter is an excellent lookout station, as the depths of Kaunolu Bay can readily be scanned from it. A number of cairns have been set on the rim as on the sea tower, Puupehe.

An altar (25 by 15 feet, 6 feet high) built of large, water-worn stones, is located against the west bluff of Kaunolu Valley, upon a great platform near the sea. A step, one foot high, runs along the front of the altar where once stood an image of the god Kuula, patron of fishermen. Natives who claim to have seen this stone idol, called Kunihi, describe it as two feet high, with ears, eyes, nose, mouth and arms. Keliihananui's brother, Ohua, was one of several men instructed to hide the image by Kamehameha V during his visit in 1868 (23).

Three cairns of lime-stone slabs (the largest 12 feet in diameter and 3.5 feet high) (Pl. V, *A*) are located a quarter of a mile inland on the coral limestone ridge, which forms Lae Hi point; larger slabs are laid upright against the ridge. A Hawaiian who lives at Pohakupili says that these cairns are not graves, but *ko'a*, upon which the natives placed ferns, maile vines, and fish, then bowed their heads in prayer.

In addition to the *ko'a* described there are *ko'a* or structures resembling *ko'a* at the following places:

North coast: Pohakuloa, on the east bluff of the valley north of the peninsula, above two large house-sites—a cairn with coral; Kuahua, adjoining a house-site—a cairn with coral; Kukui, a quarter of a mile upland, associated with four house-sites—a platform 12 feet square, 6 feet high; Kahue, on the lower slope of the east bluff—enclosures forming one, possibly two *ko'a;* Kae'a—two cairns. West coast: Kaena-nui, in line with the center of the bay, 100 yards inland—a cairn adjoining a

[1] Kenui, of Nuu, Maui, who was using a *ko'a* (a rectangular platform, with an imu in the corner and a temporary hut in center) up to 1916, told me that nowadays the natives cook their fish sacrifices, and my field assistant, Maunupau, says that in Kona, Hawaii, practices differ widely according to purpose or dream-vision of the fisherman.

MELE
Box 318 LANAI CITY, HAWAII 96763

12/83

Dear George,

Just a short note to inform you of another turtle sighting. I went to the Dr. here for the first time since he has started practice and he told me that this spring at Polihua (extreme West end of sandy beach) he saw a large turtle returning to the water in the early am. He retaced the turtle's tracks and they led to a mound in the sand. He didn't disturb turtle or mound and evidently didn't tell anyone other than immediate family about the sighting. I'm convinced that thrtles are nesting again on Lanai. This Dr. knows turtles and the ocean well. His name is Joe Hennesy. He practiced in Kau on Hawaii before coming to Lanai this year. In Kau he volunteered that he was given turtle meat as payment for medical services. He is fond of turtle meat and has medicinal uses for the fat.

The film on the shark bit turtle is still in my camera. As soon as i shot it up, I'll forward you a slide.

alohas,

Pete C

P.S. Kenai helicopters lands tourist at Polihua + the exact spot where Dr Hennesy saw the mound!

LANAI BOAT CLUB
MANELE BAY
Box 318
LANAI CITY, HAWAII 96763

CONFIDENTIAL

Dear George,

Regret that I am unable to make any presentations for a while due to the political heat.

We got a report of two very large turltes hauled out at Polihua on July 5 at 1:00pm afternoon. Lots of turtles offshore!! Request your advise in determining if the turtles are in fact nesting.

I have information re Maunakea/Palila situation that will be in court soon. Perhaps you could call me some night.

Aloha.

7/31/81 Telephone call – older Japanese fishmarket butcher at Pine Isle store. 20-30 yards up beach by boulders - no tracks seen later (wind covered?)

no eggs seen. He tried to turn them over – but too big.

LANAI BOAT CLUB
MANELE BAY
LANAI CITY, HAWAII
P.O. Box 318
Lanai City 96763

Dear George,

Sorry to hear that you'll not be coming to Lanai soon, I was looking forward to some turtle adventures. Did you know that there's supposed to be a turtle petroglyph at ~~xxxxxxx~~ Polihua? This person has never seen it but his father has. Apparently it is covered by sand on or near a rocky point on the East end of the beach. I keep looking. Maybe the big surf will uncover it.

I would be pleased to attend a Audubon Board meeting whenever I'm in Hnl, ~~which is hardly ever~~. Tanee and i will take a Hnl vacation in March during the DOE ~~xxxxxxxxxxxxxx~~ spring break. (week of March 23).

1980? 81

I have a couple of items which I would like to discuss with the board. Last August I was in N.Z. studying their Herbivor control programs. This topic is especially appropriate to Hi where our forests are decimated by such pests. I have a lot of material on this subject w/ a few slides.

I also got a chance to see some of their bird recovery programs which the Board might like to hear about.

Hope to see you soon,

Peter Connally

Jan 5, 1978

Dear George,

On Nov 23, 1977 Al, Bill Gearon and myself saw two large green sea turtles mating off Lae Hi, Lanai at 10:00am.

I plan on being in Honolulu during the later part of Feb and will try and contact you.

alohas,

Peter Connally

peter connally

P.O. Box 318
Lanai City 96763

1983

Alan Tomita – Aquarist at Pacific Beach Hotel 9221233 07
Manager – Bruce Hirai

8-18 Thursday Called David Bourrass about graft sites. He just finished talking to Kim.

8-18 Thursday WWF Nancy Hammond (202) 387-0800 Talked about Clifton project.

[NEED TO CALL MONDAY MORNING]

8-19-1983 Friday – Call from Peter Connally's wife – A report to Peter about a large turtle crawling ashore at Awalua, Landing and digging a hole. Called Connally at home 565-6242

Peter & ~~Dobbs~~ Maggie – + Nurse

Saw large turtle ~ 2 wks ago while sun bathing at Awalua. Turtle was gone by the time she went to get her husband. Seemed to be only in intertidal. Many turtles seen offshore.

8-19 Walt Dudley & Nancy Bernard visited ME.

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
DIVISION OF FISH AND GAME
~~330 S. HOTEL STREET~~ • HONOLULU, HAWAII 96813
1179 PUNCHBOWL STREET

MESSAGE

TO G. Bela,
HIMB

SUBJECT Tagged Turtle

DATE 10-12-78

Today Bobby Emeral brought me a turtle to tag. It weighed ca #25 and measured 17"X13". I tagged it with tags # 2530 & 2531. It was released at noon at Kamalapau Harbor, LANAI

BY Peter Connally #22

REPLY

DATE

STATE OF HAWAII
DEPT. OF LAND & NATURAL RESOURCES
DIVISION OF FISH & GAME
P. O. BOX 1086
WAILUKU, HAWAII 96793
Lahui City 96763

SIGNED

Form NR113B The Drawing Board, Inc., Box 193, Dallas, Texas

INSTRUCTIONS TO SENDER:
1. KEEP YELLOW COPY. 2. SEND WHITE AND PINK COPIES WITH CARBON INTACT.

INSTRUCTIONS TO RECEIVER:
1. WRITE REPLY. 2. DETACH STUB. KEEP PINK COPY. RETURN WHITE COPY TO SENDER.

by Bill Puleloa

LANAI

* * * * * * * * TURTLES TAGGED ON ~~MOLOKAI~~ * * * * * * * * *

Date Tagged: Oct. 28, 1982

Location Caught: Laewahie, Lanai (just west of ferro-cement shipwreck)

Method of Capture: Hand Grab

Number	Curved Length	Curved WIDTH (cm)	Tag Number On Left Front Flipper	Tag Number On Right Front Flipper
1	56½	48	6569	6570

Remarks: Turtle was sleeping under a ledge in about 20' of water.

(Many others seen swimming around in this area.)

8-27-84

11015
Ser 248:TE/ 8906
24 JUL 1984

National Marine Fisheries Service
P.O. Box 3830
Honolulu, Hawaii 96812

Gentlemen:

The Marine Corps Air Station, Kaneohe Bay, 1st Marine Brigade, FMF is investigating the feasibility of utilizing a portion of northern Lanai for amphibious training exercises. The proposed training area is situated in the north/northwestern portion of the island as depicted on enclosure (1) and comprises approximately 7,000 acres. The area is considered particularly desirable in that it is relatively uninhabited and provides beach frontage and other land features ideally suited to the type of training intended. Marine Corps interest in northern Lanai is for long-term use; however, individual exercises will be confined to one or two days of operations conducted two to three times a year. Training activities are scheduled to commence at the first available opportunity after environmental, historical and legal requirements are satisfied.

Proposed training exercises are to consist of combined helicopter and amphibious assaults wherein marines will disembark and conduct follow-on day and night operations. Troops will proceed inland for a mechanized assault against enemy forces at higher elevations. Polihua Beach will be used for off-landing vehicles, supplies and troops and will serve as a primary site for service and logistical support detachments. No live ammunition will be used throughout operations. Pyrotechnics, if used, will be confined to select areas to avoid any risk of accidental wildfires. The number of participants in this exercise is estimated at 900 men.

To assess potentially adverse effects of training exercises on plant and wildlife species, an on-site inspection of the proposed Lanai training area was conducted on June 14, 1984 by representatives of this Command, State and Federal personnel and MCAS Kaneohe civilian and military representatives. Survey findings as documented by the Fish and Wildlife Service are provided as enclosure (2). Although no proposed, candidate, threatened or endangered plant or animal species were observed during this survey, there was some concern that Polihua Beach may on occasion provide nesting and basking areas for sea turtles, and coastal waters off-shore may be used as calving areas for whales.

In view of the above-noted concerns, we are requesting your comments on this training proposal as regards probable effects of the exercise on marine species specifically, reptiles, mammals and reef communities under your jurisdiction. Should your Service determine a more intensive assessment is

Don Rappel 471-3217

11015
Ser 248:TE/8908

required of the coastal area bordering Polihua Beach, please reveal specific survey requirements (location, man-days, cost, etc.) and your availability to perform said work.

Your cooperation in this matter will be greatly appreciated.

Sincerely,

Y. HIRONAKA
Head, Facilities Planning Dept.
Acting

Enclosures:
(1) Site Map-Proposed Training Area
(2) FWS Survey Report

DEPARTMENT OF THE INTERIOR

Fish and Wildlife Service

DEPARTMENT OF COMMERCE

National Oceanic and Atmospheric Administration

50 CFR Part 424

Listing Endangered and Threatened Species and Designating Critical Habitat; Amended Procedures To Comply With the 1982 Amendments to the Endangered Species Act

AGENCIES: Fish and Wildlife Service, Interior; National Marine Fisheries Service, National Oceanic and Atmospheric Administration, Commerce.

ACTION: Final rule.

SUMMARY: The U.S. Fish and Wildlife Service and the National Marine Fisheries Service (Services) amend Part 424 of Title 50 of the U.S. Code of Federal Regulations in order to comply with changes made in the Endangered Species Act of 1973 (Act) by the Endangered Species Act Amendments of 1982 (Amendments). Part 424 is amended to alter the procedures followed by the Services in determining whether species are endangered or threatened and in designating or revising critical habitat. Changes are made in the treatment of petitions from the public, mandatory time limits for various actions, standards under which determinations are made, and other procedural matters.

EFFECTIVE DATE: This rule takes effect on October 31, 1984.

ADDRESS: The complete file for this rule is available for inspection, by appointment, during normal business hours at the Office of Endangered Species, U.S. Fish and Wildlife Service, 1000 North Glebe Road, Arlington, Virginia.

FOR FURTHER INFORMATION CONTACT: Mr. John L. Spinks, Jr., Chief, Office of Endangered Species, U.S. Fish and Wildlife Service, Washington, D.C. 20240 (703/235–2771), or Dr. Charles Karnella, Office of Protected Species and Habitat Conservation, National Marine Fisheries Service, Washington, D.C. 20235 (202/634–7471).

SUPPLEMENTARY INFORMATION: The Services first adopted regulations governing the listing, delisting, and reclassification of species, and the designation and revision of critical habitat, on February 27, 1980 (45 FR 13022). These regulations are codified at 50 CFR Part 424. The Endangered Species Act Amendments of 1982 became law on October 13, 1982, making several changes in the required procedures to be followed under the Act.

In order to implement the changes of the Amendments, the Services proposed to amend 50 CFR Part 424 on August 8, 1983 (48 FR 36062). Comments were invited at that time from all interested parties, and the comment period on the proposal closed on October 7, 1983.

The present final rule essentially adopts the proposal of August 8, 1983. Some minor changes have been made in response to comments, as discussed below in the Summary of Comments and Recommendations. Some minor editorial changes have been made for the sake of clarity.

In addition the terms "endangered," "threatened," and "critical habitat" are not routinely capitalized in the final rule. This change from past practice is adopted to conform more closely with conventional English usage.

Changes made by the Amendments were designed to ensure that decisions in every phase of the listing process are based *solely* on biological considerations, and to prohibit considerations of economic or other nonbiological factors from affecting decisions regarding endangered or threatened status. The legislative history accompanying the Amendments makes it clear that, although economic considerations are relevant for the designation of critical habitat, such considerations should not be taken into account in deciding whether to list a given species. The listing process has been streamlined by reducing the time periods for adopting rules, by consolidating public meeting and hearing requirements, and by providing for the separation of critical habitat designations from the listing process when appropriate.

After receiving a petition to list, delist, or reclassify a species, the Secretary must now act "to the maximum extent practicable" within a 90-day period to publish a finding that the petition does or does not present substantial information indicating that the petitioned action may be warranted. The requirement to make such a finding within 90 days may be waived only if the devotion of staff resources to petition responses would interfere with actions needed to list other species in greater need of protection. Decisions to take one action rather than another must be made in conjunction with a scientifically-based priority system (such a system is embodied in U.S. Fish and Wildlife Service guidelines published September 21, 1983, 48 FR 43098).

Within 12 months of receiving a petition that presents "substantial scientific or commercial information," the Secretary must publish a proposed rule, determine that the petitioned action is not warranted, or determine that the action is warranted but that other listing, delisting, or reclassification actions preclude the preparation of a proposal. In any case, a notice of such findings must be published in the Federal Register. If a negative finding is made with regard to a petition, the finding is subject to judicial review.

The Amendments also provide that the 12-month time period may be extended only if the Secretary can demonstrate expeditious progress on other listings, delistings, and reclassifications. Any petition so extended is treated as if resubmitted, and an additional year is allowed for the required action. The justification for failure to propose an otherwise warranted petitioned species is subject to judicial review. Petitions to list, delist, or reclassify species that were pending at the time of passage of the Amendments are also covered by these new provisions.

Petitions to revise critical habitat, or to designate critical habitat concurrently with a listing, are not required to present economic information relevant to the proposed revision or designation. They will be treated in the same manner as other petitions except that the Services need not propose a revision supported by a petition containing substantial scientific information within 12 months of receipt. Rather, they must publish notice of an intended course of action.

Final action on listing, delisting, or critical habitat proposals now must be taken within 1 year of publication of the proposed rule, instead of 2 years as was previously allowed. A 6-month extension is permissible only if there exists substantial disagreement among specialists regarding the sufficiency or accuracy of the required biological data. This 6-month extension is not permissible to allow additional time to conduct economic or other analyses relating to critical habitat designations.

The Amendments restate the general requirement of concurrent listing and critical habitat designation for a given species but authorize listing without the latter in certain circumstances. If a critical habitat designation is found "not prudent," the listing can become final at any time during the 1-year (or 18-month) period. When scientific and commercial information indicates that prompt listing of the species is essential to its

conservation, but the analysis necessary to designate critical habitat has not been completed, the listing must be made final within the 1-year (or 18-month) period without designating critical habitat; the critical habitat segment of the proposal then would be completed and made final separately.

When critical habitat has been deemed "not determinable" within the 1-year (or 18-month) period, the initial 1-year period may be extended by not more than 1 additional year. At the end of the additional year, or earlier, critical habitat must be determined to "the maximum extent prudent." Revisions may be made as new information becomes available.

Finally, the Amendments require that if the Secretary adopts a rule over the objection of a State conservation agency or fails to take an action petitioned by such an agency, a written justification must be provided to the agency.

Summary of Comments and Recommendations

The Services received comments from the following individuals and organizations: the American Association of Port Authorities (AAPA); the Edison Electric Institute (EEI); the National Wildlife Federation (NWF); the Sierra Club, Hawaii Chapter (HSC); the Western Timber Association (WTA); the Wildlife Legislation Fund of America (WLFA); the Alabama Power Company (APC); Chevron U.S.A., Inc. (CUS); Conoco Inc., North American Production (CNAP); Middle South Services, Inc. (MSS); Texas Utility Services, Inc. (supporting the comments of EEI); the U.S. Department of Agriculture, Forest Service (USDA); the Office of the Assistant Secretary of Defense, Manpower, Reserve Affairs, and Logistics (DOD); the Department of Energy; the Office of Federal Activities of the U.S. Environmental Protection Agency (EPA); the Office of Environment and Energy, Department of Housing and Urban Development; the Office of Food and Natural Resources, Department of State (DS); Dr. Mark K. Johnson, of the School of Forestry and Wildlife Management, Louisiana State University; Mr. Richard W. Klukas, Wind Cave National Park; Dr. Lovett E. Williams; the Colorado River Water Conservation District (CRWCD); the Michigan State Department of Natural Resources; the Department of Environmental Resources of the Commonwealth of Pennsylvania; and the Office of Planning and Budget, State of Utah. Joint comments were submitted by the Environmental Defense Fund, Defenders of Wildlife, the Center for Environmental Education, the Humane Society of the United States, the Natural Resources Defense Council, the Friends of the Sea Otter, and the National Audubon Society (EDF).

Many comments expressed general approval of the proposal. Comments of a general nature are addressed below. More specific recommendations and responses follow, organized by the sections of the proposed rule to which they refer.

CUS, noting the Amendments' intention to expedite decisions on listings and delistings, encouraged the Services to avoid using the full time allotted to issue rules, and to especially avoid extensions of listing deadlines. The Services agree with the rationale presented in this comment, that both the species involved and industry project planning are best served by expeditious determinations of species' status. The Services intend listings and delistings to be processed as quickly as possible, consistent with the need to consider carefully all information in formulating rules. It is intended that the provisions for extending deadlines, contained in both the Act and the present procedural rules, will be invoked rarely and only in cases of real need to do so.

EDF expressed concern that determinations regarding the substantiality of petitions not be made according to the listing priority system previously published by the U.S. Fish and Wildlife Service (48 FR 43098, September 21, 1983). The Services regret any impression that may have been given in the preamble to the proposed listing regulations that determinations of substantiality of petitions would follow that priority system. Although considerations of priority may preclude prompt actions in response to petitions, it is not intended that they will affect the substantive finding that must be made regarding substantiality or the later finding that a petitioned action is or is not warranted.

EDF also recommended that a declaration be made that, "species the subject of 'pending proposals' previously withdrawn may be reproposed without regard to when the biological information was developed." The Services consider that this position is clear both in the amended Act and in the proposed regulations. Species withdrawn for purely administrative reasons under the 2-year limit on proposals, which is no longer contained in the Act, may be reproposed whenever information is available to support such a proposal.

Comments expressed contrary opinions with regard to the timing of critical habitat designations. Three (Dr. Gilbert, Mr. Klukas, WTA) held that delaying designation of critical habitat until after the listing of a species would likely benefit the species by expediting listing, while three others (AAPA, CRWCD, HSC) recommended that such designation regularly be concurrent with listing. The Services appreciate the concerns of those who believe that definition and designation of critical habitat in most cases slows the listing process. Although Congress, in passing the Amendments, clearly expressed the intention that the economic considerations connected to critical habitat designation not delay listing, other elements of the designation process clearly slow the pace of listing species. The Services also are aware of the concern that, if critical habitat is not designated concurrently with the listing of a species, potential conflicts may not be identified early enough to be satisfactorily resolved, or important areas of habitat may be inadvertently destroyed. It should be noted, however, that the Services may notify affected organizations and individuals of the habitat needs of species without going through the formal designation of critical habitat.

In making decisions regarding the timing and advisability of critical habitat designations, the Services will apply the requirements of the Act in a reasonable fashion. Legislative history makes clear that Congress intended designation of critical habitat to be beneficial to the conservation of species. Experience has shown, nevertheless, that precise identification of habitat of vulnerable species carries inherent risks of vandalism and taking. In some cases, these risks can be controlled through vigorous enforcement of Section 9 of the Act. In other cases, because of enforcement difficulties, or because no violation of Section 9 may be involved (as in taking of plants on non-Federal land or the destruction of plants even on Federal land without their reduction to possession), designation of critical habitat may have a net adverse effect on a species. It is this net effect, taking into account potential risks and benefits of a particular designation, that will guide the Services in decisions regarding the prudence of a particular designation. The timing of critical habitat designation is explicitly mandated in the Act, along with the possibility of deferring action for a limited time after listing a species when critical habitat is judged not to be determinable concurrently with listing. The latter deferral of designation can allow listings to go forward in a timely manner and critical habitat to be designated later. The Services believe

that these provisions of the Act are accurately reflected in the proposed and final listing regulations.

HSC recommended that provisions be made to include as part of the critical habitat "* * * those portions of the historic range of an endangered species which are still suitable for the species but, because of one or more perturbations to it, no longer occurs there but almost certainly could if such perturbations were removed or adequately ameliorated." The Services note that the Act and the listing regulations allow designation of areas outside the known range of a species when such areas are essential to the species' conservation. These provisions adequately allow for critical habitat designations in unoccupied portions of a species' historic range.

CRWCD recommended that, "* * * where a species listing proposal is known to conflict with a water (or other) resources development project, the agencies should consult closely with the affected entity." The Services agree that early contact and sharing of information with affected entities is desirable and is in the best interests of candidate species as well as sound project planning.

Subpart A—General provisions

Section 424.02 Definitions.

(b) *"Candidate"*—Several commenters (CUS, EDF, NWF, USDA) requested clarification of this term, particularly to differentiate between a candidate species being considered for listing and a species that has already been proposed to be listed. The definition has been altered in the final rule to make this point clear. As stated in the proposed rule, this term is included and defined to reflect the Fish and Wildlife Service's current practice of issuing consolidated notices of review, in which such species are identified.

(c) *"Conservation, conserve, and conserving"*—NWF recommended that this definition be altered to conform to that proposed to be placed at 50 CFR 402.2 (48 FR 29998, June 29, 1983). The Services believe that the two definitions are essentially equivalent and, inasmuch as that proposed at § 424.02 precisely follows the definition contained in the Act, this version is adopted here.

(d) *"Critical habitat"*—CNAP recommended that this definition be altered to require that a positive showing be made (presumably that an area designated is essential to a species' conservation) if critical habitat extends beyond the area actually occupied by a species, and that multiple-use management of critical habitat be provided for. The Services consider both recommendations to fall outside the scope appropriate for a definition. The former is adequately addressed in § 424.12(e). The latter recommendation is consistent with the provisions of the Act and policies of the Services. No limitation, express or implied, on multiple use of areas designated as critical habitat is contained in the Act or has been imposed by the Services, so long as such multiple use is consistent with section 7(a)(2) of the Act.

(e) *"Endangered species"*—CNAP indicated that, to be endangered, a species must be in danger of extinction throughout all or a significant portion of its range, and expressed concern over the, "* * * unjustified listing of subgroups or subspecies by location of a plentiful species (e.g., Tennessee River tributary 'snail darter' and 'Houstonian [sic] toad')." The Services note that both the snail darter (*Percina tanasi*) and the Houston toad (*Bufo houstonensis*) are recognized as full species and listed throughout their ranges. The Services further note that the Act explicitly allows for the listing of infraspecific taxa and, in the case of vertebrate species, populations as well. Thus, any change in this definition that would exclude such entities would be in conflict with the clear provisions of the Act.

(g) *"Plant"*—NWF recommended that this definition be altered to make it conform more closely to the definition of "wildlife" or "fish and wildlife" at § 424.02(n). The Services accept this recommendation for the sake of clarity and uniformity. The definition has been altered in the final rule. This is not viewed as a substantive change, inasmuch as the Services have always interpreted the two definitions as being comparable in scope.

(i) *"Secretary"*—CNAP questioned the appropriateness of having an authorized representative empowered to serve in the place of the Secretary in all cases. The representative referred to is an individual with clearly delegated authority from the Secretary to undertake the actions covered by this rule. Nothing in the Act hinders such a delegation. At present, these authorities have been delegated to the Assistant Secretary of the Interior for Fish and Wildlife and Parks, and the Assistant Administrator for Fisheries, National Marine Fisheries Service, Department of Commerce.

(k) *"Species"*—Dr. Williams suggested that the Services consider defining this term so that it does not use the term "subspecies," because of the lack of consensus among biologists as to its precise meaning and significance, and because of the likelihood that it would be misinterpreted by individuals lacking an adequate background in biology. The Services appreciate the possible uncertainty that could arise if the term "subspecies" were not interpreted carefully. However, the Act specifically includes this term within its definition of "species," so that its exclusion from the regulatory definition would not be warranted. The Services are confident that they have access to sufficient biological expertise to ensure that the definition of "species" will be interpreted in a manner consistent with accepted biological principles.

Several additional terms were suggested by NWF for inclusion and definition in this section. These were "maximum extent practicable," "promptly," "proposed species," and "substantial information." The Services believe that the first two of these are not used in the regulations in any specialized sense that differs from their common meanings, and that regulatory definition is unnecessary. "Proposed species" was recommended for inclusion solely to draw a distinction between it and "candidate." Inasmuch as this distinction is made in the altered definition of "candidate" finally adopted, the inclusion and definition of a new term is not necessary. The term "substantial information" has specific applicability to findings necessary with regard to petitions. Because of this specific and narrow applicability, it has been defined in § 424.14(b). Inclusion of this definition in § 424.02 is unnecessary and could be misleading.

Subpart B—Revision of the lists

Section 424.10 General.

EDF recommended that this section be broadened to extend the new petition procedures to petitions to designate experimental populations or to treat species as if listed because of similarity of appearance. The Services believe that Congress clearly expressed its intent with regard to the scope of the amended petition provisions, and applied different requirements to each class of petitions covered by the Act. Inasmuch as no provision was made to subject either experimental populations or similarity-of-appearance cases to specific listing procedures under the Act, the Services consider it appropriate to treat such petitions, if received, only under the relevant provisions of the Administrative Procedure Act (5 U.S.C. 553), as opposed to subsections 4 (a) and (b) of the Endangered Species Act.

Section 424.11 Factors for listing, delisting, or reclassifying species.

CNAP responded to this section that, "We do not agree that Congress in using the phrase 'solely on the basis of the best scientific data available to him' (ESA, section 4(b)) ever intended that every scarce creature or plant should be protected at all costs!" The Services note that the listing provisions of the Act, and the regulations intended to implement them, address the identification by the Secretary of species that qualify for the Act's protection. Insofar as these provisions consider the status of a species, Congress has clearly indicated its intention that any costs of eventual protection not be considered as part of the identification and listing process. The exemption procedures in section 7 of the Act are intended to effect any balancing of the costs involved against the value of protecting a species. These provisions of section 7, however, are completely independent of the identification and listing of species that are unlikely to survive without protection under the Act.

Dr. Williams questioned the possibility, allowed in § 424.11(a), of listing taxonomic groups of rank higher than species, noting that, "Taxa above the species level are not biological entities—they are merely components in somebody's classification scheme that reflects their beliefs concerning evolutionary affinities." The Services wish to clarify the intention, stated in the proposed and final regulation, that taxonomic groups at a rank higher than species will be listed only if all their constituent species individually meet the terms of the Act for listing. Listing of the taxon of higher rank then serves as a "short-hand" means of listing all its constituent species.

APC recommended that § 424.11(b) be altered to conform more closely to the wording of section 4(b)(1)(A) of the Act, by adding the material proposed to be located at § 424.11(f) and deleting the phrase "* * * without reference to possible economic or other impacts of such determination." The Services believe that no substantial change would result from adoption of such a recommendation, and that the rule as proposed more clearly expresses both the provisions of the Act and the instructive language of the Conference Report on the Amendments than would the recommended alternative.

CRWCD indicated concern that "* * * too little emphasis may have been given in the past to the quality and validity of the biological information used by agencies in the listing process." They noted the provision of § 424.11(b) requiring that the Services formulate listings based on the best available scientific and commercial information and recommended that listing decisions not be made on, "* * * shaky scientific foundations or biased analyses." The Services agree that listing decisions should not be made on the basis of faulty or inconclusive information, and affirm their intention to comply fully with relevant provisions of the Act and these regulations. It is their intention to base all listing decisions on the best information available to them when such decisions are made.

EPA recommended that language be added to the preamble of the final rule to clarify why a more precise definition of time is not included in § 424.11(d), which describes the period of time necessary to establish that a listed species has become extinct. The comment expressed understanding that this length of time might vary among the species concerned, in that some species are more cryptic than others. The Services agree and note that survey techniques appropriate to a given species in determining whether it has become extinct will require varying lengths of time to carry out. The Services intend to base delistings due to extinction upon conclusive evidence appropriate for the species in question.

EPA also recommended that § 424.11(d)(2) be altered to make it follow more closely the language of section 4(b)(1)(A) of the Act. This recommendation is accepted, and the final rule is so altered.

Section 424.12 Criteria for designating critical habitat.

CNAP expressed the opinion that, "* * * there must be a positive showing of need before a critical habitat larger than that currently occupied by the species to be protected can be designated." The Services agree that any designation of critical habitat must be based on a finding that such designated area contains features that are essential in order to conserve the species concerned. This finding of need will be a part of all designations of critical habitat, whether or not they extend beyond a species' currently-occupied range.

EEI supported the Services' intention to protect species from "* * * harm that might result if critical habitat were publicized." Nevertheless, the Institute recommended that private parties contemplating development or other activities be provided with information as to whether "non-designated critical habitat" could be affected. The Services note that the term "critical habitat" is not properly applied to an area that has not been formally designated as such by regulation. However, the Services intend to inform private parties of the habitat needs of listed species whenever a potential conflict is identified between contemplated development and the species' conservation, regardless of whether critical habitat has been designated for such species.

EPA recommended that criteria and examples of cases be provided in which it would not be prudent to designate critical habitat because designation would not be beneficial to the species concerned. The Services believe that such decisions must be made on a case-by-case basis. Because of the variations in circumstances, it is not possible to formulate strict criteria according to which decisions regarding the prudence of a critical habitat designation might be made. Nevertheless, it is possible to note some general considerations that may contribute to such decisions. As noted above in response to more general comments, the Services will examine the balance between risk to a species that might be a consequence of designating its critical habitat and benefits that the species might derive from such designation. The risks may be immediate and obvious, such as the taking of a species that has demonstrated commercial value, or more speculative, such as vandalism to a species' habitat as a consequence of wide public notification of its precise boundaries. Experience has also shown that listing of a species may stimulate commercial demand that could not have been predicted beforehand, and that designation of critical habitat may generate public antagonism that could lead to vandalism. Such possibilities will be considered in determining whether a particular designation of critical habitat is prudent. To the extent possible, the Services will attempt to undertake only those regulatory actions of net benefit to the conservation of species and their habitats. In those cases in which the possible adverse consequences would outweigh the benefits of designation of critical habitat, the Services may forego such designation as matter of prudence.

Dr. Williams suggested that designation of critical habitat not be considered determinable, "When habitat requirements are superfluous to the recovery requirements of the species." He noted that this would be appropriate in cases of species affected by such threats as pesticides, exotic animals, or hunting. The Services believe that such classes of threats are often related to habitat in the broad sense, noting that

the presence of a pesticide is an element of the habitat occupied by a species. In any event, such considerations are more properly addressed in determining whether designation is prudent, rather than whether critical habitat is determinable. In cases in which critical habitat designation would not be of benefit to a species, the Services believe that sufficient discretion exists under the Act and § 424.12(a)(1) to forego designation on grounds of prudence.

AAPA recommended deletion of proposed § 424.12(a)(2)(ii), because they failed to, "* * * see how a species can be determined to be endangered if its biological needs are not sufficiently well-known to allow identification of its critical habitat needs." The Services believe that it is possible to determine that a species is endangered or threatened, on the basis of its known and documented decline or evidence of threats to it, without knowing what precise habitat resources the species requires for survival and recovery. This is one reason for which the "determinable" standard was inserted by the Amendments and is reflected, with explanation, in the proposed and final regulations.

EEI recommended that § 424.12(e) be modified to allow designations of critical habitat outside the present geographical range of a species only when such designation is required to prevent the species' extinction. The Services believe that such a change would be inconsistent with the Act's purpose of conserving and recovering species as well as the definitions of critical habitat contained in the Act and these regulations, both of which allow designation of critical habitat beyond a species' known range when such designation is essential for the species' conservation. The Services also disagree with EEI's further statement in this regard that extensions beyond a species' present range are unlikely to occur without artificial assistance, and that such additions to critical habitat are more properly considered under those portions of the Act and proposed regulations treating experimental populations. Designations of critical habitat outside current range are normally undertaken when essential to a species' conservation and to provide for natural range expansion into adjacent suitable habitat or to assure proper management of resources. Neither of these cases is appropriately addressed under provisions governing the establishment of experimental populations.

APC recommended that provisions regarding analysis of impacts of critical habitat designation, proposed to be located at § 424.19, be relocated to § 424.12(c). The Services consider this inadvisable inasmuch as § 424.12 deals with both proposed and final rules to designate critical habitat. Current procedures call for the consideration of economic impacts only after publication of a proposed rule, so that placement of the relevant provisions in § 424.12 would be inappropriate. The final version of § 424.19 has been altered to reflect the proper timing of analyses of critical habitat designations. Reference to the economic considerations for final rules has been included in § 424.12.

EDF recommended that the Services, "* * * not foreclose the authority to designate critical habitat in foreign countries," as proposed in § 424.12(h). The Services believe that the clear instruction of the House Committee on Merchant Marine and Fisheries, contained in its report on the Amendments and implicitly accepted by the Committee of Conference, must control any consideration of designating critical habitat in foreign countries. The House report noted with approval an opinion of the Office of the Solicitor, Department of the Interior, that the Act does not contain authority to designate critical habitat in areas outside U.S. jurisdiction. Given this clear instruction in the legislative history of the Amendments and the original 1973 Act, the Services perceive no discretion to interpret the Act otherwise, and have retained § 424.12(h) in the final rule in order to clarify their position in this regard.

Section 424.13 Sources of information and relevant data.

NWF commented that the statement in the proposal that, "[T]he last sentence of this section would be deleted because a similar provision is proposed to be added to § 424.11(d)," was misleading and incorrect. The Services agree; the reference should have been to § 424.11(c). Inasmuch as this error was part of the section-by-section analysis, rather than the text of the proposed rule, no change in the final rule is necessary. The Services regret any misunderstanding that might have arisen.

EPA recommended that this section be revised to require that the Secretary consult with individuals, agencies, or sovereign nations whenever a specific interest in a species is known to exist on the part of such entities, rather than requiring such contacts only "as appropriate." The Services note that this provision was originally included in § 424.13 to reflect a former provision of section 4(b)(1) of the Act. Although the relevant portion of the Act was removed by the Amendments, the Services have retained the provision for consultation with affected parties. In the absence of any legislated requirement in the amended Act, however, the Services consider it inappropriate to make this provision any more stringent than it was in the proposed version.

Dr. Johnson suggested that the phrase, "if available" be inserted at the beginning of the second sentence of § 424.13, so that the Secretary may review only those data that are available. Inasmuch as a substantive review can only address information that is in hand, the Services believe this qualification to be unnecessary.

CNAP expressed the opinion that "interested parties" must specifically include any person affected by the proposed designation. The Services agree that such persons should be consulted in formulating any proposed change in the lists, and intend to do so. Inclusion of such a statement in the regulations, however, would imply that *only* such persons are to be consulted, and thus would tend to limit the scope of interested parties that might be consulted. The Services believe that such implied limitation would be inadvisable.

Section 424.14 Petitions.

NWF questioned the basis for applying different standards to petitions dealing with critical habitat than those applied to petitions regarding a species' listing. Section 4(b)(3) of the Act explicitly prescribes the different standards to be applied to such petitions; the Services follow the clear language of the Act in this case.

Dr. Johnson suggested that § 424.14(a) be altered to require that a petition contain substantial scientific or commercial information. The Services note that the paragraph in question is intended to identify those elements that must be included in a document for it to be considered a petition. Inasmuch as the Act requires that petitions be evaluated to determine whether they contain such substantial information, it would be contradictory to require such information in order for a document to be considered to be a petition.

NWF requested that a provision be added to this section to require the Secretary, when making a negative finding under § 424.14(b)(1), to so notify the petitioner in writing and explain any deficiencies of information in the petition, so that it could be corrected and resubmitted. Although the Services will notify petitioners of findings and point out the basis on which negative

findings are made, it may not be possible in all cases to furnish a petitioner with specific points of information that might be added to a petition in order for it to provide substantial information. The finding rests not on any artificial compliance with the general guidance of § 424.14(b)(2)(i)–(v), but upon a reasoned evaluation of the information presented and a judgment of whether or not it is sufficient to warrant a review of a species' status. As an example, a petition that failed to adequately establish the existence of a threat to a species recommended for listing could be judged not to have presented substantial information, but it would not necessarily be possible for the Services to detail the precise kinds of information that would be sufficient to document such threat. Because of the speculative nature of any such explanation, the Services do not consider it advisable to establish it as a requirement.

NWF also objected to § 424.14(b)(2)(i)–(v) as proposed, holding that the considerations presented would not always be germane or necessary to the evaluation of a petition. NWF therefore advocated inclusion of an additional paragraph stating that, "Items (b)(2)(i–v), while usually necessary for petition evaluation, shall not be required to demonstrate substantial information." The Services agree in principle with this comment, but do not believe the rule as proposed is unclear on this point. The paragraphs in question are intended only to provide a general guide to the kinds of information the Services believe are necessary to evaluate a petition. They do not establish strict requirements that must be met in order for a petition to be considered substantial, so that a specific qualification of the sort advocated by NWF would be unnecessary.

APC recommended that, in addition to the types of information to be considered in determining whether a petition presents substantial information under § 424.14(b)(2)(ii), the Secretary consider whether a petition describes, "* * * the features of economic and biologic importance of any recommended critical habitat."

The Services note that the Conference Report on the Amendments expressed the intention that petitioners not be required to provide economic information, other than evidence of trade, if any, in connection with a petition to list or delist a species or a petition to revise critical habitat. Thus, it would be inappropriate to require such information among that to be considered under § 424.14(b)(2). Proposed § 424.14(b)(2)(iii) was concerned with information bearing on the appropriateness and extent of any critical habitat designation recommended in a petition primarily concerned with the determination of a species' status. The Services believe that proposed paragraph (iii) adequately outlined the types of information to be considered in evaluating a recommended critical habitat designation on biological grounds. However, to make clear that such information need not be included in a petition in order for it to satisfy the requirement to present substantial information, the proposed paragraph has been removed from the list of considerations to be examined in determining substantiality. The information regarding the concurrent designation of critical habitat is requested from each petitioner but not required in two new concluding sentences to § 424.14(b)(2). The Act's requirement that the Secretary consider economic impacts of such a designation is interpreted as applying directly to the Services, and is not necessarily to be addressed in a petition in order for that petition to be judged substantial.

NWF commented in reference to § 424.14(b)(3) that, "* * * the proposed regulations do not discuss what happens when the Secretary makes a negative finding on a petition, and they completely ignore the judicial review process * * *." Section 424.14(b)(1) requires that any negative 90-day finding on a petition be published in the Federal Register with notification being sent to the petitioner. Such publication and notice will constitute the Services' final action with regard to such a petition. The Services recognize the mechanism established by the Amendments to provide judicial review of findings on petitions. This mechanism is in place and available independently of the regulations adopted in Part 424, which are intended to prescribe the procedures to be followed by the Services in implementing the Act. It would appear to be inappropriate and superfluous to provide for such review in the present regulations. The statute speaks for itself.

NWF requested that provisions be made in § 424.14(c) for notification to a petitioner to explain the reason for rejecting a petition to revise critical habitat. The Services note that notice of any negative finding under § 424.14(c) must be published in the Federal Register. As noted above in reference to § 424.14(b), the Services intend to notify a petitioner of the reasons for any negative finding regarding substantiality. Nevertheless, it would not be possible to detail in every case the exact type of additional information that would be required to make a positive finding, and the Services do not consider it advisable to mandate such explanation by regulation.

NWF also requested that a provision be added to § 424.14(c) that would make clear that a petition to revise critical habitat is not required to present economic information relevant to the revision recommended. The Services consider it to be clear that no such information is solicited in connection with any class of petition, and thus believe it to be unnecessary to expressly state that such information need not be provided by a petitioner. However, although the Services may not require the submission of economic data with a petition to revise critical habitat, they must consider the economic and other impacts of specifying a particular area as critical habitat before issuing a final rule.

APC recommended that § 424.14(c)(2) refer back to § 424.12(b) in setting out the types of information that must be considered in determining whether a petition to revise critical habitat presents substantial information, rather than establishing the separate standards proposed to be placed at § 424.14(c)(2)(i) and (ii). The Services believe that the standards applied to petitions are sufficiently different from those governing the overall designation of critical habitat that it could be confusing to accept APC's recommendation, and could imply that a higher standard would be applied in judging substantiality of such petitions than is intended by the Act. A petition may fall short of supplying all the information that would be necessary to issue a proposed rule, but still be judged to present substantial information indicating that a revision of critical habitat may be warranted. Inasmuch as the criteria of § 424.12 are aimed at the information needed by the Services to allow them to propose a rule, such critieria would be unnecessarily burdensome if applied to petition findings.

APC also recommended that § 424.14(d) be altered to include a statement that the Secretary designate critical habitat on the basis of the best scientific data available and after taking into consideration the economic and other impacts of the designation. The Services do not believe such a provision would be appropriately placed in § 424.14(d), which deals with petitions to designate critical habitat. The substance

of the recommendation is already provided for in §§ 424.12 and 424.19.

NWF requested that § 424.14(d) be expanded to indicate information standards, time limitations, and appeal provisions for petitions to designate new critical habitat. Because the Act imposes no specific standards for such petitions, the Services see no necessity to adopt such standards administratively. Properly considered, the Act's specific petition procedures appear to be intended as an attention-calling device to ensure that the Services take prompt and appropriate action when newly notified of a situation affecting the welfare of a species or of the apparent inappropriateness of some past listing or designation of critical habitat. Because consideration of designating critical habitat is an integral part of the process of listing a species, it is unlikely that a petition to designate critical habitat for a listed species will be intended to call the Services' attention to a situation of which they were previously unaware. It thus makes sense not to treat petitions to designate critical habitat under standards as stringent as those applied to other petitions.

Section 424.15 Notices of review.

CUS requested a clarification of what was meant by the statement that, "No legal consequences shall arise under the Act as a result of the designation of a species as a candidate for listing." This statement was intended to make clear that species so identified, but not proposed for listing, are not subject to the protections or prohibitions of the Act under sections 7 and 9.

HSC recommended that candidate species be given some legal protection to prevent destruction of the species or their habitats before a listing decision is made. The Services note that the Act makes no provisions for the legal protection of candidate species, and thus none can be afforded in these rules. Nevertheless, it is the belief of the Services, as also recommended by EDF, that such species should be taken into consideration in environmental planning under such laws as the National Environmental Policy Act. Such consideration, however, is not appropriately included in the present rule, which is intended only to govern listing procedures under the authority of the Endangered Species Act.

The Department of State requested that an alteration be made in the notification provisions of this section to ensure that notifications to foreign countries be made through the Secretary of State. This correction has been made in the final rule.

Section 424.16 Proposed rules.

NWF questioned the advisability of including a map in all proposals of critical habitat because of the possibility of thereby increasing the threat to a species by making public the area in which it occurs. When publication of maps would increase threats to species, the Services intend to forego entirely the designation of critical habitat as not prudent. Critical habitat designation will be proposed, and detailed maps published, only when it is judged that such designation will be to the net benefit of the species involved.

AAPA supported the provision contained in § 424.16(c)(1)(ii) for notifying local authorities, but recommended that it be broadened to include all jurisdictions within a local area. The Services intend to notify all known affected local authorities of proposed rules. Section 424.16(c)(1)(iii) has been modified to express this intent.

EPA requested that this section require notification of all appropriate Federal agencies. A provision has been added to the final rule at § 424.16(c)(1)(iii) to make clear that the Services will notify Federal agencies as well as private individuals and organizations known to be affected by a proposal. This is in keeping with existing administrative practice.

The State of Utah requested that provisions be made in § 424.16(c)(1)(vi) for publication of notice of any proposed rule in appropriate scientific journals. The Services note that § 424.16(c)(1)(v) requires notification of appropriate scientific organizations, as required in the Amendments. The Services believe that this provision adequately allows for notification of the scientific community.

NWF requested that § 424.16(c)(2) specifically provide that a comment period may be extended for good cause. The Services note that the paragraph in question provides only minimum periods for public comment, without any express or implied limitation of the maximum period that may be allowed. Nevertheless, the paragraph has been modified in the final rule in order to clarify the Secretary's discretion to extend or reopen a comment period on a proposed rule.

NWF also pointed out that the legislative history of the Amendments indicates that more than one public hearing may be held in connection with a proposed rule. Although the Services do not believe the proposed rule necessarily implied any limitation on the Secretary's discretion to hold more than one hearing, the final version of § 424.16(c)(3) has been modified to make this point clear.

Section 424.17 Time limits and required actions.

EDF requested that § 424.17(a)(1)(iii) (now at § 424.17(a)(1)(iv)) be expanded to indicate that the substantial disagreement concerning the sufficiency or accuracy of data, upon which a 6-month extension may be based, must be a disagreement among scientists knowledgeable about the species in question. The Services agree that this was the intention of the Amendments, and have modified the final rule to make this clear.

NWF recommended that the clarity of the rule would be improved if §§ 424.17(a)(1) (iii) and (iv) were reversed in order. The Services agree and have so modified the final rule.

Section 424.18 Final rules—general.

NWF recommended two minor changes in this section: (1) Specification that a final rule would take effect 30 days after publication, rather than, "not less than" 30 days, and (2) substitution of "proposed regulation" for "regulation" in § 424.18(c). In the first case, the Services note that final regulations adopted pursuant to Part 424 ordinarily do take effect 30 days following publication, but prefer not to make this a regulatory requirement. The second recommendation would conflict with the provisions of the Act as amended, which deal with the adoption, rather than proposal, of a regulation. The paragraph remains as proposed.

WLFA recommended that any justification provided a State agency under § 424.18(c) be required to, "* * * set forth the reasons that the State agency's position was rejected, in sufficient detail and with sufficient supporting data, that the agency may have an evidentiary basis for comparing its position with that of the Secretary." The Services do not believe that Congress intended to establish such a strict standard for justifications to State agencies. Rather, the Services interpret this provision of the Act to provide that State agencies be adequately informed of the basis for any action that is not in agreement with that agency's recommendation. Section 424.18(c) remains in the form proposed.

Section 424.19 Final rules—impact analysis of critical habitat.

MSS recommended that provisions for considering economic and other impacts of critical habitat designations be relocated to § 424.12, because the proposed placement, "* * * diminishes the weight to be given economic impacts in the designation of Critical Habitats."

The Services deliberately placed the substantive consideration of economic impacts of critical habitat designation in a section apart from that discussing the biological criteria for designating critical habitat. This was done in response to the expressed intent of Congress that economic considerations not affect or delay the listing of species. In that designations of critical habitat are customarily included in rules that list species, the consideration of economic impacts before issuance of a proposed rule could inappropriately delay proposal. Once a rule is proposed, however, the Services are ordinarily required to take final action within 1 year and, if economic analyses are not yet complete, must extend the critical habitat portion of a rule while making the listing final. Thus, if economic impacts are not considered until after the proposal stage, the possibility that economic considerations will prevent the listing of a species is reduced. The Services do not believe this represents a diminution in the weight given to the consideration of the economics of a designation, consideration of which will be completed once a proposed listing has been published. Moreover, since the Services expressly solicit public comment on the economic consequences of a given critical habitat proposal, the Services will have the benefit of such comments as they develop a final rule.

EPA requested clarification of the intended scope and methodology of any economic analysis performed on a designation of critical habitat, specifically asking whether environmental as well as economic impacts would be addressed and whether standard cost-benefit techniques would be used. EPA recommended that both classes of impacts be addressed and that the analytical methodology be cited in the final rule. The Services intend that analyses performed under this section will be focused primarily on the economic costs associated with designation, which was the intent of Congress in requiring such analyses. Consideration of biological impacts of critical habitat designation are more properly addressed in determining whether designation is prudent and will be of benefit to a species. The methodology and specific techniques employed have been developed and refined since economic considerations were first required by the 1978 Amendments to the Endangered Species Act. To fully address the issues at hand, these procedures must vary according to the specific area under review. Impacts should not be expected to remain static or to apply uniformly to all cases.

The Services' consideration of economic and other impacts resulting from the designation of critical habitat will cover all activities affecting or affected by the proposed critical habitat designation. The best available data on economic and other impacts must be gathered on the full scope of proposed critical habitat to assist the Services in determining whether adjustments should be made before the critical habitat designation is made final.

EPA requested that this section and § 424.12 be cross-referenced. For the reasons mentioned above in reply to a recommendation from MSS, the Services believe that it is advisable to keep separate the biological and economic considerations that lead to a final designation of critical habitat.

EPA also recommended that the provision of this section that prohibits the Secretary from excluding any area from critical habitat if so doing would result in extinction of the species concerned be altered to prohibit exclusion if so doing would "preclude the recovery of the species." The Services appreciate the inconsistency between the discretion allowed the Secretary in excluding areas from critical habitat and the stated purpose of the Act of providing not only for the survival of species, but for their recovery as well. Nevertheless, the Services must follow the provision of the Act that allows exclusions of certain areas from critical habitat so long as it will not result in extinction of the species concerned. It should be noted that this provision is permissive rather than prescriptive, and does not *require* exclusion of an area from critical habitat under any given set of circumstances.

Section 424.20 Emergency rules.

NWF recommended that this section include a provision that would require the Secretary to, "* * * publish emergency rules in the Federal Register within 10 days after they are issued [sic] * * *." The Services assume that this is intended to mean that emergency rules should be published within 10 days after being approved by the Secretary, inasmuch as issuance and publication are the same. The Services intend that emergency rules be published as quickly as possible after approval, but see no need to make this a regulatory requirement.

DOD recommended that this section contain a requirement to notify concerned Federal land managers of emergency rules. The provision for notification of State agencies of emergency rules is adopted directly from the Act. The Services do routinely notify affected Federal agencies as well when adopting emergency rules, but do not believe it necessary to make this a regulatory requirement, since inadvertent failure to comply with such a required notification could then cast doubt on the validity of a rule. Nevertheless, the Services will endeavor to notify Federal land managers of such emergency rules to the maximum extent possible.

Executive Order 12291, Paperwork Reduction Act, and Regulatory Flexibility Act

The Department of the Interior, as lead agency in the development of this rule, has determined that it is not a major rule as defined by Executive Order 12291; that the rule would not have a significant economic effect on a substantial number of small entities as described in the Regulatory Flexibility Act (Pub. L. 96-354); and that the rule does not contain any information collection or recordkeeping requirements as defined in the Paperwork Reduction Act of 1980 (Pub. L. 96-511).

National Environmental Policy Act

The Fish and Wildlife Service has determined that these proposed regulations are categorically excluded from National Environmental Policy Act (NEPA) requirements (Part 516 of the Departmental Manual, Chapter 6, Appendix I, section 1.4A.(3) categorically excludes the issuance of regulatory procedures when the impacts are limited to administrative or technological effects). This rule is procedural in nature, adopted in strict, non-discretionary compliance with the Amendments and will have no independent environmental consequences.

Author

The principal author of this rule is Dr. John J. Fay, Office of Endangered Species, U.S. Fish and Wildlife Service, Washington, D.C. 20240 (703/235-1975).

List of Subjects in 50 CFR Part 424

Administrative practice and procedure, Endangered and threatened wildlife, Fish, Marine mammals, Plants (agriculture).

Regulation Promulgation

Accordingly, Part 424 of Chapter IV of Title 50 of the U.S. Code of Federal Regulations is revised to read as set forth below:

PART 424—LISTING ENDANGERED AND THREATENED SPECIES AND DESIGNATING CRITICAL HABITAT

Subpart A—General Provisions

Authority: Pub. L. 93–205, 87 Stat. 884; Pub. L. 95–632, 92 Stat. 3751; Pub. L. 96–159, 93 Stat. 1225; Pub. L. 97–304, 96 Stat. 1411 (16 U.S.C. § 1531 *et seq.*).

Subpart A—General Provisions

§ 424.01 Scope and purpose.

(a) Part 424 provides rules for revising the Lists of Endangered and Threatened Wildlife and Plants and, where appropriate, designating or revising their critical habitats. Criteria are provided for determining species to be endangered or threatened and for designating critical habitats. Procedures for receiving and considering petitions to revise the lists and for conducting periodic reviews of listed species also are established.

(b) The purpose of these rules is to interpret and implement those portions of the Endangered Species Act of 1973, as amended (16 U.S.C. 1531 *et seq.*), that pertain to the listing of species and the determination of critical habitats.

§ 424.02 Definitions.

(a) The definitions of terms in 50 CFR 402.02 shall apply to this Part 424, except as otherwise stated.

(b) "Candidate" means any species being considered by the Secretary for listing as an endangered or a threatened species, but not yet the subject of a proposed rule.

(c) "Conservation," "conserve," and "conserving" mean to use and the use of all methods and procedures that are necessary to bring any endangered or threatened species to the point at which the measures provided pursuant to the Act are no longer necessary. Such methods and procedures include, but are not limited to, all activities associated with scientific resources management such as research, census, law enforcement, habitat acquisition and maintenance, propagation, live trapping, and transplantation, and, in the extraordinary case where population pressures within a given ecosystem cannot be otherwise relieved, may include regulated taking.

(d) "Critical habitat" means (1) the specific areas within the geographical area currently occupied by a species, at the time it is listed in accordance with the Act, on which are found those physical or biological features (i) essential to the conservation of the species and (ii) that may require special management considerations or protection, and (2) specific areas outside the geographical area occupied by a species at the time it is listed upon a determination by the Secretary that such areas are essential for the conservation of the species.

(e) "Endangered species" means a species that is in danger of extinction throughout all or a significant portion of its range.

(f) "List" or "lists" means the Lists of Endangered and Threatened Wildlife and Plants found at 50 CFR 17.11(h) or 17.12(h).

(g) "Plant" means any member of the plant kingdom, including, without limitation, seeds, roots, and other parts thereof.

(h) "Public hearing" means an informal hearing to provide the public with the opportunity to give comments and to permit an exchange of information and opinion on a proposed rule.

(i) "Secretary" means the Secretary of the Interior or the Secretary of Commerce, as appropriate, or their authorized representatives.

(j) "Special management considerations or protection" means any methods or procedures useful in protecting physical and biological features of the environment for the conservation of listed species.

(k) "Species" includes any species or subspecies of fish, wildlife, or plant, and any distinct population segment of any vertebrate species that interbreeds when mature. Excluded is any species of the Class Insecta determined by the Secretary to constitute a pest whose protection under the provisions of the Act would present an overwhelming and overriding risk to man.

(l) "State agency" means any State agency, department, board, commission, or other governmental entity that is responsible for the management and conservation of fish, plant, or wildlife resources within a State.

(m) "Threatened species" means any species that is likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range.

(n) "Wildlife" or "fish and wildlife" means any member of the animal kingdom, including without limitation, any vertebrate, mollusk, crustacean, arthropod, or other invertebrate, and includes any part, product, egg, or offspring thereof, or the dead body or parts thereof.

Subpart B—Revision of the Lists

§ 424.10 General.

The Secretary may add a species to the lists or designate critical habitat, delete a species or critical habitat, change the listed status of a species, revise the boundary of an area designated as critical habitat, or adopt or modify special rules (see 50 CFR 17.40–17.48 and Parts 222 and 227) applied to a threatened species only in accordance with the procedures of this Part.

§ 424.11 Factors for listing, delisting, or reclassifying species.

(a) Any species or taxonomic group of species (e.g., genus, subgenus) as defined in § 424.02(k) is eligible for listing under the Act. A taxon of higher rank than species may be listed only if all included species are individually found to be endangered or threatened. In determining whether a particular taxon or population is a species for the purposes of the Act, the Secretary shall rely on standard taxonomic distinctions and the biological expertise of the Department and the scientific community concerning the relevant taxonomic group.

(b) The Secretary shall make any determination required by paragraphs (c) and (d) of this section *solely* on the basis of the best available scientific and commercial information regarding a species' status, without reference to possible economic or other impacts of such determination.

(c) A species shall be listed or reclassified if the Secretary determines, on the basis of the best scientific and commercial data available after conducting a review of the species' status, that the species is endangered or threatened because of any one or a combination of the following factors:

(1) The present or threatened destruction, modification, or curtailment of its habitat or range;

(2) Overutilization for commercial, recreational, scientific, or educational purposes;

(3) Disease or predation;

(4) The inadequacy of existing regulatory mechanisms; or

(5) Other natural or manmade factors affecting its continued existence.

(d) The factors considered in delisting a species are those in paragraph (c) of this section as they relate to the definitions of endangered or threatened species. Such removal must be supported by the best scientific and commercial data available to the Secretary after conducting a review of the status of the species. A species may be delisted only if such data substantiate that it is neither endangered nor threatened for one or more of the following reasons:

(1) *Extinction.* Unless all individuals of the listed species had been previously identified and located, and were later found to be extirpated from their previous range, a sufficient period of time must be allowed before delisting to indicate clearly that the species is extinct.

(2) *Recovery.* The principal goal of the U.S. Fish and Wildlife Service and the National Marine Fisheries Service is to return listed species to a point at which protection under the Act is no longer required. A species may be delisted on the basis of recovery only if the best scientific and commercial data available indicate that it is no longer endangered or threatened.

(3) *Original data for classification in error.* Subsequent investigations may show that the best scientific or commercial data available when the species was listed, or the interpretation of such data, were in error.

(e) The fact that a species of fish, wildlife, or plant is protected by the Convention on International Trade in Endangered Species of Wild Fauna and Flora (see Part 23 of this Title 50) or a similar international agreement on such species, or has been identified as requiring protection from unrestricted commerce by any foreign nation, or to be in danger of extinction or likely to become so within the foreseeable future by any State agency or by any agency of a foreign nation that is responsible for the conservation of fish, wildlife, or plants, may constitute evidence that the species is endangered or threatened. The weight given such evidence will vary depending on the international agreement in question, the criteria pursuant to which the species is eligible for protection under such authorities, and the degree of protection afforded the species. The Secretary shall give consideration to any species protected under such an international agreement, or by any State or foreign nation, to determine whether the species is endangered or threatened.

(f) The Secretary shall take into account, in making determinations under paragraph (c) or (d) of this section, those efforts, if any, being made by any State or foreign nation, or any political subdivision of a State or foreign nation, to protect such species, whether by predator control, protection of habitat and food supply, or other conservation practices, within any area under its jurisdiction, or on the high seas.

§ 424.12 Criteria for designating critical habitat.

(a) Critical habitat shall be specified to the maximum extent prudent and determinable at the time a species is proposed for listing. If designation of critical habitat is not prudent or if critical habitat is not determinable, the reasons for not designating critical habitat will be stated in the publication of proposed and final rules listing a species. A final designation of critical habitat shall be made on the basis of the best scientific data available, after taking into consideration the probable economic and other impacts of making such a designation in accordance with § 424.19.

(1) A designation of critical habitat is not prudent when one or both of the following situations exist:

(i) The species is threatened by taking or other human activity, and identification of critical habitat can be expected to increase the degree of such threat to the species, or

(ii) Such designation of critical habitat would not be beneficial to the species.

(2) Critical habitat is not determinable when one or both of the following situations exist:

(i) Information sufficient to perform required analyses of the impacts of the designation is lacking, or

(ii) The biological needs of the species are not sufficiently well known to permit identification of an area as critical habitat.

(b) In determining what areas are critical habitat, the Secretary shall consider those physical and biological features that are essential to the conservation of a given species and that may require special management considerations or protection. Such requirements include, but are not limited to the following:

(1) Space for individual and population growth, and for normal behavior;

(2) Food, water, air, light, minerals, or other nutritional or physiological requirements;

(3) Cover or shelter;

(4) Sites for breeding, reproduction, rearing of offspring, germination, or seed dispersal; and generally,

(5) Habitats that are protected from disturbance or are representative of the historic geographical and ecological distributions of a species.

When considering the designation of critical habitat, the Secretary shall focus on the principal biological or physical constituent elements within the defined area that are essential to the conservation of the species. Known primary constituent elements shall be listed with the critical habitat description. Primary constituent elements may include, but are not limited to, the following: roost sites, nesting grounds, spawning sites, feeding sites, seasonal wetland or dryland, water quality or quantity, host species or plant pollinator, geological formation, vegetation type, tide, and specific soil types.

(c) Each critical habitat will be defined by specific limits using reference points and lines as found on standard topographic maps of the area. Each area will be referenced to the State(s), county(ies), or other local governmental units within which all or part of the critical habitat is located. Unless otherwise indicated within the critical habitat descriptions, the names of the State(s) and county(ies) are provided for information only and do not constitute the boundaries of the area. Ephemeral reference points (e.g., trees, sand bars) shall not be used in defining critical habitat.

(d) When several habitats, each satisfying the requirements for designation as critical habitat, are located in proximity to one another, an inclusive area may be designated as critical habitat.

Example: Several dozen or more small ponds, lakes, and springs are found in a small local area. The entire area could be designated critical habitat if it were concluded that the upland areas were essential to the conservation of an aquatic species located in the ponds and lakes.

(e) The Secretary shall designate as critical habitat areas outside the geographical area presently occupied by a species only when a designation limited to its present range would be inadequate to ensure the conservation of the species.

(f) Critical habitat may be designated for those species listed as threatened or endangered but for which no critical habitat has been previously designated.

(g) Existing critical habitat may be revised according to procedures in this section as new data become available to the Secretary.

(h) Critical habitat shall not be designated within foreign countries or in other areas outside of United States jurisdiction.

§ 424.13 Sources of information and relevant data.

When considering any revision of the lists, the Secretary shall consult as appropriate with affected States, interested persons and organizations, other affected Federal agencies, and, in cooperation with the Secretary of State, with the country or countries in which the species concerned are normally found or whose citizens harvest such species from the high seas. Data reviewed by the Secretary may include, but are not limited to scientific or commercial publications, administrative reports, maps or other graphic materials, information received from experts on the subject, and comments from interested parties.

§ 424.14 Petitions.

(a) *General.* Any interested person may submit a written petition to the Secretary requesting that one of the actions described in § 424.10 be taken. Such a document must clearly identify itself as a petition and be dated. It must contain the name, signature, address, telephone number, if any, and the association, institution, or business affiliation, if any, of the petitioner. The Secretary shall acknowledge in writing receipt of such a petition within 30 days.

(b) *Petitions to list, delist, or reclassify species.* (1) To the maximum extent practicable, within 90 days of receiving a petition to list, delist, or reclassify a species, the Secretary shall make a finding as to whether the petition presents substantial scientific or commercial information indicating that the petitioned action may be warranted. For the purposes of this section, "substantial information" is that amount of information that would lead a reasonable person to believe that the measure proposed in the petition may be warranted. The Secretary shall promptly publish such finding in the Federal Register and so notify the petitioner.

(2) In making a finding under paragraph (b)(1) of this section, the Secretary shall consider whether such petition—

(i) Clearly indicates the administrative measure recommended and gives the scientific and any common name of the species involved;

(ii) Contains detailed narrative justification for the recommended measure, describing, based on available information, past and present numbers and distribution of the species involved and any threats faced by the species;

(iii) Provides information regarding the status of the species over all or a significant portion of its range; and

(iv) Is accompanied by appropriate supporting documentation in the form of bibliographic references, reprints of pertinent publications, copies of reports or letters from authorities, and maps.

The petitioner may provide information that describes any recommended critical habitat as to boundaries and physical features, and indicates any benefits and/or adverse effects on the species that would result from such designation. Such information, however, will not be a basis for the determination of the substantiality of a petition.

(3) Upon making a positive finding under paragraph (b)(1) of this section, the Secretary shall commence a review of the status of the species concerned and shall make, within 12 months of receipt of such petition, one of the following findings:

(i) The petitioned action is not warranted, in which case the Secretary shall promptly publish such finding in the Federal Register and so notify the petitioner.

(ii) The petitioned action is warranted, in which case the Secretary shall promptly publish in the Federal Register a proposed regulation to implement the action pursuant to § 424.16 of this Part, or

(iii) The petitioned action is warranted, but that—

(A) The immediate proposal and timely promulgation of a regulation to implement the petitioned action is precluded because of other pending proposals to list, delist, or reclassify species, and

(B) Expeditious progress is being made to list, delist, or reclassify qualified species,

in which case, such finding shall be promptly published in the Federal Register together with a description and evaluation of the reasons and data on which the finding is based.

(4) If a finding is made under paragraph (b)(3)(iii) of this Section with regard to any petition, the Secretary shall, within 12 months of such finding, again make one of the findings described in paragraph (b)(3) with regard to such petition, but no further finding of substantial information will be required.

(c) *Petitions to revise critical habitat.* (1) To the maximum extent practicable, within 90 days of receiving a petition to revise a critical habitat designation, the Secretary shall make a finding as to whether the petition presents substantial scienific information indicating that the revision may be warranted. The Secretary shall promptly publish such finding in the Federal Register and so notify the petitioner.

(2) In making the finding required by paragraph (c)(1) of this section, the Secretary shall consider whether a petition contains—

(i) Information indicating that areas petitioned to be added to critical habitat contain physical and biological features essential to, and that may require special management to provide for, the conservation of the species involved; or

(ii) Information indicating that areas designated as critical habitat do not contain resources essential to, or do not require special management to provide for, the conservation of the species involved.

(3) Within 12 months after receiving a petition found under paragraph (c)(1) of this section to present substantial information indicating that revision of a critical habitat may be warranted, the Secretary shall determine how he intends to proceed with the requested revision, and shall promptly publish notice of such intention in the Federal Register.

(d) *Petitions to designate critical habitat or adopt special rules.* Upon receiving a petition to designate critical habitat or to adopt a special rule to provide for the conservation of a species, the Secretary shall promptly conduct a review in accordance with the Administrative Procedure Act [5 U.S.C. 553] and applicable Departmental regulations, and take appropriate action.

§ 424.15 Notices of review.

(a) If the Secretary finds that one of the actions described in § 424.10 may be warranted, but that the available evidence is not sufficiently definitive to justify proposing the action at that time, a notice of review may be published in the Federal Register. The notice will describe the measure under consideration, briefly explain the reasons for considering the action, and solicit comments and additional information on the action under consideration.

(b) The Secretary from time to time also may publish notices of review containing the names of species that are considered to be candidates for listing under the Act and indicating whether sufficient scientific or commercial information is then available to warrant proposing to list such species, the names of species no longer being considered for listing, or the names of listed species being considered for delisting or reclassification. However, none of the substantive or procedural provisions of

the Act apply to a species that is designated as a candidate for listing.

(c) Such notices of review will invite comment from all interested parties regarding the status of the species named. At the time of publication of such a notice, notification in writing will be sent to State agencies in any affected States, known affected Federal agencies, and, to the greatest extent practicable, through the Secretary of State, to the governments of any foreign countries in which the subject species normally occur.

§ 424.16 Proposed rules.

(a) *General.* Based on the information received through §§ 424.13, 424.14, 424.15, and 424.21, or through other available avenues, the Secretary may propose revising the lists as described in § 424.10.

(b) *Contents.* A notice of a proposed rule to carry out one of the actions described in § 424.10 shall contain the complete text of the proposed rule, a summary of the data on which the proposal is based (including, as appropriate, citation of pertinent information sources), and shall show the relationship of such data to the rule proposed. If such a rule designates or revises critical habitat, such summary shall, to the maximum extent practicable, include a brief description and evaluation of those activities (whether public or private) that, in the opinion of the Secretary, if undertaken, may adversely modify such habitat, or may be affected by such designation. Any proposed rule to designate or revise critical habitat shall contain a map of such habitat. Any such notice proposing the listing, delisting, or reclassification of a species or the designation or revision of critical habitat shall also include a summary of factors affecting the species and/or critical habitat.

(c) *Procedures.*—(1) *Notifications.* In the case of any proposed rule to list, delist, or reclassify a species, or to designate or revise critical habitat, the Secretary shall—

(i) Publish notice of the proposal in the Federal Register;

(ii) Give actual notice of the proposed regulation (including the complete text of the regulation) to the State agency in each State in which the species is believed to occur, and to each county or equivalent jurisdiction therein in which the species is believed to occur, and invite the comment of each such agency and jurisdiction;

(iii) Give notice of the proposed regulation to any Federal agencies, local authorities, or private individuals or organizations known to be affected by the rule;

(iv) Insofar as practical, and in cooperation with the Secretary of State, give notice of the proposed regulation to list, delist, or reclassify a species to each foreign nation in which the species is believed to occur or whose citizens harvest the species on the high seas, and invite the comment of such nation;

(v) Give notice of the proposed regulation to such professional scientific organizations as the Secretary deems appropriate; and

(vi) Publish a summary of the proposed regulation in a newspaper of general circulation in each area of the United States in which the species is believed to occur.

(2) *Period of public comments.* At least 60 days shall be allowed for public comment following publication in the Federal Register of a rule proposing the listing, delisting, or reclassification of a species, or the designation or revision of critical habitat. All other proposed rules shall be subject to a comment period of at least 30 days following publication in the Federal Register. The Secretary may extend or reopen the period for public comment on a proposed rule upon a finding that there is good cause to do so. A notice of any such extension or reopening shall be published in the Federal Register, and shall specify the basis for so doing.

(3) *Public hearings.* The Secretary shall promptly hold at least one public hearing if any person so requests within 45 days of publication of a proposed regulation to list, delist, or reclassify a species, or to designate or revise critical habitat. Notice of the location and time of any such hearing shall be published in the Federal Register not less than 15 days before the hearing is held.

§ 424.17 Time limits and required actions.

(a) *General.* (1) Within 1 year of the publication of a rule proposing to determine whether a species is an endangered or threatened species, or to designate or revise critical habitat, the Secretary shall publish one of the following in the Federal Register:

(i) A final rule to implement such determination or revision,

(ii) A finding that such revision should not be made,

(iii) A notice withdrawing the proposed rule upon a finding that available evidence does not justify the action proposed by the rule, or

(iv) A notice extending such 1-year period by an additional period of not more than 6 months because there is substantial disagreement among scientists knowledgeable about the species concerned regarding the sufficiency or accuracy of the available data relevant to the determination or revision concerned.

(2) If an extension is made under paragraph (a)(1)(iv) of this section, the Secretary shall, within the extended period, take one of the actions described in paragraphs (a)(1) (i), (ii), or (iii) of this section.

(3) If a proposed rule is withdrawn under paragraph (a)(1)(iii) of this section, the notice of withdrawal shall set forth the basis upon which the proposed rule has been found not to be supported by available evidence. The Secretary shall not again propose a rule withdrawn under such provision except on the basis of sufficient new information that warrants a reproposal.

(b) *Critical habitat designations.* A final rule designating critical habitat of an endangered or a threatened species shall to the extent permissible under § 424.12 be published concurrently with the final rule listing such species, unless the Secretary deems that—

(1) It is essential to the conservation of such species that it be listed promptly; or

(2) Critical habitat of such species is not then determinable,

in which case, the Secretary, with respect to the proposed regulation to designate such habitat, may extend the 1-year period specified in paragraph (a) of this section by not more than one additional year. Not later than the close of such additional year the Secretary must publish a final regulation, based on such data as may be available at that time, designating, to the maximum extent prudent, such habitat.

§ 424.18 Final rules—general.

(a) *Contents.* A final rule promulgated to carry out the purposes of the Act will be published in the Federal Register. This publication will contain the complete text of the rule, a summary of the comments and recommendations received in response to the proposal (including applicable public hearings), summaries of the data on which the rule is based and the relationship of such data to the final rule, and a description of any conservation measures available under the rule. Publication of a final rule to list, delist, or reclassify a species or designate or revise critical habitat shall also provide a summary of factors affecting the species. A rule designating or revising critical habitat will also contain a description of the boundaries and a map of such habitat and will, to the maximum extent practicable, be accompanied by a brief description and evaluation of those activities (whether public or private) that might occur in the area and which, in the opinion of the

Secretary, may adversly modify such habitat or be affected by such designation.

(b) *Effective dote.* A final rule shall take effect—

(1) Not less than 30 days after it is published in the Federal Register, except as otherwise provided for good cause found and published with the rule; and

(2) Not less than 90 days after (i) publication in the Federal Register of the proposed rule, and (ii) actual notification of any affected State agencies and counties or equivalent jurisdictions in accordance with § 424.16(c)(1)(ii).

(c) *Disagreement with State agency.* If a State agency, given notice of a proposed rule in accordance with § 424.16(c)(1)(ii), submits comments disagreeing in whole or in part with a proposed rule, and the Secretary issues a final rule that is in conflict with such comments, or if the Secretary fails to adopt a regulation for which a State agency has made a petition in accordance with § 424.14, the Secretary shall provide such agency with a written justification for the failure to adopt a rule consistent with the agency's comments or petition.

§ 424.19 Final rules—Impact analysis of critical habitat.

The Secretary shall identify any significant activities that would either affect an area considered for designation as critical habitat or be likely to be affected by the designation, and shall, after proposing designation of such an area, consider the probable economic and other impacts of the designation upon proposed or ongoing activities. The Secretary may exclude any portion of such an area from the critical habitat if the benefits of such exclusion outweigh the benefits of specifying the area as part of the critical habitat. The Secretary shall not exclude any such area if, based on the best scientific and commercial data available, he determines that the failure to designate that area as critical habitat will result in the extinction of the species concerned.

§ 424.20 Emergency rules.

(a) Sections 424.16, 424.17, 424.18, and 424.19 notwithstanding, the Secretary may at any time issue a regulation implementing any action described in § 424.10 in regard to any emergency posing a significant risk to the well-being of a species of fish, wildlife, or plant. Such rules shall, at the discretion of the Secretary, take effect immediately on publication in the Federal Register. In the case of any such action that applies to a resident species, the Secretary shall give actual notice of such regulation to the State agency in each State in which such species is believed to occur. Publication in the Federal Register of such an emergency rule shall provide detailed reasons why the rule is necessary. An emergency rule shall cease to have force and effect after 240 days unless the procedures described in §§ 424.16, 424.17, 424.18, and 424.19 (as appropriate) have been complied with during that period.

(b) If at any time after issuing an emergency rule, the Secretary determines, on the basis of the best scientific and commercial data available, that substantial evidence does not then exist to warrant such rule, it shall be withdrawn.

§ 424.21 Periodic review.

At least once every 5 years, the Secretary shall conduct a review of each listed species to determine whether it should be delisted or reclassified. Each such determination shall be made in accordance with §§ 424.11, 424.16, and 424.17 of this Part, as appropriate. A notice announcing those species under active review will be published in the Federal Register. Notwithstanding this section's provisions, the Secretary may review the status of any species at any time based upon a petition (see § 424.14) or upon other data available to the Service.

Dated: July 18, 1984.

G. Ray Arnett,

Assistant Secretary for Fish and Wildlife and Parks.

Dated: August 22, 1984.

William G. Gordon,

Assistant Administrator for Fisheries, National Oceanic and Atmospheric Administration.

[FR Doc. 84-24786 Filed 9-28-84; 8:45 am]
BILLING CODE 4310-55-M

January 7, 1985 F/SWR1:DEC

TO: E.C. Fullerton, Regional Director
Southwest Region, F/SWR

FROM: Doyle E. Gates, Administrator
Western Pacific Program Office, F/SWR1

SUBJECT: **Biological Opinion - Lanai Training Area**

There is no "Lanai training Area" at present

I append subject Opinion for your signature and transmittal to headquarters. You may recall that I discussed this troublesome matter with you shortly before Christmas.

There are differences of opinion on the recommendations for sea turtles between me and some staff members and between me and the Honolulu Laboratory.

Staff's original recommendation for sea turtles finds no jeopardy action. This I agree with as does the Honolulu Laboratory (see copy of letter attached). However the original recommendations by staff and concurred in by Honolulu Lab also stated:

"1. The proposed activity should not occur from May through September the period in which green turtle nesting and hatching would most likely occur.

2. Pyrotechnics should not be used. Night illumination on the beach should be kept to a minimum for human safety.

3. Helicopters should avoid low (less than 1000 feet) over water approaches to the beach and in particular should avoid hovering over nearshore waters."

I do not agree with these recommendations because:

1) The opinion finds no jeopardy [if recommendations are followed] and the recommendations appear most inconsistent with that finding.

2) They are unduly restrictive.

3) Other options are available.

4) They unnecessarily strain our credibility, and

5) They may result in a lack of compliance with important recommendations regarding humpback whales.

Please note the proposed activity is scheduled for a total of six days each year of no more than three two day exercises.

Accordingly I have inserted on Page 7, substitute language for sea turtles as follows:

"1. The Administrator, Western Pacific Program Office,(WPPO), Southwest Region shall be notified of the dates and times of every exercise for Polihua Beach and adjacent waters.

2. NMFS personnel shall be allowed to conduct detailed inspections of the assault beach(es) prior to the military exercise to assure sea turtles are clear of the area. If turtles, nests, or nesting activities are found, activity shall be diverted no less than 100 yards from all such sites.

3. Should a turtle experimental restocking be initiated at Polihua Beach, that section of beach shall be closed to training exercises."

Informal contact with representatives of the Marine Corps on 12/20/84 indicates that they will adhere to these recommendations as well as those recommended for humpback whales. We are informed that the proposed original recommendation by staff closing the beach from May through September would effectively eliminate the proposed military training.

Please call me if you have any questions regarding this matter.

Attachment

obtained 1-22-85

DO

December 17, 1984 F/SWC2

TO: F/SWR1 - Doyle E. Gates

FROM: F/SWC2 - Richard S. Shomura

SUBJECT: Comment on the draft biological opinion for proposed use of northern Lanai as a Marine Corps amphibious assault training area

The following specific comments are provided:

1. Page 5, para. 4 - The adverse effects of electrical lights and likely petroleum leakage on the beach and in the water should also be included.

2. Page 7, line 3 - Training exercises will preclude any experimental restocking effort, as well as the natural recruitment and re-establishment of the breeding colony that may be expected to occur with the gradual overall recovery of the population.

3. Page 7, lines 11-12 - According to periodic newspaper reports, beaches at Kahoolawe, Barking Sands, Kauai, and Bellows, Oahu are already being used for Marine Corps amphibious training exercises. Why is it necessary to expand such training to a new location like Polihua, Lanai?

4. Page 7, conservation recommendation #2 - In view of the available information, this recommendation appears to be entirely valid and therefore should be retained.

5. Page 7, conservation recommendation #3 - Vehicle and other electrical lights should be included along with pyrotechnics.

The major point here is that considering item 2, above, and other information presented in the opinion, item 4 is consistent with the intent of the Section 7 process and certainly warranted based on the potential of this area to contribute to recovery of the species.

cc: Gilmartin
DO
HL

DRAFT

F/SWR1:LDC

Cdr. T.E. Gunn
Head, Facilities Planning Department
Pacific Division
Naval Facilities Engineering Command
Pearl Harbor, Hawaii 96860

Dear CDR Gunn,

Enclosed is the Biological Opinion prepared by the National Marine Fisheries Service (NMFS) pursuant to Section 7(b) of the Endangered Species Act (ESA), as amended, concerning the potential impacts to endangered and threatened species associated with the proposed use of northern Lanai as a Marine Corps amphibious assault training area. The humpback whale and green sea turtle are the only species under the jurisdiction of the NMFS that may occur in the project area.

Based on the available information, we conclude that the proposed activity will jeopardize the continued existence of the humpback whale in Hawaii. The activity will not jeopardize the continued existence of the green sea turtle population in Hawaii, though it clearly will not be conducive to its recovery.

If the recommendations of the Opinion are adhered to, then the proposed activity is not likely to jeopardize humpback whales and adverse impacts to green turtles will be minimized.

Consultation must be reinitiated if; new information reveals impacts not considered in this Opinion; the identified activities are modified; or a new species is listed or critical habitat is designated that may be affected by the proposed activity.

Sincerely yours,

William G. Gordon

Assistant Administrator for Fisheries

Enclosure

ENDANGERED SPECIES ACT

SECTION 7 AND BIOLOGICAL OPINION

AGENCY: Department of the Navy, Civil Engineer Corps

ACTIVITY: Permit for use of northern Lanai as an amphibious assault training area.

CONSULTATION CONDUCTED BY: National Marine Fisheries Service (NMFS)

DATE OF ISSUANCE:

BACKGROUND: By letter dated July 24, 1984, the U.S. Navy, Civil Engineer Corps (CEC) requested comments from the NMFS regarding proposed amphibious training exercises on northern Lanai. The NMFS' response recommended initiation of formal consultation under Section 7 of the Endangered Species Act of 1973 (ESA), as amended, for potential adverse impacts to endangered humpback whales (Megaptera novaeangliae) and threatened green turtles (Chelonia mydas). In a letter dated September 19, 1984 the CEC requested initiation of formal consultation. On October 3, the NMFS acknowledged receipt of the request and initiated formal consultation (pre-dated to September 20, 1984).

PROJECT DESCRIPTION: The following project summary is taken from a letter dated 24 July 1984 from the Naval Facilities Engineering Command to the NMFS, Western Pacific Program Office. As a biological assessment has not been provided, a more detailed description of the training activities is not available.

The Marine Corps Air Station, Kaneohe Bay, 1st Marine Brigade, Fleet Marine Force (FMF) is investigating the feasibility of utilizing a portion of northern Lanai for amphibious training exercises. The proposed training area is situated in the north/northwestern portion of the island (Fig. 1) and comprises approximately 7,000 acres. The area is considered particularly desirable in that it is relatively uninhabited and provides beach frontage and other land features ideally suited to the type of training intended. Marine Corps interest in northern Lanai is for long-term use; however, individual exercises will be confined to one or two days of operations conducted two to three times a year. Training activities are scheduled to commence at the first available opportunity after environmental, historical and legal requirements are satisfied.

Proposed training exercises are to consist of combined helicopter and amphibious assaults wherein marines will disembark and conduct follow-on day and night operations. Troops will proceed inland for a mechanized assault against enemy forces at higher elevations. Polihua Beach will be used for off-landing vehicles, supplies and troops and will serve as a primary site for service and logistical support detachments. No live ammunition will be used throughout operations. Pyrotechnics, if used, will be confined to select areas to avoid any risk of accidental wildfires. The number of participants in this exercise is estimated at 800 men.

SPECIES OCCURRING IN THE PROJECT AREA: Listed species that occur in the project area include the endangered humpback whale (Megaptera novaeangliae) from December through May and the threatened green turtle (Chelonia mydas) year round.

SPECIES ACCOUNTS: Green turtle (Chelonia mydas)

Green turtles are found throughout the Hawaiian Archipelago. Their distribution, however, has been reduced in recent historical times, with breeding aggregations being eliminated and certain foraging areas no longer utilized in the Main Hawaiian Islands. Breeding aggregations in the Northwestern Hawaiian Islands (NWHI) also have declined, particularly at Laysan Island and Pearl and Hermes Reef.

Presently, more than 90 percent of the breeding and nesting activity of Hawaiian green turtles occurs at French Frigate Shoals, NWHI. The remainder of the reproductive effort is primarily distributed among small groups using Laysan Island, Lisianski Island and Pearl and Hermes Reef (Balazs 1980).

Feeding and nesting areas, where adult Hawaiian Chelonia live the greater portion of their lives during nonbreeding periods, are located in coastal waters of both the main islands and the NWHI. The principal food source, marine benthic algae of several genera, is restricted to shallow depths where sunlight, substrate and nutrients are conducive to plant growth. Feeding pastures used by adults are usually less than 10m deep, and frequently not more than 3m deep. The underwater resting sites for adults include coral recesses, the undersides of ledges, and sand bottom areas (called "nests") that are relatively free of strong currents and disturbance from natural predators and man. In the main islands, these areas for adults usually occur at depths greater than 20m, but probably not normally exceeding 50m. Available information indicates that the resting areas are in proximity to the feeding pasture. Periods of rest near the feeding pasture are also known to take place while floating at the surface during light winds and calm seas.

The north coast of Lanai is one of the important main island resident areas for green turtles identified by Balazs (1980) (Fig. 2). Polihua Beach is the only site in the main Hawaiian Islands with a well documented history of nesting

green turtles (Balazs 1984). A well known place to capture turtles in the 1800's and early 1900's, Polihua's use as a nesting beach apparently declined with the construction of roads and resulting traffic to the north shore. Recent reports of apparent nesting occurred in July of 1981 and in the spring of 1983. Due to its relative inaccessibility and past history, Polihua was noted as possibly one of the best places in Hawaii to do experimental restocking of green turtles aimed at reestablishing a nesting colony (Balazs 1984).

Green turtles foraging off Lanai rely mainly on the following species of algae: Amansia glomerata, Acanthophora spicifera, and Sargassum polyphyllum. Balazs (1984) notes "the coastal foraging pastures of Northern Lanai appear to be an attractive habitat for the recruitment of young turtles."

Humpback whale (Megaptera novaeangliae)

The humpback whale migrates each year from summer coastal feeding grounds in high latitudes to breeding and calving grounds near islands or shallow banks in low-latitude waters. Populations of humpback whales are found in most of the world's oceans, but intensive 20th century whaling reduced their numbers to a small fraction of the original abundance. Though internationally protected since 1966, the entire north Pacific population is currently estimated to number about 1,200 animals (Rice and Wolman, 1982). The north Pacific stock feeds in summer and fall along the upper rim of the north Pacific Ocean and in winter assembles in three geographicaly isolated tropical areas. One area is located in the Revillagigedo Islands of Baja California and adjacent regions, the second is in the western north Pacific along the Ryuku, Bonin, and Mariana Islands, and the third is around the main islands of the Hawaiian Archipelago. The Hawaiian assembly is believed to be the largest of the three numerically with present estimates ranging between 670±120 (Rice and Wolman unpubl. ms) and 1,000 animals (Darling and Morowitz unpubl. ms).

The Hawaiian humpback population migrates between higher latitude north

Pacific summer feeding grounds and winter breeding/calving areas in nearshore shallow waters around the main Hawaiian Islands. Their numbers peak in late January through February and remain fairly constant through mid-March. In April they begin migrating out of Hawaiian waters and by late May or early June the last whales usually have departed.

Humpback whales concentrate during the winter breeding season in shallow waters, usually less than 100 fathoms, and are particularly attracted to broad bank areas (Herman and Antinoja, 1977). In the Hawaiian Islands, major areas of concentration are Penguin Bank, the "Four Island area" between Molokai, Maui, Kahoolawe, and Lanai, and the nearshore waters of Hawaii Island between Upolu Point and Keahole Point. They are found consistently, although in smaller numbers, in several other areas of the main Hawaiian Islands.

The northeast coast of Lanai, from Kaena Pt. to Kamaiki Pt., was an area of high relative abundance of calves in 1976 and 1977 (Herman et al. 1980). This area appears to be one of the most important calf-rearing zones in the four island complex. The National Marine Fisheries Service (NMFS) designated this area a calving and breeding ground in its 1979 Notice of Interpretation of Harassment pertaining to humpback whales. Shore observers on the east side of Lanai have noted the presence of whales very close to the beach (Paul Forestell, pers. comm.).

ASSESSMENT OF IMPACTS: Green turtles found in the vicinity of the proposed training site are likely to be adversely affected by sand compaction and the activity generated by beach assault exercises. Human and especially vehicle activity on Polihua beach is likely to have the adverse effects of possibly destroying existing nests and compacting the sand, rendering it unsuitable for nesting. A site visit and discussion with Hawaii state enforcement agents (Al Morita, pers. comm.) revealed that Polihua Beach regularly washes out during the winter and is regenerated in the spring. Thus, vehicle usage on the beach

proper would probably not result in cumulative degradation of turtle nesting habitat. The presence of personnel, the use of pyrotechnics at night when turtles come ashore to nest, and the noise generated by helicopters and vehicles would also probably dissuade turtles from utilizing the beach for either basking or nesting.

Helicopter operations are likely to adversely affect foraging and resting turtles in the nearshore waters of the training area. Surfacing turtles would probably be displaced from this foraging area by the high noise level generated by rotor-craft.

Because the training site is found within a known breeding and calving area of humpback whales in Hawaii, resulting displacement will probably result in significant adverse impacts. Displacement of cows with calves from preferred habitat may result in increased mortality. Available data are insufficient to be able to state why certain areas are preferred for breeding and calving, thus it must be inferred from their repeated presence that those areas offer optimal conditions.

Although past attempts to document the effects of vessel traffic on humpback whales have proved inconclusive (Baker et al. 1982), the potential volume and activities of vessels associated with any exercise conducted off of Polihua beach, the noise generated by helicopters, the 800 or more personnel on the beach and their support vehicles, and the visual disturbance from beach pyrotechnics will likely disturb and displace whales from that preferred habitat.

CONCLUSIONS: Based on the best available information, it is our opinion that despite displacement from foraging and potential nesting areas the proposed Marine Corps Amphibious Training Exercises on northern Lanai are not likely to jeopardize the continued existence of the Hawaiian population of green turtles. However, this activity will greatly reduce the potential for recovery of

Hawaiian green turtles. A previously stated, Polihua Beach may be an excellent choice for experimental restocking of turtles leading to the re-establishment of a nesting colony. This activity will preclude this possibility, as well as the potential for natural re-establishment of a population at Polihua.

The proposed activity is likely to jeopardize the continued existence of humpback whales in Hawaiian waters unless the exercises are limited to the time periods outlined in the following recommendations. Critical habitat for either species has not been proposed or designated in the project area.

RECOMMENDATIONS: We recommend that the Marine Corps not conduct the proposed training exercises at northern Lanai because of the potential adverse impacts to green turtles and wintering humpback whales, and consider alternate sites. However, should the Marine Corps determine that other training sites are unavailable or not suitable, the following conservation recommendation is provided pursuant to Section 7(a)(1) of the Act to reduce or eliminate any potential adverse impacts to humpback whales and insure that the proposed activity will not likely jeopardize the continued existence of the species.

1. The proposed activity shall not occur from December through May, the period in which humpback whales are present.

The conservation recommendations presented below are intended to reduce the potential adverse impacts to the Hawaiian population of green turtles and promote the recovery of the species in Hawaiian waters even though the proposed action is not likely to jeopardize the species.

1. The Administrator, Western Pacific Program Office,(WPPO), Southwest Region shall be notified of the dates and times of every exercise for Polihua Beach and adjacent waters.

2. NMFS personnel shall be allowed to conduct detailed inspections of the assault beach(es) prior to the military exercise to assure sea turtles are clear of the area. If turtles, nests, or nesting activities are found, activity shall be diverted no less than 100 meters from all such sites.

3. Should a experimental turtle restocking program be initiated at Polihua Beach, that section of beach shall be closed to training exercises.

REINITIATION OF CONSULTATION: Consultation must be reinitiated if:

1. New information reveals impacts of the identified activities, not considered in this opinion, that may affect listed species or their critical habitat.

2. The identified activities are modified in a manner not considered herein.

3. A new species is listed or critical habitat is designated that may be affected by the identified activity.

Nothing in this Biological Opinion should be construed as authorizing any takings (as defined in Section 3 of the ESA) of endangered or threatened species pursuant to Section 10(a) or immunizing any actions from the prohibitions of Section 9(a) of the ESA.

Statement Regarding Incidental Taking Pursuant to Section 7(b)(4) of the Endangered Species Act of 1973, as Amended

In 1973, the humpback whale was listed as an endangered species under the Endangered Species Act (ESA). By definition, a species or population stock which is listed as threatened or endangered under the ESA is also considered depleted under the Marine Mammal Protection Act of 1972 (MMPA). Under the MMPA there is no allowable take other than for research for any species listed as depleted. In addition, section 7 of the ESA provides that no provision of the ESA is to take precedence over any more restrictive conflicting provision of the MMPA.

We anticipate the taking, through harassment, of humpback whales resulting from the proposed action. Since such taking is not permissible under the MMPA, no Section 7(b)(4) statement will be provided for humpback whales in this Biological Opinion.

The NMFS also anticipates low level incidental taking, primarily by harassment, of green sea turtles.

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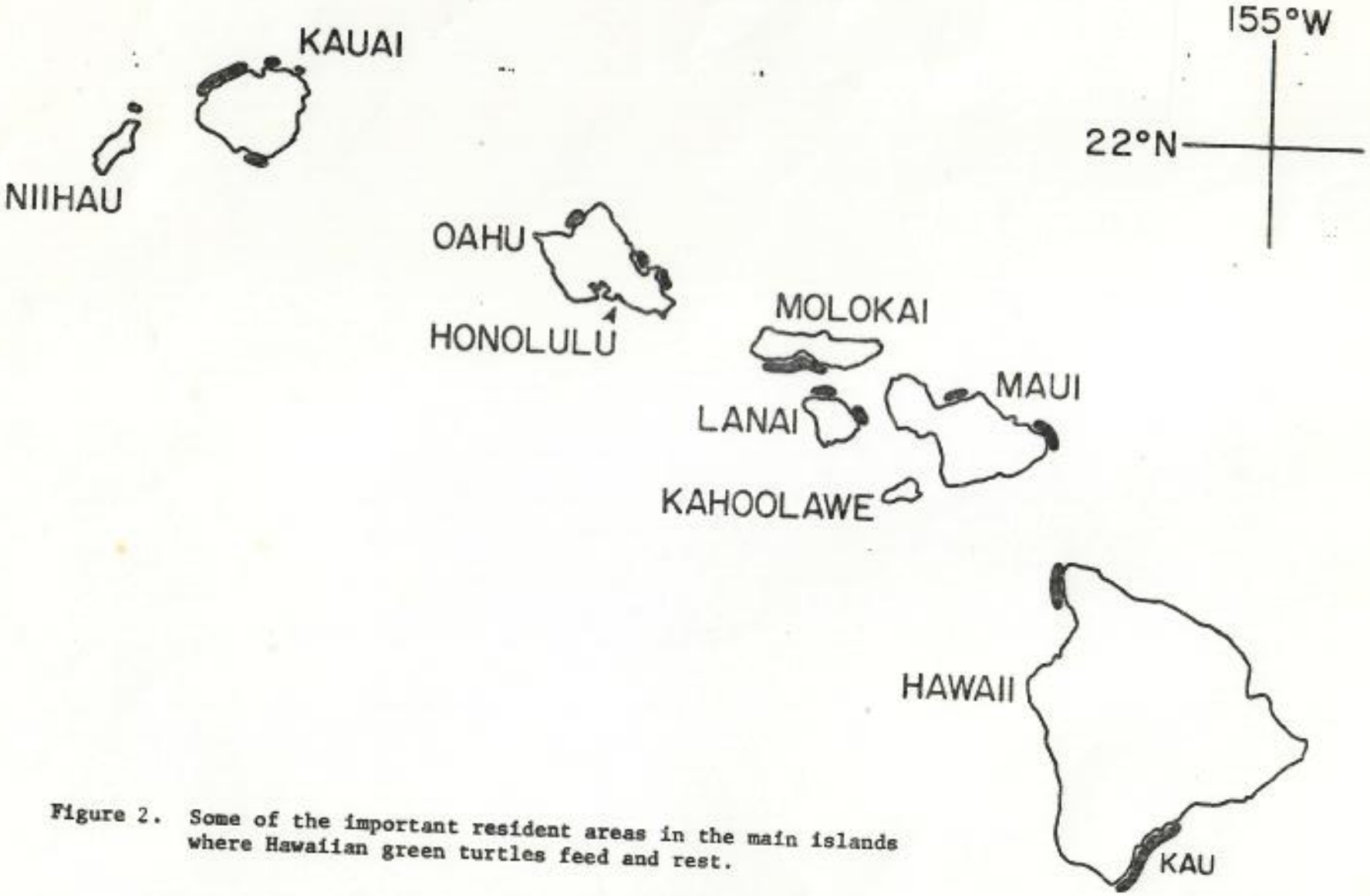


Figure 2. Some of the important resident areas in the main islands where Hawaiian green turtles feed and rest.

Aloha nui, 10-30-84

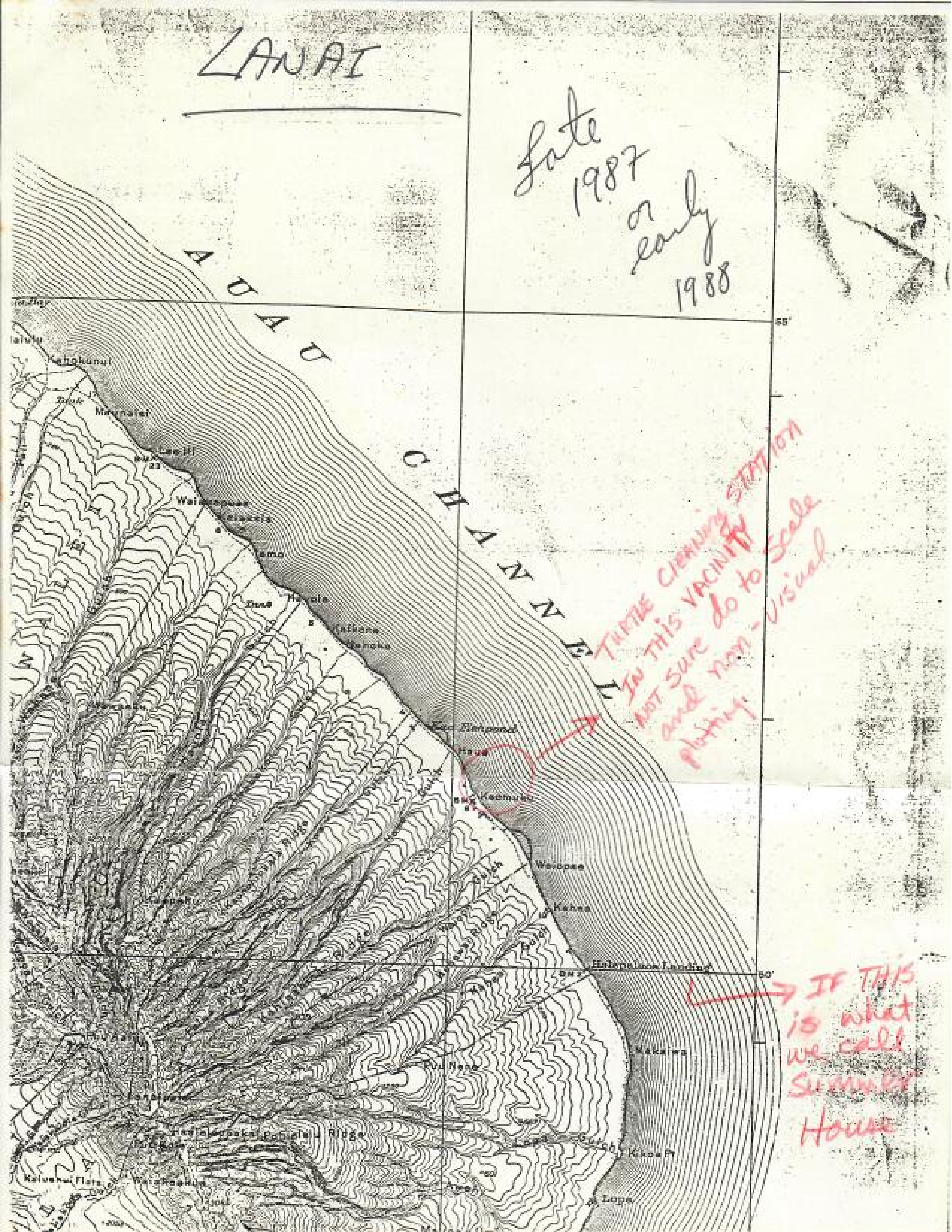
George - I hope that you are well. Thank you for Report H-84-15. I pray that Polihua will not be disturbed. My personal feeling is: there is enough land - coast to mountain with to much endangered life being abused already -

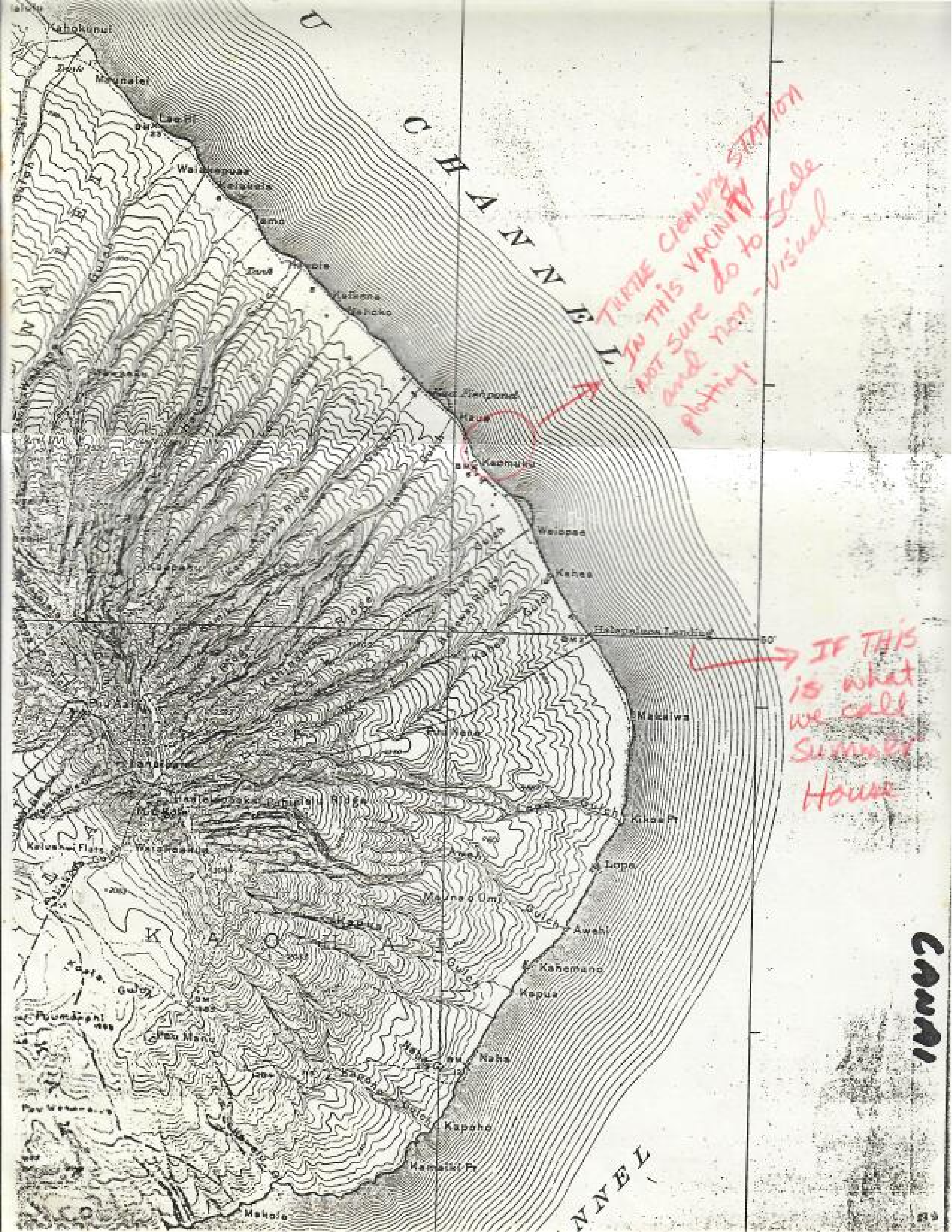
I can't really add any information to what you have compiled, though I wish you the best of luck in your works.

In two weeks I will be transferring to Point Reye Natl Seashore. It is a career move and will hopefully prepare me for management responsibilities in the Pacific area - If you come out to Pt Reyes please look me up. I would also appreciate hearing of your successes - our

respectfully -

Kepa Mahy


LANAI
Late 1987 or early 1988
AUAU CHANNEL
Kahokunui
Maunalei
Keomuku
Waiopae
Kahea
Halepalaoa Landing
Makaiwa
Kikoa Pt
Lopa
TURTLE CLEANING STATION IN THIS VACINITY
NOT SURE do to Scale and non-Visual plotting
IF THIS is what we call Summer House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Maunalei
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Awehi
Kahemano
Kapua
Naha
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Kamaiki Pt.
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IF THIS is what we call Summer House
LANAI

MARINE CASUALTIES FOR THE HAWAIIAN ISLANDS.

CONTINUED FROM THE ANNUAL FOR 1882.

NOTE.—In this first attempt to compile a list of this nature covering so long a period, we would not make pretensions to perfection for the years given, but trust that any omissions that may be observed will be duly reported, so that in time the list may be complete and reliable. Through the contributions of parties interested, we are favored with a few omissions published in last year's Annual.

1838—Ship *Oscar* went ashore abreast of Honolulu during a heavy gale; was afterwards gotten off, repaired, and sailed for China.

1831—Ship *Gloucester* burned at the wharf in Honolulu harbor.

1852—Schooner —— lost off Hanalei, Kauai. Ed. Johnson lost at the time.

1860 (or prior)—American whaling ship *Maria Theresa* touched on the reef at Hilo and had to come to Honolulu for repairs.

1861, June 21—Hawaiian schooner *Moi Wahine* grounded on entering this port, but was gotten off without much damage.

—Schooner *Flibberty Gibbet*, lost on the Kona coast of Hawaii; is said to have run her bow into a cave while all hands were asleep.

1862, Jan. 4—Hawaiian schooner *Hannah* went ashore at Honuaula, Maui, in a heavy souther.

Feb. 14—Hawaiian schooner *Kalihiwai* went ashore at Kalihiwai, Kauai, resulting in a total wreck.

March 12—Hawaiian schooner *Hokulele* foundered off Waianae, Oahu. Crew picked up the next day by the *Moi Wahine*.

May 27—Hawaiian schooner *Keoni Ana* lost at Mahinauli, Kauai, sinking in deep water.

1863, March 20—American whaling bark *Florence*, lying off and on, was discovered on fire, but through strenuous efforts after being brought into port, was saved.

Nov.—Hawaiian schooner *Hannah* went ashore at Nawiliwili, Kauai, during a gale, but was gotten off by cutting away the masts.

Dec. 7—Hawaiian schooner *Emma Rooke*, entering the port, grounded on the east side of the channel. She was finally saved, with much damage.

Dec. 26—American whale ship *Jeria Swift* was fired by a colored man, but extinguished without much damage.

—Hawaiian schooner *Rob Roy* lost near Makee's Landing, Maui.

1864, Jan 19—Hawaiian schooner *Emma Rooke* went ashore on Kohala Point, Hawaii, and, with cargo, became a total loss. Crew, passengers and specie saved.

Oct. 28—Schooner *Ortolan* missed stays in beating out of Hana harbor and went ashore in a squall.

Dec. 28—Hawaiian sloop *Emma*, for Waialua, capsized off Barber's Point, Oahu; one life lost.

1865—Hawaiian schooner *Hannah* missed stays and went ashore again at Molona, Kauai.

Feb.—Hawaiian steamer *Kilauea* grounded off Kalepolepo, causing her the loss of her false keel.

Feb.—Hawaiian schooner *Emeline* sprung her foremast off Kau, Hawaii, in a squall, but reached port in safety.

1866, Jan.—Schooner *Annie Laurie* went ashore at Koloa, Kauai, and became a total wreck; most of cargo saved in a damaged condition.

Jan. 12—Steamer *Kilauea* ran ashore at Kawaihae, Hawaii, but was afterwards saved.

—Schooner *Alberi* ran ashore at Waimea, Kauai, but got off with but little injury.

June 15—A boat with the Captain, two passengers, and twelve of the crew of the American ship *Hornet*, from New York en route to San Francisco, burned at sea May 3d, landed at Laupahoehoe, Hawaii, all but famished.

—Schooner *Moi Wahine*, en route for this port from Wake's Island, this year, was never afterward heard of.

June 23—Hawaiian schooner *Onward* went ashore at Wahiawa, Kauai, while getting under way, and became a total wreck.

Oct. 26—Sloop *Union* went ashore at Lahaina and sunk; cargo with vessel a total loss.

—American whaling ship *Josephine* ran on the reef at Kawaihae, and came to Honolulu for repairs.

1867, April 14—American whaling bark *Daniel Wood* was lost on French Frigate shoals, part of the crew arriving at this port in a whale boat.

April 25—Schooner *Bruce* went ashore at Kipahulu, Maui, becoming a total loss.

Sept. 3—Schooner *Warwick* ran ashore on the southwest point of Kauai; little of value saved.

Sept. 22—Hawaiian schooner *Kohala* took fire at Kohala Landing, Hawaii, and was wholly destroyed, with her full cargo of lumber and assorted merchandise.

Nov. 14—Hawaiian schooner *Helen* was lost at her anchorage at Maliko, Maui, during a heavy norther.

—Hawaiian sloop *Kaeeihe* was lost at Hana, Maui.

1868—Hawaiian sloop *Maukiukiu* went ashore on Hawaii.

—Hawaiian schooner *Kealoha* condemned and broken up.

—Hawaiian schooner *Yette* lost at Moloaa, Kauai.

Oct.—Hawaiian sloop *Nakolaelua* lost at Niihau.

1869, March—American ship *King Phillip* was discovered on fire in Honolulu harbor, and saved only after very strenuous efforts; supposed to have been the work of incendiaries.

Feb. 17—Hawaiian sloop *Pomaikai* ran ashore on the Kona coast of Hawaii and became a total wreck.

June 24—Hawaiian schooner *Maria*, Babcock, went ashore at Onomea, and was a total loss.

—Hawaiian schooner *Onward* ran ashore at Wahiawa, Kauai.

1870, Sept. 25—Hawaiian schooner *Marilda*, Burill master, ran ashore on the eastern end of Kahoolawe and became a total loss. No lives lost.

Makee Plantation	Ulupalakua, Maui	W G Irwin & Co
Waihee Sugar Co	Waihee, Maui	W G Irwin & Co
Haw'n Com'l & Sugar Co	Maui	W G Irwin & Co
Makee Sugar Co	Kealia, Kauai	W G Irwin & Co
Kealia Plantation	Kealia, Kauai	W G Irwin & Co
Hutchinson Plantation Co	Kau, Hawaii	W G Irwin & Co
Hilea Sugar Co	Kau, Hawaii	W G Irwin & Co
Star Mill Co	Kohala, Hawaii	W G Irwin & Co
Hakalau Plantation Co	Hilo, Hawaii	W G Irwin & Co
Hilo Sugar Co	Hilo, Hawaii	W G Irwin & Co
Paauhau Mill†	Hamakua, Hawaii	W G Irwin & Co
Kilauea Sugar Co	Kilauea, Kauai	W G Irwin & Co
Honohina Sugar Co	Hilo, Hawaii	W G Irwin & Co
Waipunalei Plantation	Hilo, Hawaii	W G Irwin & Co
Paauhau Plantation*	Hamakua, Hawaii	W G Irwin & Co
Olowalu Sugar Co	Olowalu, Maui	W G Irwin & Co
Ookala Sugar Co	Ookala, Hawaii	W G Irwin & Co
Makaha Plantation*	Waianae	W G Irwin & Co
Waikapu Sugar Co	Waikapu, Maui	W G Irwin & Co
Reciprocity Sugar Co	Hana, Maui	W G Irwin & Co
Huelo Mill Co†	Huelo, Maui	W G Irwin & Co
Huelo Plantation*	Hamakua, Maui	W G Irwin & Co
Kamaloo Plantation	Molokai	J McColgan
Honokaa Sugar Co	Hamakua, Hawaii	F A Schaefer & Co
Pacific Sugar Mill	Hamakua, Hawaii	F A Schaefer & Co
Eleele Plantation	Koloa, Kauai	F A Schaefer & Co
Laie Plantation	Laie, Oahu	J T Waterhouse
Gay & Robinson*	Makaweli, Kauai	J T Waterhouse
Waianae Co	Waianae, Oahu	H A Widemann
Moanui Plantation	Molokai	Wong Leong & Co

MARINE CASUALTIES FOR THE HAWAIIAN ISLANDS FOR 1914.

Jan. 10—Hawaiian schooner *Julia* went ashore at Nukanan, Gilbert Islands, and became a total loss; crew and passengers all saved.

Jan. 13—American brigantine *Consuelo* arrived from San Francisco with loss of her fore-top-gallant mast which occurred during a squall.

Jan. 16—Hawaiian schooner *Kulamanu* was lost between the south end of Kona and Kau, Hawaii, with a load of sugar, 1,464 bags from the Ookala Plantation. Partially insured.

March 26—American whale bark *Dawn* from San Francisco and cruise, arrived in a leaky condition necessitating two weeks delay for repairs. Left this port for the Arctic but was obliged to give up the voyage and return to San Francisco.

March 30—American schooner *Caleb Eaton*, from San Francisco for the Arctic, touched in for repairs, having sprung a leak.

April 5—American brigantine *Consuelo* leaving for San Francisco sprung a leak after being out four or five hours, and returned to port for repairs, sailing again on the 8th.

July 12—News received of the loss of the missionary brig *Morning Star* at Kusaie, crew all saved.

Aug. 9—Hawaiian schooner *Ka Moi* grounded on the east side of the channel on coming into port, but got off without damage at high tide on lightening part of her cargo.

1884 (Aug) —Hawaiian schooner *Mary Ahee* went ashore at Awalua, Lanai, and became a total loss. The captain had one leg broken and sustained other injuries, and was brought to this port for surgical aid.

Aug. 28—Hawaiian steamer *James Makee*, grounded on making her anchorage at Waianae, Oahu, necessitating going on the marine railway for repairs.

Sept. 6—American ship *El Dorado*, coal laden from Newcastle, got aground off Waikiki at 10 P. M. in making this port, but got off with the aid of the tug after midnight, with but slight injury.

Sept. 6—Steamer *James Makee* touched on a sand spit at Waialua, Oahu, but got off without injury.

Sept. 8—Hawaiian schooner *Ehukai* was carried over the reef and stranded at Kaena Point, Oahu. She was afterward gotten off with loss of mainmast, badly battered, and towed to Honolulu for repairs.

Sept. 13—American schooner *Dora Harkness* was rescued from precarious position in the surf at Anahola, Kauai, by the steamer *James Makee*.

Oct. 6—French brig *Tamara*, from Tahiti for San Francisco put back to this port leaking badly. Failing to raise sufficient funds for repairs, she was sold at auction.

Oct. 22—Hawaiian steamer *Lehua* lost her mainmast during a gale encountered in the channel between Maui and Hawaii.

Oct. 23—Hawaiian steamer *Kilauea Hou* went ashore at the mouth of the Wailuku River, Hilo. Was towed off by the *Kinau*, unharmed.

Oct. —Hawaiian brigantine *Dora*, Capt. Lund, foundered at sea near La Paz, Mexico, and all hands lost.

Nov. 5—Hawaiian schooner *Pauahi* went ashore at Kohawaike, Kona, Hawaii, and became a total loss.

BEARINGS AND DISTANCES.

Honolulu Lighthouse to summit of Diamond Head, S. 50° 37' 40", E. (true) 34,559 feet.

Punchbowl to Diamond Head Station, S. 2° 15' 30" E. (true) 26,515 feet.

Halemaala to Mauna Kea, S. 39° 23' 30" E. (true) 79.2 statute miles.

Average Magnetic Declination south part of Oahu, 9° 55' E., A. D. 1885.

Spaniard, was not so lucky. He was heard of at Waimea, Kauai, as living under the protection of the principal chief of that Island. After Buchard had secured all the buccaneers on Hawaii and recovered the most of the plunder, he took leave of Kamehameha and sailed for Kauai in quest of the Spanish mate. Some delay occurred in getting possession of the man, as the Chief of Waimea at first disclaimed any knowledge of his whereabouts; but a message from Kamehameha,—who had been acknowledged by the Kauai chiefs as King of all the group—led at once to the production of the culprit. Buchard held a "drum-head" court martial on the sand beach of Waimea, and with a short shrift—most probably none at all—the second in command of the "Victory" was then and there hanged and his body buried on the spot. The war vessel sailed away for the Spanish Main, and that is the last we he hear of the affair. No doubt, among old Peruvian or Chilean records, the beginning and ending of the story, of which we have only the middle, may be found.

During the latter years of his life Kamahameha (he died on the 8th of May, 1819), possessed several small schooners, in which, commanded by foreigners or sometimes by natives who had learned how to sail them, he made occasional inter-island trips, or employed them in the coasting business. Observing that foreign ships bought largely of sandal-wood here, which they carried to China, it very naturally occurred to so shrewd a person as the King that there was money to be made in the business. So in the year 1817, having purchased a brig called the "Forester," he caused her to be fitted out and loaded with sandal-wood, and dispatched to "far Cathay," under command of the late Alexander Adams, who went by the soubriquet of "Alika." The voyage was safely performed, and the vessel brought back some East Indian rum and some bales of silk, but report says the King lost about $3,000 by the speculation. Such a result was anything but satisfactory to the thrifty monarch, and he questioned "Alika" rather closely as to the receipts and expenditures of the voyage. It appeared that there was some difficulty with the Chinese about opening a trade, because the brig bore a flag with which they were unacquainted. It is a historical fact which we have never yet met with in our reading, that the first national flag of these Islands, and which was for the first time displayed in foreign waters by Captain Adams, consisted of eight horizontal stripes of red, white and blue. We have as yet been unable to fix the date when the present "union" was added. Among other charges paid by the captain, about which the King was inquisitive, was one for pilotage,—one dollar a foot inward and outward. After this had been fully explained to his satisfaction, an order was issued instructing "the King's pilots" to charge $1 per foot draft on all foreign vessels which they might bring into or take out of port. Thus in 1817 was first instituted here a system of pilot charges.

MARINE CASUALTIES FOR THE HAWAIIAN ISLANDS.

COMPILED FROM VOYAGES, HISTORIES, LOCAL PUBLICATIONS, &c.

NOTE.—In this first attempt to compile a list of this nature, covering so long a period, we would not make pretentions to perfection for the years given, but trust that any omissions that may be observed will be duly reported, so that with the balance of the list in next year's Annual its completeness may be arrived at up to date of issue.

1820—A vessel known by the natives as *Konalilelka* was wrecked at the south side of Kealakekua, Hawaii.

1790—American schooner *Fair American*, cut off at Kawaihae, Hawaii.

1796—British brig *Arthur*, Capt. Barber, lost on the S. W. point of Oahu, through which it takes the name of Barber's Point. Principal part of cargo saved.

1804—American schooner *Lily Bird* got ashore off Honolulu, and was purchased by Kamehameha I., who got her off and mounted her with 20 guns for his Kauai expedition.

1812—A Russian ship—formerly the *Atlawelpa*, of Boston—owned by Baranoff, Governor of Sitka, was wrecked at Waimea, Kauai. Principal part of cargo saved.

1813—John Jacob Astor's trading ship *Lark*, after being dismasted and buffetted about for several days, during which time a number of the crew died from famine and exhaustion, stranded on Kohoolawe.

1815—*The *Myrtle*, a Russian ship, returning to Honolulu in a leaky condition, sunk in the harbor.

1821—Royal yacht *Pride of Hawaii* stranded at Hanalei, Kauai, and became a total loss.

———British whaleship *Royal George* was wrecked at the west side of entrance to Honolulu. Considerable of cargo saved.

———British ship *Alderman Wood*, with a cargo of liquors, went ashore on Lanai and became a total loss. Her figure-head has adorned Robinson's warehouse ever since its erection.

1826, Feb.—American ship *London*, Edwards, from New York, was lost on Lanai. She had considerable specie on board, which was taken possession of by Lieut. Percival of the U. S. schooner *Dolphin*.

1828—American whaleship *Paragon* of Nantucket, D. N. Edwards, master, with 2,100 barrels sperm on board, sank at sea a few days after leaving Oahu. Crew taken off by the *Rosalie* of Newport.

1830, Aug.—American whaleship *Lyra*, Ed. Howland master, was totally lost at Kahului, Maui, by which it was long known as Lyra Bay.

*A Russian ship named *Wellington* is also reported to have sunk in Honolulu harbor in 1823. Whether this is an error of date and a confusion of names we have not been able to ascertain. Jarves mentions the former vessel but not the latter.

1832, Dec.—A Japanese junk was stranded on the northern part of Oahu (Waialua), only four of her crew being saved.

1834—American whaleship *Catherine* of Salem, Mass., was burned off Oahu.

1842, June 22—American whaleship *Jefferson* of Nantucket, Cash, master, was lost on Kauai with 2,560 barrels oil on board.

Dec. 18—British whaleship *Jas. Stewart* touched on the reef entering the port of Honolulu, necessitating repairs.

1844, April 12—American whaleship *Holder Borden* of New Bedford—from Honolulu for the North-west—went ashore and became a total wreck on Pellis Island, no lives lost. A small schooner was built from the wreck, and arrived at Honolulu October 3d with a portion of cargo and crew.

Nov. 15—American whaleship *Wilmington and Liverpool Packet* of New Bedford, Capt. Place, grounded east of the bar in making the port of Honolulu, and after much labor in lightening the vessel—having 2,500 barrels oil and 20,000 pounds bone on board—she was brought into port and repaired.

1845, Feb. 10—Hawaiian schooner *Pilot* went ashore near the entrance to Honolulu harbor and became a total wreck.

April—Schooner *Hawaii* went ashore 10 miles from Lahaina, Maui, and became a total wreck.

April—Schooner *Paalua* capsized in a squall off Anahola, Kauai, whereby many lives were lost, and a cargo valued at $4,000.

Oct. 17—American whaleship *Drimo*, while in charge of the mate (Abe Russell), went ashore on the reef at Lahaina, Maui. She bilged and became a total wreck, but her oil and most of property was saved.

1846, Jan 25—American whaleship *Helvetia* of New London, Porter, master, ready for sea, was discovered on fire in Honolulu harbor. A gale blowing at the time she was soon beyond hope of rescue. She had 1,650 barrels oil on board, of which 750 were saved.

May 27—Hawaiian brig *Ann*, late *Clementine*, on coming to anchor at Koloa, Kauai, dragged and went ashore.

Aug. 5—Brig *Wm. Neilson*, Weston master, sailed from Honolulu for Manila and China and was never afterward heard from.

Aug. 29—Hawaiian schooner *Clarion* went ashore near Keauhou, Hawaii, and became a total wreck.

1847, April 19—American whaleship *Wm. Thompson* of New Bedford, Ellis, master, was discovered on fire off Kauai, but after strenuos efforts was saved and brought to Honolulu for repairs.

1849, Nov. 2—American whaleship *Mercury* of Stonington was totally lost by fire, with her cargo of oil (1,200 barrels), in Honolulu harbor.

Nov. 29—American whaleship *Tobacco Plant* of New Bedford, was also fired in the harbor and became a total loss. Both were supposed to be the work of incendiaries.

1848, June 1—French schooner *Ariel* went ashore at Waikiki, cargo discharged damaged and vessel got off on the 3d, with but slight injury. She was repaired, put under the Hawaiian flag, and finally capsized on a trip to San Francisco, in October, when about 200 miles from port. No lives lost.

1849, Jan. —Hawaiian schooner *Kekauonohi*, lost off Kauai. Five natives drowned.

June 12—English ship *Lady Leigh*, from Hobart Town, touched on the reef in entering Honolulu harbor, but got off with but slight damage.

Nov. —Hawaiian sloop *Mokuola* lost on Maui.

Dec. —Hawaiian schooner *Hipahipa* totally wrecked on north end of Molokai.

Dec. 13—American brig *Potapsco*, from Boston en route for San Francisco, anchored off the port of Honolulu, and during a severe gale from the S. W. parted her cables and was driven on the reef, becoming a total wreck. No lives lost.

1850—Brig *Brothers*, sailed from Honolulu for San Francisco, Feb. —, and returned March 8, having been on fire fourteen days and almost wholly destroyed. Cause of fire unknown.

March 14—Brig *Tuscar*, bound to San Francisco, put into Honolulu under jury masts, having been dismasted in heavy weather Feb. 22.

March 23—British bark *Caroline*, Perry, master, 109 days from Hobart Town, went on the reef opposite Honolulu during a heavy southeast gale and became a total wreck.

March 24—Hawaiian schooner *Lehua*, was lost at Hanalei, Kauai, from her anchors during a northwest gale.

March 25—British bark *Caroline*, from Australia, was wrecked on the reef, opposite Honolulu, during a southerly gale.

Sept. 18—Hawaiian brigantine *Kalama*, grounded on the reef on leaving Honolulu, and on getting off and proceeding 40 miles had to return, leaking. On her next Kauai trip she got ashore again and became a total wreck. A small schooner of the same name also went ashore near the same place the December following.

Nov. 1—Hawaiian schooner *Victoria* lost at Hanalei, Kauai.

Dec. —Hawaiian schooner *Paukalohua* struck on a rock at Hanapepe, Hauai, and sank in deep water.

Oct. 23—American whaleship *Chas. Drew*, of N. B., Cary, master, went ashore on the west side of entrance to Pearl River and became a total wreck. She had a cargo of 1,300 bbls oil and 10,000 lbs bone, about half of which was saved.

1851, Jan. 25—American ship *Nicida Stewart*, Fales, master, en route for Calcutta, went on the reef near the entrance to Honolulu harbor, and after the securing of all movables, the wreck was sold at auction on the 8th of February. She was finally gotten off and refitted.

Jan. 25—Hawaiian schooner *Kamakaili*, formerly the *Vulcan*, went ashore at Koloa, Kauai, (her first coasting voyage) and became a total wreck.

Jan. 29—Hawaiian brig *Starling*, parted from her anchors at Kalepolepo, Maui, during a souther and went ashore; becoming with her cargo of potatoes, a total loss.

March 10—Hawaiian schooner *William*, anchored at Lahaina, with no one on board, drifted to sea during the night and was never more seen.

1852, April—British ship *Harpooner* touched on the reef off Honolulu in coming to an anchorage without a pilot, and had to come inside for repairs.

Dec. 9—American whale ship *A. H. Haviland*, with 1,655 bbls oil, went ashore in a southerly gale on the reef to eastward of entrance of the harbor of Honolulu, and became a total wreck. One life lost.

Dec. —American ship *Alexander*, loaded with oil and bone, touched on the reef on leaving port and was left by the tide. She was lightened off and returned for repairs.

1853, May 15—British schooner *Royalist* touched on the reef in making the port of Honolulu, but sustained no damage.

1853—American whaleship *Heroine*, of Fairhaven, badly burned in September, and injured by a gale, arrived at Honolulu November 12, and was condemned.

1853—Hawaiian Lorcha *Premier*, lost on Maui.

1854—Hawaiian bark *John Wesley* was totally lost at Koloa, Kauai, whither she had gone from Honolulu to complete cargo for San Francisco.

1855, April—French whaleship *Marquis de Turenne*, from Havre, en route to the whaling grounds went ashore at Barber's Point and became a total wreck.

———American whale-bark *Oscar*, fired and considerably damaged at Honolulu.

———Schooner *Chance* lost at Koloa, Kauai.

1856—Steamer *West Point* went ashore at Koloa, Kauai, and became a total wreck.

———American whaleship *Benj. Tucker*, of N. B., Barber, master, was dismasted in a gale and came into port for repairs at an expense of $8,000.

Nov. 21—American whaleship *Nauticon* of N. B., Luce, master, lost on Honolulu Bar on going out, homeward bound. Cargo of 2,300 bbls oil and 10,000 lbs bone saved.

1857, Jan.—American whale-bark *United States* was condemned at Honolulu. She was repaired, refitted and sailed to cruise; but was condemned again December, 1858.

Feb. 2—Hawaiian schooner *Rialto* lost at Koloa, Kauai, while loading for San Francisco.

March 18—Hawaiian schooner *Komamalu* sailed from Honolulu for Hilo, touching at Lahaina, and was never afterward heard from; supposed to have capsized in the Hawaiian Channel. She had a full cargo and about 70 souls on board.

Nov. 26—American whale-bark *Isabella* returned to Honolulu under jury masts, having lost most of her spars in a squall Oct. 26.

1858, March 14—American whaleship *Young Hero*, of Nantucket, burned with her cargo of 370 bbls of oil at Lahaina, the work of an incendiary.

March 18—American ship *Whalow*, of N. B., went on the reef opposite Honolulu and became a total wreck.

March 28—Hawaiian schooner *Kekauluohi* dragged from her anchors and went ashore at Nawiliwili, Kauai, but was saved after strenuous efforts.

——Hawaiian schooner *Mary Ellen*, 20 tons, went ashore at Wahiawa, Kauai, and became a total wreck.

Aug. 10—Hawaiian schooner *Prince of Hawaii*, capsized and lost off Niihau. Eight lives lost.

Aug. 23—Hawaiian schooner *Sally* was lost off Kaholalele, Hawaii, while lying off and on loading pulu.

Dec. 15—Whale-brig *Ewana*, from Honolulu, went on the reef at Waikiki and became a total loss.

1859—American whale-bark *Florence* was condemned at Honolulu and bought by Capt. T. Spencer and refitted; was fired on the harbor in 1902, but brought into port and saved. Afterward sold to San Francisco parties and lost in the Arctic in 1877.

Jan. 22—Schooner *Dolphin* wrecked on Kahoolawe, a total loss.

March 1—Schooner *George* with a number of passengers left Kauai for Honolulu and was never afterward heard from.

April 6—American whaleship *Levi Starbuck*, struck by lightning during a heavy Kona storm at Lahaina so as to need a new mainmast.

July 10—American bark *Jacob R. Lancaster*, from San Francisco en route for Sydney, foundered off Molokai with cargo of rice, ale and quicksilver, manifested at $82,000. Crew all saved.

1860, Jan.—Sloop *Kalama* was lost off Koloa, Kauai, during a heavy gale.

Aug. 24—Schooner *Kinoole* wrecked on Niihau in moderate weather.

Nov. 14—American whale-bark *Pauline* dragged her anchors and went on the reef at Lahaina with 400 bbls oil, and became a total wreck. Crew and most of cargo saved.

Nov. 21—American ship *Siam* discovered on fire; but after strenuous efforts was finally saved.

1861, March 16—Schooner *Margaret* and sloop *Eva* went ashore at Anahola, Kauai, in a heavy gale and became total wrecks.

Prayer of Malaehaakoa

In the Legend of Hiiakaikapoliopele.

Of Pele, her warfare in Kahiki,
That was fought with Punaaikoae,
Pele fled hither to Hawaii,
Fled as her eyeball—
As the lightning's flash,
Lighting as does the moon,
[Let] awe possess me.

For Pele the ocean sleeps,
For the god a sea hastens toward the islands,
It breaks afar at Hanakahi
Upon the sands of Waiolama,
And guards the house of your god.
The axe is being borne to fell the tree above,
Heavily breaks the surf from Kahiki,
Cresting onward in front of Kilauea,
The sea turned at the front of Papalauahi.
Man called that day
To Puaakanu's lehua-stringing women
Above at Olaa, my lehua-land,
In the front of Heeia, Kukuena women
The companions entered the entanglement
In the thickets of Puna, irregularly, and dwelt.
Here we are thy many adherents.
[Let] awe possess me.

A spraying sea has Kohalaloa,

Pule o Malaehaakoa

Mai ke Kaao o Hiiakaikapoliopele.

O kaua a Pele i haka i Kahiki,
I hakaka ai me Punaaikoae,[1]
Mahuka mai Pele i Hawaii
Mahuka Pele i ona onohi,
I na lapa uwila,
E lapa i mahina—la
Elieli[2] kau mai.

He kai moe nei no Pele,
No ke akua, he kai hoolale i na moku,
Hai aku ka i Hanakahi,[3]
I ke one o Waiolama iluna,
A koa ka hale o ko akua,
Ke amo ala ke koi, ke kua la iuka,
Haki nuanua mai ka nalu mai Kahiki,
Popoi aku i ke alo o Kilauea,[4]
Ke kai huli i ke alo o Papalauahi,[5]
Kanaka hea i ka la,
Ko Puaakanu[6] wahine kui lehua,
Ka uka i Olaa, kuu moku lehua,[7]
I ke alo o Heeia, o Kukuena wahine[8]
Komo i ka lauwili[9] na hoalii,
I ka nahele[10] o Puna ae ae a noho,
Eia makou ko lau kaula la,
Elieli kau mai.

He kai ehu[11] ko Kohalaloa,

[1]Some versions of this story name Namakaokahai as the one who drove Pele hither to Hawaii, an account of which will be found in the legend of Aukelenuiaiku. (See Memoirs Vol. IV, p. 102.)

[2]The expression *elieli* at the close of certain prayers has occasioned much thought and inquiry by students. Taking it as intensive of the root word *eli*, to dig, we get the impression of frequent, earnest, or vigorous effort, mental or physical. It takes a range of definitions according to the character of the petition, which all agree includes the *amama* or amen. One veteran said it was used only in sincere prayers to which amama only belonged. Another held that it expressed fervency in the petitioner. That it evinces a feeling of awe, as used here, is recognized in the accompanying *kau mai*, o'rshadow, or possess me. It also means entirely, profoundly.

[3]Hanakahi, a name applied to Hilo, as also Waiolama, its sand beach, make this the location of Pele's arrival, whereas tradition and geography point to Kauai as the place of her first landing.

[4]Pele's activities at Kilauea began as a cresting surf from Kahiki (abroad), which turned in front of Papalauahi.

[5]Literally, leaf strata [of] fire; a flow of molten lava.

[6]Puaakanu women stringing lehua blossoms, a simile freely applied to the Puna district.

[7]Kuu moku lehua, my lehua forested land, above Olaa.

[8]Kukuena wahine, the fiery sweep of women, to which Pele's activities are likened.

[9]Lauwili, literally, leaf-twisting; the companions, na hoalii, entered the entangling thicket, the nahale.

[10]Of Puna.

[11]The scene changes to the sea-coast, represented as controlled and directed by Pele even to the shore of Maui, sea of the chiefess.

Sea roughed by the cliff above.
A sea cliff-watcher is Kakupehau.
Sea invading your pandanus groves.
It crests onward toward Maui,
The sea of the chiefess
Of the lehua-stringing party of Pele,
Of my god indeed.
[Let] awe possess me.

Answer, O mountain, in the cliff mist;
Turn the voice of the moaning ohia,
I see in the fire-consuming rocks
The aged dame sleeping quietly
On hot lava bed, liquid stone,
Till, canoe-shaped, the covering there hid first,
Depressed in center, else flat in the rear,
Spouting was its source, Kamakahakaikea,
Mischievous Niheu, [the] cutting man.
[Let] awe possess me.

On famed Molokai of Hina,
Is Kaunuohua, a cliff,
When Hapuu was lighted—
Hapuu the small god—
Pele came forth, the great god,
With Haumea and Hiiaka,
With Kukuena and Okaoka.
When the small fire lights, it burns
[As] an eye-ball of Pele.
The flash-light of the heavens is it.
[Let] awe possess me.

At Kaulahea, Lanai,
At Mauna-lei, twine the wreath,
Pele is wreathed with the ieie,
Hiiaka shines [her] head,
Haumea anoints [her] body.
Pele enjoys her fish,
The small turtle of Polihua,
Small turtle, short necked,

Kai apaapaa ko ka pali i uka,
He kai kiai pali ko Kakupehau,
Kai pii hala ko aina,
Ke popoi aku la i kai o Maui,
Ke kai a ka wahine[13] alii,
O ke kai kui[13] lehua a Pele,
A ko'u akua la—e,
Elieli kau mai.

E o, e mauna i ka ohu ka pali,
Kaha ka leo o ka ohia uwe,
Ike au i ke ahi ai ala,
Ka luahine[14] moe nana,
A Papaenaena[15] wai hau,
A waa ka uhi, ilaila pee mua,
Pepepe waena, o pepe ka muimui,
O kihele ia ulu, Kamakahakaikea,
O Niheu-kalohe, kanaka kaha la,[16]
Elieli kau mai.

A Molokai nui a Hina,[17]
A Kaunuohua he pali,
A kukui o Hapuu,
Hapuu[18] ke akua liilii,
Puka mai Pele[19] ke akua nui,
Me Haumea me Hiiaka,
Me Kukuena me Okaoka,
O ke a ke ahi iki e—a
He onohi no Pele,
Ka oaka o ka lani[20] la—e
Elieli kau mai.

A Nanai[21] Kaulahea,
A Mauna-lei, kui ka lei,
Lei Pele i ka ieie la,
Wai hinu poo o Hiiaka,
Holapu ili o Haumea,
Ua ono Pele i kana ia,
O ka honu iki o Polihua,[22]
Honu iki ai nounou,

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[13]Wahine alii, the lehua-stringing party.
[13]Party of Pele; kai, for huakai, a large traveling company.
[14]Luahine, Pele is often referred to as an old woman.
[15]Papaenaena, a place in the vicinity of Kilauea; wai, anything in a liquid state; hau, soft porous stone.
[16]This refers to Niheu's cutting Kana's legs, swollen with fatness, while he himself suffered hunger.
[17]A proverbial saying, from the tradition that Molokai is the offspring of Hina.
[18]Molokai hill, Hapuu, represented as a small god.
[19]Pele came forth a great god, with Haumea (her mother) and Hiiaka a sister, as also two others.
[20]Ka oaka o ka lani, literally, the flash-light of heaven.
[21]Nanai for Lanai. Kaulahea an early king of that island; also a noted prophet.
[22]Polihua, noted for sea-turtle, a favorite of Pele.

[Of] crab-like back, of the sea.
The large pattern-backed tortoise
Resembling the food for Pele
If glistening and reflecting in the sun.
[Let] awe possess me.

Kua papai o ka moana,
Ka ea nui kua wawaka,
Hoolike i ka ai na Pele,
Ina oaoaka oaka i ka lani la
Elieli kau mai.

At Keolewa over Kauai,
At the flowers floating below Wailua,
Pele looks from there:
Oahu is seen set aside,
Longing for the water mirage of the land.
Mokihana [fragrance] arose,
The enjoyment of Hiiaka.
Pele disputed there,
There was no guardian to protect.
Pele stamped with her feet the long waves;
An eye-ball for Pele [was] the flash-light of the heavens.
[Let] awe possess me.

A Kauai, a Keolewa iluna,
A ka pua lana i kai o Wailua,
Nana mai Pele ilaila,
E waiho aku ana Oahu,
Aloha i ka wai liu[23] o ka aina,
E ala mai ana mokihana[24]
Wai auau o Hiiaka,
Hoopaapaa Pele ilaila,
Aohe kahu e ulu[25] ai,
Keehi aku Pele[26] i ke ale kua loloa,
He onohi no Pele, Kaoakoakalani la,
Elieli kau mai.

Pele came forth from the east,
The canoe landed at Mookini
[The] battle ceased at Kumalae.
Pele people set up an image,
The image of Pele folk remained for the offspring of Koi.
Pele folk offered sacrifices there;
Pele led them in procession.
At the cape of Leleiwi
[They] inhaled the fragrance of the pandanus;
Of the lehua of Mokaulele,
That was what Pele was wreathing.
Puuloa was a village;
Papalauahi a sleeping house,
A shed for Kilauea.
Pele came forth from Kahiki
[With] the thunder, the earthquake, the bitter rain;

Holo mai Pele mai Kahikina,
A kau ka waa[27] i Mookini,
Noho kaua i Kumalae,
Hooku Pele[28] ma i ke kii,
Noho i ke kii a Pele ma, na ka pua o Koi,[29]
Kanaenae[30] Pele ma ilaila,
Kai a huakai mai Pele,
A ka lae i Leleiwi[31]
Honi i ke ala o ka hala,
O ka lehua o Mokaulele,[32]
Oia ka Pele a kui la,
He kunana[33] hale Puuloa,
He hale moe o Papalauahi,[34]
He halau no Kilauea,
Haule mai Pele mai Kahiki mai,
O ka hekili, o ke olai, o ka ua loku,

[23]Kauai becomes Pele's scene of action. Li'u doubtless refers to the mirage of Mana.
[24]The fragrance of the mokihana (*Pelea anisata*), for which Kauai is famous, arose.
[25]Ulu, influence or protection; there was no guardian or keeper to render such aid.
[26]Pele stamped in her wrath, producing the long waves, while her eye-balls flashed heavenly light.
[27]Pele's canoe here lands from the east on Molokini, a small islet between Maui and Kahoolawe.
[28]At Kumalae Pele released the idols. Tradition has it that image worship in the islands originated with her advent, though Pele was never represented by one.
[29]Koi, not recognized by this name, whose progeny should be so honored.
[30]Kanaenae, sacrificial offering. Pele and her people sacrificed there (at Kumalae).
[31]Leleiwi point, near Hilo.
[32]Mokaulele, a land in Hilo, whose lehua blossoms attracted Pele's wreathing proclivities.
[33]Kunana hale for kulana hale, kau understood, a village.
[34]Papalauahi (see note 5), the halau or shed structure of Kilauea, likely the lava strata of the pit.

The pelting rain of Haihailaunfeaiku,
Of the women in the wilds of Maukele.
Pele came at twilight,
Tossing and turning the long-backed waves.
The ocean was in agitation at the jealousy of Pele;
The great shock is the shock above the heavens,
Tearing the foundation, the surface stratas,
The strata on which Kane surfed at Maui.
Kahiliopua was the god of the day
At Waiakahalaloa, to expand.
It was Waa, whose was the fishing fleet
Remaining at Kohala's shore.
The ghost-god of Puuloa
Entreated the traveler,
The wreath-stringing god of Kuaokala.
Makanoni was wreath making,
The day Pualaa arose and was observed,
The day after Kahuoi stood cold above.
A red-fisted robber was exercising
Eastward of the sun of Kumukahi
Whose first rays reveal the light.
[The] fine garments of Kohala are spread out
To the sun, warmed not in the night,
When the sun hides the day, placed above
Is the moon.
[Let] awe possess me.

Auaahea meets death; on baking
The hog, unshorn of its bristles,
The acceptable offering to the god,
The sacred observance of the companions,
Thunder shook the heavens, the bitter rain
Of Kaulahea of the revealed altar of light.
Kaomealani rained. So! that's the fault,
The god was jealous. Pele for the first time was duped;

O ka ua paka, o Haihailaumeaiku,
O na wahine i ka wao o Maukele la,
Ho mai ana Pele liu la e,
Aumiki, auhuli ka ale kua loloa.

Nuanua ka moana i ka lili o Pele,
O ke kua nui, ke kui la iluna o ka lani,
Wahia ka papaku ka papainoa,
Ka papa a Kane ma i hee ai i Maui,
Kahiliopua[33] ke kua o ka la,

A Waiakahalaloa i akea,
O Waa kai nana i ka auwaa lawaia,
Ku kapa kai e Kohala,
O ke akua lapu e Puuloa,
Ke uwalo la i ka mea hele,

Ke akua kui lehua o Kuaokala,
Kui mai ana o Makanoni,
Ka la puka la helu o Pualaa,
Ka la aku hoi e Kahuoi i ku uka anu,
E olohe[34] kui ula e mauna mai ana.[35]
Ka hikina o ka la o Kumukahi ma,
E haliko ae ana ka aama,
Lele[36] hihee o Kohala, ke kau laina la,
E ka la, pumehana ole o ka po,
O ke la pe ai o ke ao kau aku iluna

I ka malama la.
Elieli kau mai.

He make no Aua'ahea[37] i kalua ia,
I ka puaa aohe ihi ka lau ahea,
Ka ipu kaumaha a ke akua,
Ka mamala kapu a na hoalii.
Kui i ka lani, ka hekili, o ka ua loku,[40]
O Kaulahea o ka okai nu'u o ke ao,
O Kaomealani e ua la, Aha, o ka hala ia?
Lili ke akua, akahi Pele la, a hokahoka,[41]

[33]Kahiliopua, a cloud formation termed a deity.
[34]Olohe, a robber skilled in the lua, bone-breaking wrestling.
[35]Mauna mai ana, practising.
[36]Lele hihee, leaping sideways.
[37]Aua'ahea, likely the name of a special pig prepared for sacrifice; possibly a clerical error for pua'ahea, the term for the last hog on the eighth day of the dedication of a temple; the pua'ahea was to be eaten up entirely. (Andrews Dict.)
[40]The elements are represented as indicating the deities interest in the offering.
[41]Hokahoka, demeaned, chagrined from disappointment.

Akahi Pele la a neenee,[42]
Akahi Pele la a oi[43] pau, i pau i ko hoa,
I oni i ke a, i pahoehoe ai oe i ka mauna,
Auhea, pahoehoe la, noho iho la,
Kalaukaula, e ka pau hale o ke akua,

E Kaneulaapele, o Kuihimalanaiakea,[44]
He hoalii[45] na Pele, he noho ana ai laau,
Na wahine pule mana nana i papawalu,[46]
Elieli kau mai.

Kiope, kiope mai ana ke ahi a kanaka.
Ilalo o Kilauea, a i ku maumaua,
Ai kua mai ana ka pihe a ke akua,
Iluna o ka pali o Mauli,[47]
O ka hua waimaka ia nei,
O kanaka nana i huli pueo ka wai,[48]

Pu oe i kau laau me ko makaainana,
Hopu au i ka'u laau hahau[49] i ke akua.
Ku ua ae Pele, lapuu na Pele,
Waiho ana ilalo, lapuu ka moe,
A ka ula ilalo la, pahoehoe ai oe,

Auwe![50] pahoehoe la, e holo e ka waa,[51]
E kaa ka mauna,[52] ola Hiiakaikapoliopele,
Hoi aku e, hoi aku iluna i ka malama!
Aama pii ae iluna i Kauiki,
Iho mai aama i ke aka o kanaka,

Hooili aama ku i ka laau,
Lawea aama haona i ka eke,
Kaohi paiea i ka pola o ka malo,
Ku ana paiea iloko ka unuunu,
Lei ana paiea j ka hua limu kala,

---

130. Pele for the first time drew near;
Pele for the first time was without pau to clothe your companion,
To shake the stones and overflow the mountain with lava.
Where lava flowed, there dwelt
Kalaukaula, at the household of the deities,

135. Kaneulaapele and Kuihimalanaiakea,
Royal companions of Pele, resident tree eaters,
The women of wonderful prayer of eight-fold power.
[Let] awe possess me.

Stamp, stamp out the people's fire
140. Below Kilauea, and as its reward
Arise the shoutings, the confused noise of the gods
On the cliff of Mauli,
The source of tears of this place
Of men who, owl like, seek water.

145. Gird thou thy weapon with thy countrymen.
I seize my club and strike at the god.
Pele stands raining, Pele's heaps
Are placed below; heaped [was] the dead.
At reddening below thou doth flow.

150. Alas! 'tis flowing, it runs canoe-like;
The mountain rocks, Hiiakaikapoliopele is safe,
Flee away! flee above to the light!
[The] crab climbs up Kauiki,
[It] returns distressed at man's shadow.

155. Crabs are struck with the stick,
Taken and thrown in the bag,
The soft crab catches the flap of the malo;
The soft crab stays within boundaries,
Entwined with the sea-moss pods.

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[42]Ne'ene'e, edging about, to draw near slowly, to crawl on hands and knees.

[43]A oi for aole; no, having not.

[44]These three named deities, companions, hoalii of Pele.

[45]Tree eaters, through overflowing the forests with lava.

[46]Papawalu, connected with pule mana. Wonderful, effective prayer, is thus shown of eight-fold power. Like makawalu (eight-eyed), signifying all-seeing, wise, efficient. Eight seems to be the Hawaiian perfect number.

[47]Cliff of Mauli, for Mauli-ola, the site of the present volcano house, said to be the mystical abode of a supernatural deity of same name of that region.

[48]The meaning of this line is not that men are owl hunters, but that like owls, wide-eyed, they search out the water-holes, collection places of the tears (dew) of the locality.

[49]Hahau, to strike at the god, whereupon Pele reveals her destroying power, as in lines following.

[50]Auwe, exclamation of alarm at the flow of smooth lava.

[51]Hele e ka waa, a proverbial expression indicating its canoe-like speed.

[52]Kaa ka mauna, the mountain rocks or rolls away, yet Pele's favorite sister Hiiaka is safe.

The soft crab is placed upon the stone,
As chewed bait it leaves the bag.
Other crabs, how many awa drinkers? Four,
The tortoise, turtle, kukuwaa and hinalea,
At the ginger of Kahihiwai, lolipua ate,
Lolikoko ate, lolikae ate, lelea ate,
Of Leleamakua, father of Kahikona,
At his birth the red rain poured,
[A] recognizing sign of the power
Of thy god without, jealous.
[Let] awe possess me.

The heavens and the rain rejoice,
Grief rends the heavens, darkness covers the earth,
At the birth of the princely ones.
At birth of a girl the heavens travailed;
When a male child came forth
The red rain above gathered together.
Kuwalu was born and her lord
Kuihimalanaiakea.
Eat O Pele of thy land!
Source of the ohias, the pandanus grove below Leleiwi,
With Panaewa severed Kau is refuse,
With Pele a mound, Pele flows freely
Over thy land, burying the district.
[Let] awe flee on.

Standing in Wailua is the lover's hala post,
The call is heard, the loud noise
Of night gatherers singing, not calling for help.
Deep sympathy! this indeed is Ikuwa,
The first indications arise,
The evils of the wind.
Provoking, run away, make known
The sign, O Hiiaka!
Whose is the sacrifice? For the family
Of Haumea is the offering.
Kane stood supporting the valiant,
Done in his time, for Pele;

Kau ana paiea iluna i ka ala,
Maunu paiea haalele i ka eke.
Neiau moala ehia inu awa? eha,
O ea, o honu, o kukuwaa, o hinalea,
O ka apuhihi, o kahihiwai, ai ae lolipua,

Ai ae lolikoko, ai ae lolikae, ai ae lolea,
O Leleamakua, makua o Kahikona,
Nana i hanau, kaha ka ua koko,
Haina ae ana ka mana,
O ko akua iwaho la, i lili,
Elieli kau mai.

Uua lili ka lani me ka ua,
U ooki ka lani poele ka honua,
I ka hanau ana o na hoalii,[53]
Hanau he kaikamahine hoonou o ka lani,
Hemo mai he keiki kane,
O ii ka ua koko i luna,
Hanau o Kuwalu me kana kane,
O Kuihimalanaiakea,
A ai e Pele i kou aina,[54]
Ai na ka ohia, ka ulu hala i kai o Leleiwi,
Me moku Panaewa, he oka wale Kau,
Me puu o Pele[55] nuikahi e Pele,
I kou aina, hoolewa ke au,
Elieli holo e.

Ku i Wailua ka pou hala a ka ipo,
Hoolono i ka ualo ka wawau nui,
O ulu po maoli nei aohe nalo mai e,
Aloha ino o Ikuwa[56] maoli nei,
Ke lele la ka eka[57] mua,
Ka ino a ka makani,
Ukiuki, kolo e, kaulana
Ka hoaka, e Hiiaka e,
Nowai ke kanaenae? No ka ohana
A Haumea ka naenae.
Ku ua e Kane ke koa,
I ka nei manawa ia, no Pele,

[53] Heaven and earth are held to manifest interest in events affecting royalty.
[54] Pele is bid to eat her land, its ohias and pandanus groves to the shore of Leleiwi.
[55] Me puu o Pele, from hill, cone, or mountain source, Pele's lava streams flow freely over and bury the land.
[56] Ikuwa, while the October month, is taken as typical of a season of disturbance, bewailed here as a period of disaster.
[57] Eka mua, first intimations, in this case, of a storm brewing.

For Hiiaka, for the land,
This here land,
The floating land of the heaven above.
Anakuku is the assembly within
Haamo, a road that is traveled;
A drum discarded; a fence o'erleaped;
A platform trampled; a comforting grass;
A cane-leaf thatching, end trimmed;
A spread mat; a supply of dishes;
A filling of water; a food offering;
A feast for the house.
Released, released is that house; 'tis o'erleaped; 'tis entered trustfully.
For Waihonua stands the long shed,
The house where Pele lived.
Spying came a multitude of the gods.
Be gone! be gone outside!
A prayerless priest, a prayerless chief
Shall not carelessly enter the house of Pele,
My god indeed!
[Let] awe possess me.

Place dottedly the cross signs,
When the kapu expires I shall be first
Dividing into hills, scattering, dividing dottedly.
The land is freed, children restricted,
The coconut is kapu, the waters flow;
When leaf wrapped, stack the bundles [of food].
Kulipee resides at the pit,
And the companions of Kuwawa
And Kuhailimoe flee away to the mire of Hawaii.
I am first to go out hence
From thy presence,
Flying hither in nakedness.
[Let] awe possess me.

No Hiiaka, no ka honua,
Ka honua nei,
Ka honua lewa,[58] ka lani i luna,
O Anakuku ka aha[59] iloko.
O Haamo e, he ala i heie ia,
He pahu i kulaina, he pa i a'ea,
He kahua i hele ia, he luana mauu,[60]
He kau nana ko, he o kana piko,
He hola moena, he lawe na ipu kai.
He ukuhinawai, he kaumaha ai,
He haina no ka hale e,
Noa, noa ia hale, ua a'ea, ua komo hia.
No Waihonua, ku ana o halau ololo,

Ka hale o Pele i noho ai,
Makaikai[61] mai kini[62] o ke akua,
Hoi aku e! hoi aku iwaho na,
He kahuna pule ole, he 'lii pule ole,
Mai komo wale mai i ka hale o Pele,

O ko'u akua la,
Elieli kau mai.

E kau ana kiko,[63] i ke alia[64] kiko,
Hele a moa kiko, akahi nei au,
Kaele puepue, neinei, kaele pakikokiko,[65]

Ua noa ka aina, e kapu keiki.
E kapu ka niu, e kahe na wai,
E ka ha ki ana,[66] ku ka opeope,
O Kulipee[67] noho i ka lua,
A lele e na hoalii o Kuwawa,

O Kuhailimoe, o ka naele[68] o Hawaii,
Akahi nei au, a hoi aku nei,
Mai ou aku la,
A lele pakohana mai,
Elieli kau mai.

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[58] Honua lewa, swinging or floating earth, shows the Hawaiians' belief in a revolving world.
[59] Aha, a company or assembly; also a prayer service of some kapu.
[60] The poet switches off to house building, warming and dedication.
[61] Makaikai mai, comes leisurely sight-seeing, spying the land.
[62] Kini, the number 40,000, commonly used for a great multitude.
[63] Kiko, dotted, spotted, speckled, applied here to the planting of a taro patch.
[64] Alia is a cross sign of kapu, it may be of sticks, leaves, or flags. It takes its name and use from two sticks carried crosswise before the god of the year at the makahiki festivities.
[65] Terms of taro planting in small, scattered, though uniform, hills.
[66] Ha ki ana, the wrapping in ki leaves. Food so bundled (opeope) was then stacked in rows.
[67] Kulipee, a personification, to run and hide; a resident of the pit.
[68] Naele o Hawaii, a locality or condition, not clearly understood.

ole. Short; shortage. Cf. 'ekeke'i. Ke'ehi pō-
, short stride; half step [military]. Pōkole
na'au, quick-tempered. ho'opōkole. To
rten, cut short, abbreviate; contraction.
oliko, Poto Riko. Puerto Rico; Puerto
can. Eng.
opoko. Redup. of poko, 1.
o'u. Short. Lima pōko'u, short sleeve.
ā. 1. Same as paukū. Molokai. 2. To cry out
the night, as to create disturbance. Obs.
ukala, Potugala. Portugal. Eng.
. 1. Flap, as of a loincloth or sarong; tail of
ite. Lawai'a pola malo (Malo 211), fisherman
o tucks away his fishing tackle in the flap of
malo. Kani ka pola o ka malo, the flap of
loincloth snaps [of speed in running]. 2.
tform or high seat between the canoes of a
ble canoe. (PH XI.) 3. Blossoms and sheath
a banana. 4. Rare var. of kākala, spines on
. 5. Also bola. Bowl, cup (preceded by ke).
.
lauahi. Haze, as during a volcanic eruption.
.
le. Clear, bright. Obs.
lolū. Depth of night. Obs. Lit., night below
kness.
ani. 1. Handsome, beautiful, clean, pure.
(Cap.) Poland, Pole; Polish. Eng.
apola. 1. Recovered from sickness; well, after
kness; to get well, convalesce; filling out, as
er loss of weight; sprouting, as a bud. Pole-
a iki, a little better. ho'opolapola. To cure,
ke get well; to fill out, as after sickness. 2.
p.) Tahiti, Borabora; Tahitian. 'Ōlelo Pola-
a, Tahitian language. 3. Same as he'i, the
hitian banana. 4. Redup. of pola, 1; flapping.
a koke a'ela i ka lau'i, 'auwaeke, kihee ihola
olapola ihola ma ka 'ā'ī (Kep. 95), quickly
bbing ti leaves, ginger, tearing and flapping
m about the neck. 5. (Cap.) Star name, paired
h the star Melemele.
. Obs. var. of pale. (AP.)
a. 1. Sunken in, as the lips and cheeks of a
thless person. Obs. 2. Blurred, as eyes of a
er. Obs.
helehe. Insecurely bound, as a bundle. Obs.
hulehu. Twilight, dusk. ho'opōlehulehu.
ginning of dusk; to become dark.
ke. To have lost property by authority of a
of. Obs.
emo. Var. of palemo.
ena. 1. Yellowish, as bird feathers or muddy
ter. Cf. 'ī'ini-pōlena. Lena, pōlena, a kī lena,
low, yellowish, and yellow ti. 2. Bowline;
ed, as sails; tightly bound. Eng. Pōlena pa'a
the ke aloha, i kaleana like ai kāua (song),
e knotted tightly so we two have equal rights.
nekia. Polynesia; Polynesian. Eng.
epole. 1. Rare var. of palepale, to ward off.
rhaps this is poilipoli. 2. A child's game. The
ldren put their clenched fists on top of each
er; each child makes a wish or suggests a
me to play, and sings a chant such as the
owing: Polepole ka mamalihini, ka'a iuni ka'a
i kou, i kou kauhale 'ou'ou; ke 'akia nei
u pike a kaulele ia e kā ia e, ward off the
angeness, roll here, roll here the kou wood,
a kou house, a high house; there's a nip at
navel to make an effort to accomplish.
ewa. Loose, swaying, unsteady, flowing.
. 1. Bosom, breast; depression; (poetic)
rt, arms. Cf. poli lima, poli wāwae. Ma ka
the nei, ho'onanea (song), in the arms, relax.
instep. (Short for poli wāwae.) 3. Coconut
k attached to a fishing line. Cf. naka.
a. Passive/imperative of pō, 1. Obs. See
am. 5.2.
'ahu. 1. To caress. Obs. 2. (Cap.) Name of
goddess of snow who was said to live on
auna-Kea, Hawaii.

poli 'ai. To nurse at the breast; a nursing breast.
Lit., eating breast.
poli 'awa. A bitter breast. Fig., one who has
lost several mates in death.
polie. Shining, gleaming; a gleam, flash of light.
(AP.)
polikia. Tied tightly, not easily unfastened.
Fig., severe suffering. Obs.
polikika. Political. Eng.
polikua. The dark, invisible beyond, as on be-
yond the horizon or in the upper stratum. (KL
line 203.) Lit., back bosom. Polikua puhohō,
wind-blown deep beyond. Hala a'ela ua maka-
hiki nei a kapo'o akula 'ola i loko o ka polikua
o na manawa hiki 'ole ke ho'i hou mai i hope nei,
this year has passed and descended within the
deep beyond of times that cannot return back
here.
poli lima. Center of the palm (poho) of the hand.
poli make. Dead breast. Fig., see poli 'awa.
polina. Resplendent, shiny black. Obs.
polinahe. 1. Soft and gentle, as low music or
a breeze. 2. Slim-waisted and broad-shouldered.
pōlinalina. Same as pōhinahina, a beach shrub.
Oahu.
pōlio. Dark, dismal, gloomy; place of torment.
Obs.
polipoli. 1. A soft, porous stone as used for
polishing or for squid lure sinkers. 2. Rounded,
of an adze. (Malo 51.)
pōliu. Dark, mysterious.
pōliua. Same as polohiwa. Obs.
pō'lukua. Same as polikua. Lit., back mystery.
poliwaiū. Wet nurse. Lit., milk bosom.
poli wāwae. Hollow of the foot, instep.
polo. 1. Large, thick, plump. Obs. Polo hana 'ole,
fat one who does no work [especially one de-
pending on his mate]. 2. To poke, stab. Obs.
3. Special prayer offered to the spirits of the
dead. (Kep. 23.) Obs. 4. Var. of pololei, 2, and
also usually followed by the epithet kani kua
mauna. 5. Polo. Eng.
polo-. An initial part of certain words referring
to pandanus: polohinano, polokā, polope'a, polo-
poloū.
Polo-ahi-lani. Name of a star, said to be asso-
ciated with Mūlehu. Also called Pōhina, Polo-
hilani, Polo-'ula, Polo-wehi-lani.
polo'ai. To summon, command to appear, in-
vite; to proclaim publicly.
polohi. Smooth, as of skin. Obs. Ka'ili-polohi-
lani-o-Lo'eau (name), the smooth royal skin of
Lo'eau.
Polohilani. Var. of Polo-ahi-lani, a star.
polohina. Gray, misty, smoky. Fig., affectionate
grief, pity. Noe polohina no ke aloha i ku'u hoa
(chant), gray playing mist for the love of my
companion.
polohinano. White pandanus bloom (hīnano)
with its stem.
polohiwa. Dark, glistening black, as clouds or
tapa. (Kep. 175.) Ua hala i ke ao polohiwa a
Kāne, passed to the dark clouds of Kāne [death].
polohua. Same as 'ōlohua, berries of pōpolo. Obs.
polohuku. 1. Large, plump, swelling, bulging;
rich, prosperous. 2. Boat hook. Eng.
poloka. 1. Frog, toad. Eng. 2. Also boroka.
Broker. Eng. 3. Also borota. Broth. Eng.
polokā. Ripe pandanus fruit.
polokake. Slippery; wobbly; saturation. Ka
polokake wai ua o Ko'olau, the saturation of rain
water at Ko'olau.
poloka (peroka) kuea. Square pole, in sur-
veying.
polokāwa'e. 1. Fish spear. Obs. 2. Pining, wast-
ing sickness. Obs.
poloke. Broken; broke, without funds (slang).
Eng.

polokē. Fresh poi. Obs.
pōloke. Var. of pōloke, wobbly. (For. 5:331.)
polokika, polotika. Political; politics. Eng.
pololei. 1. Straight, upright; correct, right, ac-
curate, all right; eyes, front [military command].
E pololei ana ke kua, the back will be straight-
ened. ho'opololei. To straighten, correct; to
aim, as a gun; to be partial and treat with
favoritism. Kula ho'opololei keiki kāne, boys' re-
form school. 2. A land shell (Lamellaxis), fre-
quently followed poetically by the epithet kani
kua mauna, singing in the mountain ridges. 'O
ka meian pololei kani le'ale'a (PH 204), the
land-shell neatness singing gaily. 3. Fresh poi.
Kauai. 4. An adder's-tongue fern (Ophioglossum
concinnum), a small native fern with single
narrow-oblong blade, which supports one nar-
row spore-bearing spike about an inch long.
pōloli. Hunger; hungry. Make pōloli, starved to
death. ho'opōloli. To deprive of food, starve,
cause hunger; to fast.
pololia. Jellyfish.
pololo. Talkative, to talk without tact.
pōlolo. Same as kauna'oa-pehu, one of the dod-
ders (Cassytha filiformis).
pololoa. Blundering, awkward; to go astray.
Obs.
pololohua. Same as pololo. Cf. mikololohua.
pōlolohuamea. Dark, dense, distant. Obs.
pololoi. Var. of pololei, 1.
pololū. Long spear.
polona. Same as polopolona.
polope'a. Thick stem of a pandanus fruit.
polopeka. Professor; professorial; to be a pro-
fessor. Eng.
polopolo. Same as pōpolo, the plant.
polopolona. Musty odor; rancid, mouldy odor,
as of mildewed clothes; stuffy smell of a room
long closed.
polopoloū. Unripe, growing pandanus fruit.
Polo-'ula. Same as Polo-ahi-lani, a star.
polo wai. Water polo.
Polo-wehi-lani. Same as Polo-ahi-lani, a star.
polu. Obs. var. of 'ūpolu, wet.
polū. Blue, as of clothes or Euro-American ob-
jects and not of sea or sky. Eng. Cf. uliuli.
poluā. Var. spelling of poluwā.
pōlua. 1. Dark, stormy. Ku'u hoa pili o ka ua
lani pōlua, my constant companion in the rains
from the deep dark heavens. 2. Disturbances
produced by conflicting currents, as of air,
water, tides, winds.
poluea. Nausea, dizziness, seasickness; hang-
over; seasick, dizzy. 'O Ka'ala, kuahiwi mauna
kēhau . . . poluea ihola i lalo o Hale-'au'au
(PH 100), Ka'ala, hill mountainous and dew-
covered, dizzy [to gaze] below at Hale-'au'au.
poluhi. Dull, sleepy. Also maluhi.
pōluhi. Long spear. Obs.
pōluhiluhi. Redup. of poluhi. Also māluhiluhi.
pōluku. To pound, as poi (Kep. 163); to de-
stroy, slaughter, overthrow, pound to pieces.
Rare. Cf. pāluku.
pōlukuluku. Redup. of pōluku.
poluluhi. 1. Redup. of poluhi. Ho'omamalu e,
malu ka lani, poluluhi kaumaha ka honua
(chant), casting gloom, gloomy is the sky, the
earth is heavy with drowsiness. 2. Cloudy,
misty, shady. Obs.
pōlumilumi. Packed, crushed together, as in a
crowd.
pōlumu. General name for trailing plants. Obs.
pōlunu. Chubby, plump, and snort. Rare.
polupolu. Flabby fat.
poluwā. Nausea, retching. Cf. poluea.
poma. Apple.

pōmaika'i. Good fortune, blessedness, blessing,
prosperity; prosperous, fortunate, blessed, lucky.
Lit., good time. Cf. pō'ino. ho'opōmaika'i.
To cause good fortune; to bless, ask grace;
blessing.
pōmano. Dam. Obs.
pō mano. Many nights; very dark.
pō manomano. Redup. of pō mano.
pomeikalana. The pomegranate (Punica gra-
natum), an ornamental and fruit-bearing shrub
from Persia. Eng. Also pomelaike, pomekelane,
pomeraite.
pomekelane, pomegerane. Pomegranate.
(Kani. 8.8.) See pomeikalana.
pomelaike, pomeraite. Pomegranate. Eng. See
pomeikalana. Kīhāpai pomeraite (Mel. 4.3), or-
chard of pomegranates.
pona. 1. Socket; eyeball, eye socket; joint of
sugar-cane stalk, bamboo; hollow, as left after
a sweet potato vine has been dug. Cf. puna.
2. Spotted, as the sea with various shades. Cf.
kipona. 3. Also bona. Bond. Eng.
pōna'ana'a. Confused, bewildered. ho'opōna-
'ana'a. To confuse, bewilder.
pōnaha. Same as pō'aha, 1. Cf. pōnaha lani.
'O ka pōnaha ihe a ke ao, ka pipi'o mālie maluna
(UL 109), circling of clouds, arching calmly on
high. Pōnaha ke one, the sand is circular; fig.,
bloated, as the stomach.
pōnahaliūa. Circular. (AP.)
pōnaha lani. Firmament. (Kep. 83.) For exam-
ple see kaka'i.
pōnahanaha. Redup. of pōnaha.
pōnaha wai. Small, circular water pool.
pōnaho. Dark, gloomy.
pōnahonaho. Redup. of pōnaho.
pōnalo. 1. Plant louse, gnat, small fly, such as
Drosophila; blight; shriveled, as by blight;
swarming, as with gnats. For example see ulu-
ulu, 1. ho'opōnalo. To cause blight. 2. Dim,
blurred, obscure. Obs. Also pinao.
pōnalonalo. Redup. of pōnalo, 1, 2; swarming
with gnats.
ponanā. 1. Dry, arid. Obs. 2. Lame, stiff, sore,
as legs. Obs.
pōnanonano. Var. of pōnalonalo.
ponapona. Redup. of pona, 1, 2; jointed.
ponawa'a. Circle of canoes. Obs.
pone. Pony. Eng.
pō nei. Last night.
pōneko. Dirty, filthy. ho'opōneko. To soil,
besmirch.
pōnekoneko. Redup. of pōneko.
poni. 1. To anoint, consecrate, oil, crown, ordain,
inaugurate; to daub; ointment. Ha'i'ōlelo poni
a ke kia'āina, governor's inaugural address. Ipu
'alapaka poni (Luka 7.37), alabaster box of
ointment. 'Oia ka lā poni mō'ī, i poni 'ia ai na
alī'i, that was the coronation day on which the
monarchs were crowned. ho'oponi. To anoint,
crown, ordain, consecrate, inaugurate. 2. Pur-
ple; any purple-like color. He poni uliuli a he
poni 'ula'ula ko lākou lole (Ier. 10.9), dark-
purple and reddish-purple were their clothes.
(Perhaps PPN pongi, PMP bengi.) 3. Suddenly,
without warning, as of death. Cf. kā'iliponi,
kiiponi. 4. A variety of taro, used as medicine.
The term poni may be qualified by the colors
'ele'ele or uliuli, kea, 'ula'ula. 5. Same as mai'a-
'oa, a banana. 6. A variety of sweet potato.
(HP 142.) 7. A variety of yam. (HP 160.)
ponia. Passive/imperative of poni, 1.
poniaka. Poniard. Eng.
pōniho. To bare, as the teeth; to expose, as the
sea floor; to bristle, as sea urchins; thorny, as
cactus. Obs. Pōniho 'ina ka lae o Pipa, akiaiala
ka 'ina uli, ka 'ina 'a'ele'ele, Pipa point is bristling
with sea urchin [or is greatly exposed], plainly
seen is the dark sea urchin, the black sea urchin.

inject. See also *houhou*. *Hou kui*, injection needle. *Ka hou 'ana o ka ihe* (For. 5:21), the hurling of the spear. **4.** Perspiration, sweat; to perspire, sweat. **5.** Varieties of the *Thalassoma* shallow-water fish. The following names have been recorded for the young stages of the *hou*: *'ăwela, kaaaloa, 'ōlali, 'ōlani, pāhouhou, pākalele, pākauwica, palae'a, pā'ou'ou*. **6.** Same as *pakaweli*, a variety of sugar cane.

hō'ū. To grunt. See *'ū, 1*.

houhewa. To turn this way and that, as in panic.

houhou. Redup. of *hou, 3*. *Fig.*, to make cutting or cruel remarks.

hou kui. See *hou, 3*.

hō'ulu'ulu. See *'ulu'ulu*, collection.

hōuna. Scooping. See *'upena hōuna*.

hou pahi. To stab with a knife.

houpo. Diaphragm, chest. *Lelele ka houpo i ka 'oli'oli*, the heart leaps for joy. *Pa'a ka houpo*, the stomach is full. *Houpo lewalewa*, sagging chest [hunger].

houpo-'ume-pau. Strong pulsation in solar plexis, heart attack.

hou puka. To drill a hole, bore or pierce through.

hōwai. Watery, as thin *poi*. *Pā hōwai*, a dish containing liquids.

hōwai-a-ulu. A perennial herb (*Lagenophora mauiensis*) found only in marshy high parts of Maui. The leaves form a basal rosette, from which rises a stalk bearing a round daisy-like flower head with yellow center and pale-red rays.

hū. 1. To rise or swell, as yeast or souring *poi*; to ferment, overflow (Isa. 8.7), percolate, effervesce, boil over; to surge or rise to the surface, as emotion; rising, swelling; outburst, overflow. *Palena hū 'ole*, unleavened bread. *Hū ka 'aka*, to burst into laughter. *Inā hū aku kou 'uhane i ka po'e pōloli* (Isa. 58.10), if your soul has compassion for the hungry people. *Hū mai ke aloha no ka 'āina*, love for the homeland swells forth. *He hū wale mehe wai la* (Kin. 49.4), unstable as water. **ho'ohū.** (a) To leaven, cause to rise, swell, overflow. (Hal. 45.1.) (b) Yeast, baking powder, leaven. **2.** To roar, grunt, hum. *Hū ka makani*, the wind whistles or roars [of things going at great speed]. *Hū wawā ka nahele*, din roaring in the forest [gossip]. **3.** A spinning top. *Kaula hū*, cord used to spin a top. *Ho'owiniu i ka hū*, to spin a top. **4.** To depart from the proper course, miss the way. *Hū a pua'a*, off the course like a pig [of one who does not follow a straight and narrow path, as of a drunkard]. **ho'ohū.** To cause someone to deviate from the path; to shoo, drive away. **5.** Gum, as of the *'ōlapa* tree. **6.** A class of commoners. *E ka hū, e ka maka'āinana, aloha 'oukou* (chant by Ka-māmalu), O commoners, O citizenry, farewell to you. **7.** Var. of *hui*, to unite, join. *E Lono, e hū 'ia mai ka lani me ka honua* (prayer), O Lono, join heaven and earth.

hua. 1. Fruit, egg, ovum, seed, offspring; meat, as in *'opihi* shell or *'alamihi* crab; to bear fruit, seed; to bear a child; fruitful. For kinds of eggs, see *hua'alu'alu, huamakani, huamoa*. *Hua'ai*, fruit. *Huakanu*, seed. *A e hana aku ai iā 'oukou e hua a'e* (Oihk. 26.9), and will make you fruitful. **ho'ohua.** To bear fruit, reproduce, give birth; to swell high, as a wave (UL 26). *Nalu ho'ohua*, a swelling wave. *Ho'ohua kauwowo*, a medicine for women to induce conception. (PPN *fua*, PMP *buaq*.) **2.** Round object, as pill or bead. Cf. *huaale*. **3.** Result, effect; credit, as for a university course. *Ka hua o ka 'oukou hana*, the results of your work. **4.** Testicles. *He hua pīpī 'ia* (Oihk. 21.20), broken testicles. **5.** Same as *huahua, 3*, a vulgar gesture. *Ho'opu'u ka hua*, to make this gesture. **6.** Word, letter, figure, watchword, rallying cry, note in music; winning word in the Chinese gambling game of *chee-fah*; type. Cf. *huahelu, hua'ōlelo*. *Ho'onoho hua*, to set type. *Kāne ku i ke kala, kala i ka hua o ka waha* (prayer), Kāne stand to forgive, forgive the words of the mouth. **7.** To speak. *Rare*. *A hua* (For. 5:43), then speak.

8. (Cap.) Name of the thirteenth night of the lunar month. (Malo 35.) *Kapu hua*, monthly taboo nights of Mōhalu and Hua. **9.** (Cap.) Name of a star. **10.** The bulging of the broadest part of a paddle blade. **11.** See *pai hua*.

-hua. 1. Emotion, as grief, sorrow, anger. Cf. *mokuāhua, pīlihua, uluhua*. **2.** (With *ho'o-*) **ho'ohua.** Because of, ever since (followed by *no*). *Ho'ohua no ka make 'ana o ka makua kāne, pau ke ui'ike 'ike 'ana iāia*, ever since his father's death, we've never seen him again. *Ho'ohua no i ka huhū 'ana o ke kupuna, 'o ke hele no ia*, because of the anger of his grandparent, he departed.

hu'a. 1. Foam, froth, bubble, suds. *Hu'a o ka wai*, water bubble. **2.** Rim, border, edge, hem; ruffles and tucks at the bottom of a dress; tacks in a mat; train of a gown. *Akea ka hu'a o ka lole*, the bottom of the dress is wide [a full skirt]. *Ka hu'a o ka la'au* (For. 5:59), the reach of the club. **3.** Suburb, boundary. **4.** Pile, as of mats or tapa. (For. 4:63.) Also *nu'a*.

-hu'a. (With *ho'o-*) **ho'ohu'a.** To insist, persist. *Ho'ohu'a noho'i i ka inu lama*, persisting in drinking intoxicants.

hua'ā. Very sour, of *poi*.

hū'a'ā. To burn intensely.

hua'ai. Edible fruit or seed. *Hua'ai māliu* (Kanl. 28.22), blasted fruit.

hua'ala. Nutmeg. *Lit.*, fragrant fruit.

huaale. Pill. *Lit.*, seed to swallow.

huaale ho'omoe. Sleeping tablet.

hua'alu'alu. Egg with a very soft shell.

hua 'ālualua. See *'ālualua, 2*.

hua aniani. Glass bead.

hua 'e. Child born out of wedlock, that is accepted by the husband or wife of the parent and treated as his own. *Lit.*, strange fruit. *Ka'ū, Hawaii*.

huāelo. Var. spelling of *hua 'ēlo*. See *'ēlo*.

hua hapa. Half note, as in music.

hua hapahā. Quarter note, as in music.

hua hā'ule. Fallen fruit or seed. *Fig.*, friendless, uncared for by parents or chief; bastard, illegitimate child (modern); foetus lost through miscarriage.

hua hā'ule wale. Same as *hua hā'ule*. Also said of a sweet potato produced from the extended vine as distinguished from the product in the hill.

huahekili. 1. Hail. *Lit.*, thunder fruit. (Puk. 9.18.) **2.** Rare name for the beach *naupaka* (*Scaevola*) plant.

huahekili-uka. A small native *naupaka* (*Scaevola kilaueae*) found only on dry lava near Kilauea Volcano. It does not exceed a height of two and a half feet, has narrow, thick leaves, dull-yellow flowers, and small black fruits. Also called *pāpa'a-hekili*.

huahelu. 1. Figure, number (the character). **2.** A few, little. *'Ehia āu lei? He mau huahelu no.* How many leis for sale have you? Just a few. *He wahi huahelu ia*, it's of some help [financially].

hua hō'ailona. Abbreviation.

hua ho'one'e. Combination, as of a safe. *Lit.*, number to move.

hua ho'onoho. Type.

huahua. 1. Fruitful, productive; to bear many fruits; to lay many eggs. **2.** Testicles. **3.** A vulgar gesture of contempt made by thrusting the thumb between index and middle fingers with fist clenched, or the fist held up to the face and the eyelid drawn down. With the gesture one sometimes said, "*Eia kāu 'o ka huahua*," "Here's your *huahua*."

hu'ahu'a. 1. Redup. of *hu'a, 1*; foam, froth; bubbling, frothing. *Ua lo'ohia 'oia e kekāhi 'uhane, auwē koke no ia . . . a hu'ahu'a a'e* (Luka 9.39), a spirit seizes him, and he suddenly cries out . . . until [he] foams. **2.** Jelly. *Rare.* **3.** See *hu'ahu'a-kai*.

huahua'i. Redup. of *hua'i*; to boil up, as water in a spring; to gush forth; culmination of sexual passion. *Kāua i ka huahua'i, e 'ukene la i pili pā'olua* (song, UL 106), we two in passionate outpour, giggling, clinging two and two.

hu'ahu'a-kai. 1. Sponge. *A ho'oma'ū i ka hu'ahu'a-kai i ka vinega* (Mar. 15.36), and soaked a sponge with vinegar. **2.** Sea foam; crest of a wave breaking into foam. **3.** A variety of seaweed.

hu'ahu'a-kō. A coarse, woody native herb (*Rumex albescens*) in the buckwheat family.

hu'ahu'a kopa (sopa). Soapsuds.

hu'ahu'a lana. Floating froth. *Fig.*, an ignoramus.

huahualau. Interrogation to incriminate, ensnare, or obtain information by roundabout methods. **ho'ohuahualau.** Causative/simulative; to cross-examine. (Kin. 42.7.) *Na'u no'e i ho'ohuahualau aku, a no iaila, hū mai ko'u aloha* (Laie 607), I used devious methods and then my love poured forth. *Ua ho'ohuahualau mai ia iā mākou me kāna 'ōlelo 'ino'ino* (3 Ioane 10), he prattles against us with his evil words.

huahuwā. Redup. and intensifier of *hūwā*. *A huahuwā mai ko Pilisetia iāia* (Kin. 26.14), and the Philistines envied him.

hua'i. To disclose, reveal, uncover, as an oven; to disinter, dig up; to pour forth, break forth; to churn water, as the propeller of a ship. Cf. *po'o hua'i*. *Ke lepo ke kumu wai, e hua'i ana ka lepo i kai*, when the source of water is dirty, dirt is seen in the lowlands [if thoughts are dirty, dirty words are heard].

hua iki. Small letter; small fruit.

hua'ina. Boiling up, opening, uncovering; to gush forth, as lava.

huaka. 1. Clear as crystal, bright, dazzling, white, shining, flashing. **ho'ohuaka.** To cause a gleam of light, flash, glimmer. **2.** Shadow, reflection. **ho'ohuaka.** To cast a shadow or reflection.

hua kāhi. An only child or offspring.

hua kai. Scrambled eggs.

hu'a-kai. Sponge, foam.

huaka'i. Trip, voyage, mission; procession, parade; to travel, parade. Cf. *ka'i*, to lead. *Ua huli a'e na huaka'i* (Iobu 6.18), the caravans turn aside.

huaka'i hele. Travels, a long trip; to keep traveling.

huaka'i ho'ohanohano. Honor escort.

huaka'i pō. Night procession or parade, especially the night procession of ghosts that is sometimes called *'oi'o*.

hua kalakala. Bur.

hua kani. Tone in music.

huakanu. Seed, as of mango; bulb.

hu'a kapa. Pile of tapas. See *hu'a, 4*.

hu'a kapu. Taboo borders, as of a taboo place, or of the taboo enclosure where hula was taught.

huakē. Full and plump, as a healthy person; well-proportioned, as a properly built canoe.

-huake'eo. (With *ho'o-*) **ho'ohuake'eo.** Hurt, angry, displeased, resentful.

huakēpau. Printer's type.

hū a keu. Excessive. *Hū a keu i ka 'ino*, extremely wicked.

huakineko, huakineto. Jacinth. (Hoik. 21.20.)

hū a ku. Same as *hū a keu*. *He 'ōlelo hū a ku i ka pono*, a word completely just.

hua kumu. Alphabet. *Lit.*, basic letters.

hūlakē. Loose; to tie loosely; round, full, swelling; to sag, as cheeks.

hualala. Curved, warped, oval, twisted.

hua lani. Offspring of a chief.

hua-lani. A variety of sweet potato.

hua-lau. A variety of banana. *Lit.*, many fruits.

huāle. Var. spelling of *huaale*.

hualele. 1. Seeds of the *lau-lele* plant. **2.** Hernia. *Lit.*, flying testicles.

hua leo hui. See *hua palapala leo hui*.

hua leo kāhi. See *hua palapala leo kāhi*.

hu'alepo. To scatter dust, especially a method of fighting with a club in which the opponent was blinded by stirring up dust; to hit an underhanded blow. Also *hu'elepo*. *Wili a'ela 'o Pūpū-ākea i kāna lā'au, a hu'alepo akula ma na wāwae o Maka-ku-i-kalani* (For. 4:249), Pūpū-ākea twirled his club and scattered dust at the feet of Maka-ku-i-kalani.

hualewa. A type of weed.

huali. Bright, polished clean, pure, white, glittering, gleaming; morally pure. *Ua huali kona kapa e like me ka hau* (Mat. 28.3), his raiment was white as snow. **ho'ohuali.** Causative/simulative; to polish (Ezek. 21.10). *Me ke 'ōlinolino la ke nānā aku, a me ke keleawe ho'ohuali 'ia* (Ezek. 8.2), like the brightness of the sun to look upon, and gleaming bronze.

hua li'i. 1. Small or inferior fruit; runt; small, puny. **2.** Small letter.

hua li'ili'i. Grace note in music.

hua lili. Blasted fruit.

hua loa'a. Product, answer, as in arithmetic.

hu'a lole. Trimmings or borders of a garment; hem of a dress.

hū'alu. Loose skin over the eyeball; slight viscous membrane covering the eye.

hua-lua. See *mai'a-hua-lua*.

hualūkini. Musk, as used in making perfume.

hua-mai-lani. Same as *kōkea-akua*. *Lit.*, fruit from heaven.

huamakani. Tiny, yolkless egg. *Lit.*, wind egg.

hua mele. Notes in music; words of a song.

huamoa. 1. Chicken egg. **2.** Round-ended bone entering the hip socket. **3.** Same as *moa*, a native variety of banana. **4.** A variety of sweet potato.

hu'a moena. Pile of mats. (For. 4:63.)

hua mua. Offering to a Congregational church of the first earnings in a new job or undertaking; offerings in gratitude for a particular success, as a big fish catch. *Lit.*, first fruit.

huana. Gushing forth, overflow. *Hala ka huana wai*, gone is the rush of water.

hua nanai. Name of the *hinahina* root when used in *hana aloha*, love sorcery. *Lit.*, swift fruit.

hua-nui. A variety of banana.

hua nui. Capital letter.

hua 'oko'a. Whole note in music.

hua 'ole. Fruitless, unproductive, worthless.

hua'ōlelo. 1. Word. **2.** An affront to a family *'aumakua* god. *E no'ono'o noho'i i ka hua'ōlelo*, then think of the affront [that caused the god's displeasure].

hua-'ono. A variety of sweet potato.

hua-pala. 1. Orange trumpet or sweetheart vine (*Pyrostegia ignea*, synonym *Bignonia venusta*), an ornamental climber from Brazil, bearing early in the year many deep-orange flowers. (Neal 672.) *Lit.*, ripe fruit. **2.** Sweetheart, lover; pretty, handsome. *E Kohala i ka hua-pala kau i ka maka*, O Kohala with the handsome folk to delight the eyes [*lit.*, to appear at the mouth].

huapalaoa. Wheat. *Lit.*, flour (*Eng.*) seed. *'Ai 'ia na pu'u huapalaoa* (Puk. 22.6), the stacked grain is consumed.

huapalaoa-'ele'ele. Rye.

hua palapala. Letter of the alphabet. *Lit.*, writing letter.

hua palapala leo hui, hua leo hui. Consonant. *Lit.*, letter joined in pronunciation.

HAWAIIAN DICTIONARY

For Help in Solving Problems

KOKUA LINE

Harriet Gee

Phone 525-8686 or Write Kokua Line, Box 3080, Honolulu, Hi. 96802

Q — What government agency is responsible for enforcing laws dealing with large-scale littering of Hawaii's beaches and reefs? Here on Lanai, five large steel containers owned by Young Brothers washed up on the beach of our east shore facing Lahaina. Needless to say, they are an eyesore. When will someone make the company haul them out?

A — Those 20-foot-long containers were washed overboard during a storm in February 1984 and will stay on Lanai's east shore until someone can figure out how to remove them.

B.J. Hughes, Young Brothers spokeswoman, told Mrs. K yesterday that "engineering surveys were conducted to determine whether it would be feasible to remove them." The surveys concluded that the containers should be left there since they are in very shallow water and tugs cannot get into the area to remove them from the reef, Hughes said.

Young Brothers no longer owns the containers, she said. The company's insurance carrier, Lloyd's of London, reached an agreement with the state Department of Land and Natural Resources to allow the containers to remain, she said. A department official told Mrs. K that he was not aware of such an agreement and would investigate further. Watch for a follow-up report.

For Help in Solving Problems

KOKUA LINE

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Phone 525-8686 or Write Kokua Line, Box 3080, Honolulu, Hi. 96802

Q — Has the state thought about building a pedestrian bridge across Ala Moana, in front of Kaiser Hospital? It's a real problem crossing the street there because of the barricade along the medial strip. If you want to catch a bus in front of the hospital or the apartments across the street, you have to walk a block in either direction.

People risk their lives crossing the highway there. Someone is going to get killed one of these days.

A — That concrete barrier and wire fence in the medial strip were put there by the state transportation department to discourage people from crossing the heavily traveled boulevard, except where there are marked crosswalks. One block isn't too far to walk, if you value your life.

Q — Within five minutes on a recent Wednesday morning, I witnessed six cars making illegal left turns onto Old Pali Road (upper portion) from the town-bound lanes of Pali Highway. Heaven only knows how many more make that illegal turn each day.

How about a little enforcement by the Honolulu Police Department? These inconsiderate drivers only compound the traffic slowdown when they re-enter Pali Highway at the traffic light closer to town.

A — A police officer was posted there this morning to monitor the situation, in response to your complaint. Police Maj. Leslie Moon said there is a sign there that says left turns are prohibited during the early morning rush hours. He agreed with you that motorists making that illegal left turn are creating more traffic problems when they circumvent backup traffic on Pali Highway by turning left.

Follow-Up on Containers on Reef

State harbors division officials are still trying to figure out the safest way to remove five steel shipping containers that have been stuck on the reef on Lanai's east shore for more than a year.

"We were hoping we'd get some help from mother nature," said Dave Parsons, state boating manager, referring to Hurricane Ignacio, which was downgraded to a tropical storm last week. If heavy rains push the containers out to deeper water, the removal job would be easier, he said.

The containers, which were washed overboard from Young Brothers barges during stormy weather, are in a remote and inaccessible area, Parsons said.

"We could hook the containers to lines and drag them to deeper water, but we're afraid we might damage the reef," he said. "We want to proceed cautiously; the salvaging process poses a greater danger to people trying to get them off the reef than to the general public right now," he said.

Mahalo

"I had the pleasure of riding the Wahiawa bus from Mililani to downtown Honolulu at 10 a.m. July 18. I want to commend bus driver No. 177 for his polite and courteous replies to passengers' questions and his concern for their safety, especially his 'aloha' smile. I only wish he were assigned to this route permanently. We need more drivers like him. Mahalo, 177."

(Editor's note: The driver's name is Thomas Rabe. His bus number is 177.)

Moore, J.G., and Moore, G.W., 1984, Deposit from a giant wave on the Island of Lanai, Hawaii: Science, v. 226, p. 1312–1315.

Reports

Deposit from a Giant Wave on the Island of Lanai, Hawaii

Abstract. *Limestone-bearing gravel, the newly named Hulopoe Gravel, blankets the coastal slopes on Lanai. The deposit, which reaches a maximum altitude of 326 meters, formerly was believed to have been deposited along several different ancient marine strandlines, but dated submerged coral reefs and tide-gauge measurements indicate that the southeastern Hawaiian Islands sink so fast that former worldwide high stands of the sea now lie beneath local sea level. Evidence indicates that the Hulopoe Gravel and similar deposits on nearby islands were deposited during the Pleistocene by a giant wave generated by a submarine landslide on a sea scarp south of Lanai.*

Early investigators reported boulders of limestone at high levels on the south slopes of the islands of Molokai and Lanai (*1*, *2*), and later workers suggested that this limestone was deposited along ancient shorelines formed at times during the Pleistocene when sea level at the Hawaiian Islands is inferred to have stood above its present level (*3*). More recent evidence indicates that the young southeastern islands subside too fast for former worldwide high stands of sea level to have created shorelines that would now be above local sea level (*4*). We have reexamined these marine limestone boulders in an effort to learn how they reached their present positions (Fig. 1).

Several facts regarding the deposits are clear. (i) The conspicuous white limestone boulders occur in a gravel bed in which most clasts, typically 95 percent, are basalt. (ii) The skeletons of corals and other reef organisms invariably occur as clasts and not in growth position. (iii) Within the boulder bed a cemented layer that previously was considered to have been formed by encrusting reef organisms commonly extends down into the underlying basaltic bedrock, and the lithology of the cemented layer suggests that it is a calcite-cemented soil horizon.

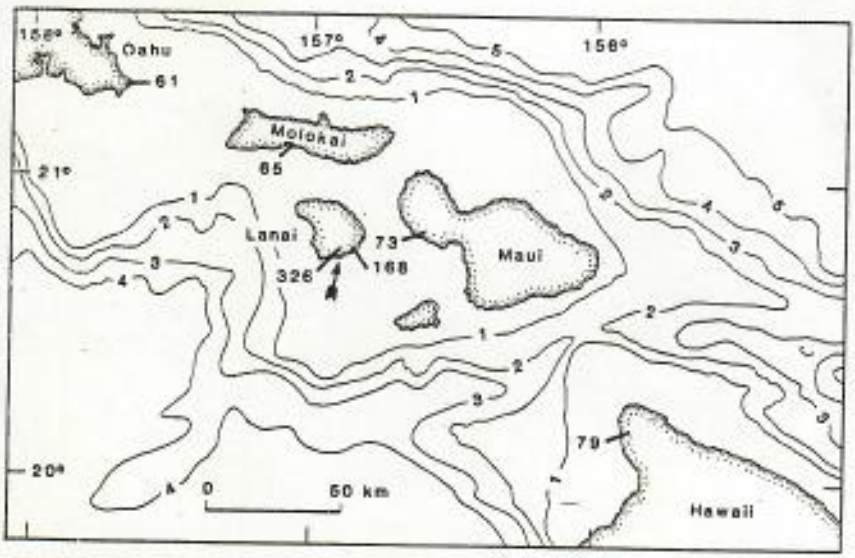

Fig. 1. Index map of the southeastern Hawaiian Islands showing the location of Fig. 2 (arrow) and the local maximum height, in meters, of limestone clasts in the Hulopoe Gravel on Lanai and of other tentatively correlated high-level limestone-bearing deposits. Bathymetric contours are in kilometers.

We mapped an area around Hulopoe Bay on the south coast of Lanai, where the gravel bed is known to be especially thick and widespread, to determine the distribution and attributes of the deposit (Fig. 2). We here name the limestone-bearing gravel bed on Lanai the Hulopoe Gravel, for Hulopoe Bay, and designate as the type locality the exposures along the major gulch which drains into the northernmost extent of Kapihua Bay, the bay directly west of Hulopoe Bay (Fig. 2). The bed is 5 m thick and directly overlies nonweathered basalt at the type locality, about 200 m from the shore (Fig. 3). The bed consists of two layers: a lower layer of subrounded to rounded clasts of basalt (about 95 percent) and limestone (about 5 percent), ranging in size from 3 cm to 1 m, and an upper layer of subangular to angular clasts of basalt ranging from 20 cm to 1.5 m. The boulders of both layers are clast-supported rather than matrix-supported; this evidence suggests that they were water-laid rather than transported in a submarine debris flow. Both the basalt and limestone boulders are varied as to type. Basalt boulders are reddish to dark gray and vesicular to dense; limestone boulders are fragments of honeycomb coral, botryoidal coralline algae, and very coarse grained to fine grained fossiliferous calcareous sandstone derived from beach rock.

Locally in valleys, the upper layer seems to truncate the limestone-bearing lower layer, whereas on ridges the upper layer is commonly thin or missing so that scattered limestone cobbles and boulders from the lower layer are exposed as float. At the surface, limestone clasts are weathered and etched and small ones generally are scarce.

The original thickness of the Hulopoe Gravel and the size of its clasts decrease systematically with distance from the shore and with elevation above sea level. At an altitude of 50 m, where the gravel locally is 4 m thick, the largest clasts are commonly 0.5 m but a few are 1 m in diameter. At an altitude of 100 m, where the deposit is as much as 2 m thick, the largest clasts are commonly 25 cm and rarely 50 cm. A notable exception to the systematic decrease in grain size occurs within Kaluakapo Crater at 150 m (Fig. 2), where clasts attain 75 cm in greatest dimension. Despite the fact that the crater is drained by a narrow gorge, some aspect of its bowl-like geometry favored deposition of a particularly thick and coarse facies of the gravel.

Above an altitude of 200 m, the chief constituent of the deposit is calcareous sand and silt that has sifted down between basalt fragments and into cracks and joints in the basaltic bedrock. In places, small fossils and fossil fragments were lodged in the cracks and cemented, producing veinlike fillings of fossiliferous limestone. Careful tracing of the highest occurrence of these fossiliferous crevice fillings to an altitude of 326 m by Stearns (*5*) led him to designate this as the type locality of the Mahana stand of the sea (Fig. 2). Above the level of calcareous crevice fillings, at an altitude of about 365 m, is an irregular boundary below which the thick red soil typical of upland Lanai has been largely removed, presumably by wave erosion associated with deposition of the Hulopoe Gravel.

The Hulopoe Gravel lies on basaltic bedrock and in a few places on a reddish-brown fossil soil developed on bedrock. The upper surface commonly consists of loose 0.5-m basalt boulders locally deposited as banks and ridges a few meters high along the flanks of ridges and around the heads of gulches (Fig. 4). Beyond the mapped limit of the gravel, rounded basalt boulders extend as a layer no more than one boulder thick, and farther upslope the spacing of these boulders becomes increasingly wide. In Kaluakapo Crater, the gravel is overlain by a thin bed of water-laid reddish-brown silt, and on the flat surface between Manele and Hulopoe bays by pebbly reddish-brown silt.

In a summary of many years' work, Stearns (*3*) interpreted the wide range of altitude for the limestone-bearing material as a series of individual terrace deposits formed at different times by different stands of the sea. The area of Fig. 2 contains the type localities of three presumed ancient stands of the sea: Mahana at 365 m (*3*); Kaluakapo at 183 m (*6*); and Manele at 170 m (*3*). Our observations, however, lead us to conclude that the gravel bed originally blanketed the region as a single deposit.

One of the highest known marine deposits yet found on a Hawaiian Island other than Lanai is located as much as 73 m above sea level in a gulch on the southwestern side of Maui. This fossiliferous marine conglomerate lies 30 km east-northeast from the exposures of the Hulopoe Gravel on Lanai (Fig. 1). The deposit on Maui, which is 1 km north-northwest of Oluwalu, has been designated by Stearns as the type locality of the Oluwalu shoreline (*7*). Similar fossiliferous marine conglomerate beds have been found on the Island of Molokai at 65 m above sea level near the town of Kaunakakai, as large blocks of limestone in talus at 61 m above sea level on easternmost Oahu, and on the Island of Hawaii at 79 m above sea level on Kohala Volcano (*3*). Our observations indicate that the Maui and Hawaii deposits closely resemble the part of the Hulopoe Gravel on Lanai that is about 1 m thick.

Basalt on Lanai dated by the potassium-argon method is 1.25 million years old (*8*), which places an upper limit on the age of the Hulopoe Gravel. Deep soil formed from weathered basalt covers the island at higher elevations than the gravel, and the gravel is younger than the soil; this finding suggests that the gravel is considerably younger than the basalt. A brown weathering rind about 1 cm thick on the surficial basaltic boulders of the gravel deposit indicates substantial age, however, as does the calcite-cemented soil within the gravel, which forms a 1-m-thick hard layer about 3 m below the ground surface. A collection of fossil mollusks (U.S. Geological Survey sample M8475) from 350 m northwest of Kaluakoi Point (Fig. 2), identified and interpreted by Moore (*9*), indicates a habitat of intertidal to 20-m depth and includes *Strombus (Gibberulus) gib-*

Fig. 2. Geologic units of Quaternary age on part of the south coast of the Island of Lanai, showing the type localities of the Hulopoe Gravel (H) and of previously named presumed ancient shorelines: Mahana (A), Kaluakapo (B), and Manele (C); contour interval, 100 m.

Fig. 3. Outcrop of the Hulopoe Gravel near its type locality, showing limestone and basalt clasts.

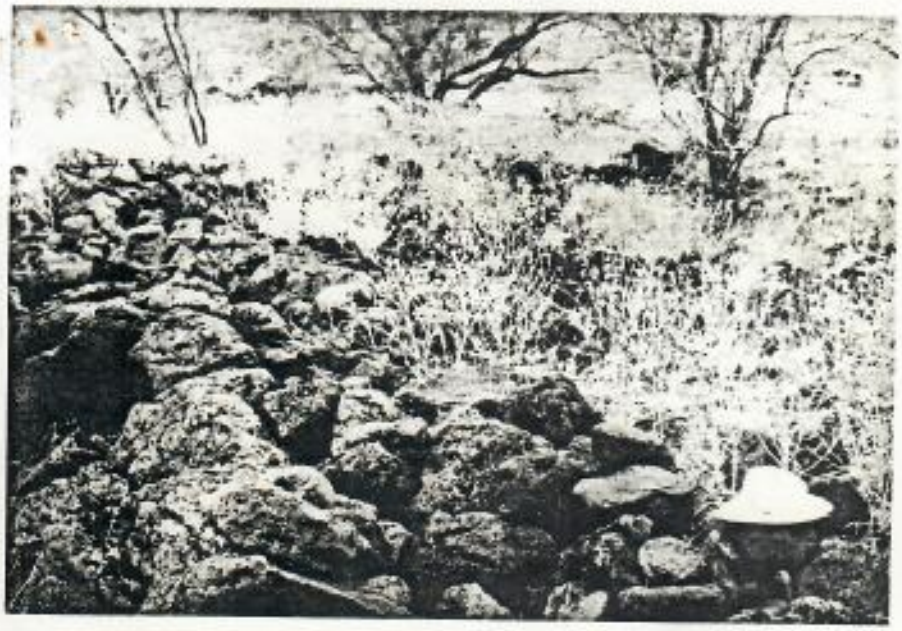

Fig. 4. A long ridge of basalt boulders, about 5 m wide, at the upper surface of the Hulopoe Gravel near its type locality.

berulus gibbosus (Röding). This marine snail now lives at the more equatorial Marshall Islands and Line Islands but is locally extinct in Hawaii; this result suggests a Pleistocene age and a warmer oceanic temperature for the Hulopoe Gravel.

Fossiliferous conglomerate on Kohala Volcano on the Island of Hawaii, similar to that of the Hulopoe Gravel, lies on basalt that has been dated by the potassium-argon method at about 0.4 million years (*10*). If this conglomerate was deposited at the same time as the Hulopoe Gravel on Lanai, then the maximum age of the gravel is further constrained.

Two uranium-series dates have been published for limestone clasts on the southeastern Hawaiian Islands: a specimen from Lanai at an altitude of 171 m was dated by J. K. Osmond as more than 350,000 years old (*11*); and a coral fragment from Hawaii at 6 m was dated by H. H. Veeh at 110,000 ± 10,000 years old (*12*). The Island of Hawaii subsides at a rate of 2 mm/year; this estimate is based on tide-gauge measurements and dated submerged coral reefs (*4*). Considering this rate of subsidence for Hawaii and the age of the bedrock there, if the limestone boulders on all the southeastern islands are the same age as the Hulopoe Gravel, the 110,000-year age seems the more reasonable for them. At the subsidence rate for the Island of Hawaii, the original position of the 110,000-year-old specimen would have been at an altitude of about 230 m, and the nearby fossiliferous conglomerate at a present altitude of 79 m on Hawaii, if 110,000 years old, would have been laid down at an altitude of about 300 m. The highest known occurrence of fossils associated with the Hulopoe Gravel on Lanai, at 326 m (*5*), if corrected for an estimated subsidence rate of Lanai of 0.5 mm/year, would have been deposited at an altitude of about 380 m. Traces of soil stripping are about 40 m higher than the fossils.

The proposition that ancient high-level emerged shorelines exist on the Hawaiian Islands has prompted controversy for half a century, especially in view of the well-defined submerged shoreline terrace and reefs. Stearns (*3*) realized that the altitude and depth range of these features is so great that they could not have resulted wholly from worldwide fluctuations of sea level caused by the withdrawal and return of water to the oceans by the growth and melting of glacial ice sheets. He also recognized that the sea had remained only briefly at the various high shorelines that he proposed. Early suggestions that the high-level fossiliferous material was carried uphill by native Hawaiians (*2*), or blown uphill by the wind (*13*), have been successfully refuted by Stearns (*3*). His preferred model includes an early Pleistocene subsidence caused by volcanic loading to explain the evidence for submergence, followed by a dramatic emergence, caused either by the local intrusion of a tremendous body of magma or by a worldwide change in sea level caused by a sinking of the ocean floors.

Our investigation indicates that all the proposed ancient high-level shorelines, including three with type localities on Lanai and one on Maui, can be correlated with a single event, the deposition of the Hulopoe Gravel. Furthermore, many features of the Hulopoe Gravel indicate that it was deposited by the surge of a giant ocean wave that swept several hundred meters up the flanks of Lanai and nearby islands about 100,000 years ago. The marine material in the deposit was ripped up from the littoral and sublittoral zone and was mixed with basaltic debris as the wave swept inland. The resulting deposit mantles the surface and both thins and becomes finer grained with increasing distance from the shoreline. The deposit is particularly well preserved where topographic traps blocked backflow from such a wave, for example, within Kaluakapo Crater (Fig. 2). The lower layer containing rounded clasts and limestone may represent the upsurge of the wave, and the upper layer containing angular basaltic clasts may represent the backflow from the same wave.

Because of the great run-up of the wave, it was probably not a seismic sea wave caused by a subsea earthquake. Run-up of the highest recorded Hawaiian tsunami reached only 17 m above sea level in Pololu Valley on the Island of Hawaii in 1946 (*14*). Either the impact of a meteorite on the sea surface or a shallow submarine volcanic explosion could have generated the Hulopoe wave. We believe, however, that a more likely explanation is a rapid downslope movement of a subsea landslide on the Hawaiian Ridge, which is among the steepest and highest landforms on earth. The occurrence of several major subsea landslides of various ages, possibly triggered by local earthquakes, indicates that the Hawaiian Ridge is a site of repeated slope failure (*15*). A landslide in a confined fjord in Alaska in 1958 produced a run-up of 524 m, the highest on record (*16*). We infer that rapid movement of a submarine slide near Lanai displaced seawater forming a wave that rushed up onto the islands, carrying with it rock and reef debris from the nearshore shelf and beach.

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13 August 1984; accepted 11 October 1984

Specific Sequence Homology and Three-Dimensional Structure of an Aminoacyl Transfer RNA Synthetase

Abstract. *Few and limited amino acid sequence homologies have been found among eight bacterial aminoacyl transfer RNA (tRNA) synthetases whose primary structures are known. The entire 939-amino acid primary structure of* Escherichia coli *isoleucyl-tRNA synthetase is now reported. In a sequence of 11 consecutive amino acids matching a sequence in* E. coli *methionyl-tRNA synthetase, there are ten identical residues and one conservative change. This is the strongest homology recorded between any two aminoacyl tRNA synthetases. This part of the methionine enzyme's three-dimensional structure has been determined, and it occurs in a mononucleotide binding fold; a close three-dimensional structural homology of this part of the enzyme with* Bacillus stearothermophilus *tyrosyl-tRNA synthetase has also been reported. The three synthetases probably fold identically in this region.*

Aminoacyl transfer RNA (tRNA) synthetases presumably arose early in evolution and established the rules of the genetic code by means of the aminoacylation reaction, in which amino acids are matched with trinucleotide sequences within tRNA molecules. It has appeared that the evolutionary relations between these canonical enzymes are weak because (i) the enzymes vary in size, (ii) there are diverse quaternary structures (*1*), and (iii) sequence homologies between the bacterial enzymes sequenced so far are sparse or nonexistent (*2–5*). We now report the first strong homology between any two synthetases and further evidence that, in spite of the various sizes of these enzymes, the catalytic portions are toward the amino terminus.

A restriction map of an 8-kilobase (kb) segment of *Escherichia coli* K12 DNA cloned into plasmid pGM21 (*6*) (Fig. 1) shows three coding regions that have been defined: ribosomal protein S20 (*7*), Ile-tRNA synthetase, and an overlapping unidentified open reading frame that would encode a polypeptide approximately 17 kilodaltons (kD) in size. The organization of restriction sites in this region suggests that the open reading frame encodes the prolipoprotein signal peptidase (*8*); this suggestion has been confirmed (*9*). We sequenced the coding region for Ile-tRNA synthetase and extended the sequencing through the region encoding the 17-kD polypeptide.

The long open reading frame encoding Ile-tRNA synthetase is located 1.4 kb from the gene encoding S20 and is transcribed in the opposite direction from it. Extensive polypeptide sequence information was independently obtained from the enzyme isolated from *E. coli* MRE600. The amino and carboxyl terminal sequences determined for the polypeptide (*10*) match exactly those encoded by the long open reading frame of the DNA sequence, rigorously defining the location and span of the *ileS* coding region.

The translated amino acid sequence of *E. coli* K12 Ile-tRNA synthetase (Fig. 2) shows stretches of the translated polypeptide sequence that were established by amino acid sequencing of purified peptides isolated from digests of the *E. coli* MRE600 protein. Altogether about 70 percent of the sequence was independently confirmed in this way. There is a strong amino acid sequence homology between residues 57 to 67 of Ile-tRNA synthetase and residues 14 to 24 of *E. coli* Met-tRNA synthetase (*4*) (Fig. 3, a and b). The homology starts with a proline which, in the methionine enzyme's structure (*11*), is near the end of the first β segment of the alternating βαβ . . . structure that is characteristic of mononucleotide binding folds. The subsequent residues (15 to 24) complete the β piece and form a characteristic loop which joins that piece to the first α-helix segment.

The significance of this region is reinforced by its strong three-dimensional structural homology, if not perfect sequence homology, with an identical structural arrangement near the amino terminus of *Bacillus stearothermophilus* Tyr-tRNA synthetase (Fig. 3c) (*12, 13*). In that enzyme the corresponding proline occurs at position 39, and the local conformation of the chain is almost superimposable with that of the methionine enzyme. The α carbons of residues 14 to 28 of the methionine enzyme, for example, have a root-mean-square deviation of 1.8 Å when they are superimposed on residues 38 to 52 of the tyrosine enzyme (*12*).

It is with this part of the methionine enzyme that the strong amino acid sequence homology occurs with Ile-tRNA synthetase (Fig. 3b). This sequence homology and the close structural homology (in this region) between the Tyr- and Met-synthetases implies that Ile-tRNA synthetase is folded in the same way. The *E. coli* Gln-tRNA synthetase is also homologous in exactly the same region (Fig. 3d). We surmise that this is because of powerful selective pressures exerted on the structure in this region.

One constraint is possibly the contact points between adenosine triphosphate (ATP) (or the adenyl part of the adenylate intermediate) and the protein. In the tyrosine enzyme, His^{48} is probably hydrogen-bonded to a ribose oxygen and His^{45} is in close proximity (*12*). Although ATP binds in the analogous place in the methionine enzyme, structural details are still unresolved (*12*). The two analogous histidines are at positions 22 and 25 in the methionine enzyme and align with histidines 64 and 67 of Ile-tRNA synthetase.

The αβ mononucleotide fold in Tyr- and Met-tRNA synthetases extends over

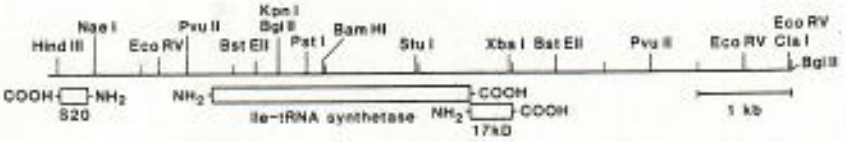


Fig. 1. Restriction map of an 8-kb insert of plasmid pGM21, showing the location of the coding regions for ribosomal protein S20, Ile-tRNA synthetase, and a 17-kD protein.

The End of an Era

Club Lanai and *Oceans Alive* Close Down

Photo by Annie Orcutt

The entrance to the snorkelarium and touch tanks. Heather Campbell in the background.

After six years of operation, the owners of Club Lanai disconnected the channel markers, dismissed the employees and dismantled the *Oceans Alive* program.

A success story in the world of marine education, *Oceans Alive* is an experiential program designed to introduce participants to the vast array of sea creatures that live in the ocean around Hawaii. The unexpected closure of Club Lanai is an obstacle for the founders of the program, but it will not prevent them from striving toward their future goal: to take *Oceans Alive* on the road.

In January 1990 a pilot project designed by Annie Orcutt of Sea Grant Extension Service and Dr. Cynthia Hunter of the Hawaii Institute of Marine Biology was launched at Club Lanai. The theme was to determine the kind of person who visited the club, what motivated them to do so, their awareness of the marine environment and their "willingness to pay for education."

At the onset of the pilot program Club owners knew there were going to be changes in how travelers would pay for their visit to the island.

For the first five years of operation, Club Lanai charged $70 for an all-day trip, complete with meals and activities. During its last year it modified the cost by charging visitors for each activity and meal, a la carte style. Consequently, a study was conducted to assess the impact.

The survey was implemented by Jane Van Schaick, staff member of the University of Hawaii Pacific Business Center Program and Business Administration College and funded by The National Coastal Resource Institute (NCRI). Project equipment and people power were supplied by the university.

Other Club Lanai projects supported by UH and MOP include the 1987 Coastal Resource Inventory of Lopa-Naha on the Lana'i coastline. One objective of this investigation was to identify the location of a natural channel to provide access to potential sites for a pier or harbor area. Club Lanai was later built on the abutting shoreline.

Support facilities for *Oceans Alive* were comprised of two touch tanks and an two MOP interns. Heather Campbell and Tina Xavier presented daily "creature features" that introduced visitors to the two round, eight-inch-deep fiberglass tanks. The tanks were fed by a continuous flow-through salt water system and supported a variety of tide pool invertebrate species.

After spending time with the *Oceans Alive* staff and sea creatures, it "is the intention (of the program) that participants will forever be advocates of healthy, living oceans," says Orcutt.

In October 1990 *Oceans Alive* changed its format to include a snorkelarium, research and a paid position for Heather Campbell during the summer of 1991.

A donut-shaped snorkelarium provided visitors with the second-best view of Hawaii's living reef. Equipped with a walkway and a central pool, the tank created the illusion of swimming amongst the fish and coral.

The snorkelarium also encouraged Orcutt and Hunter to test their own skills at large-scale aquarium maintenance. Not only did the two operators have to manage the snorkelarium, but they had to do so on a remote island where the closest supplies were six miles across the 'Au'au Channel.

To promote ecological research on coral reefs in Hawaii and throughout the Pacific region, the Coral Reef Ecology Program sponsored studies of reef fish, coastal geology, sea turtles and nutrient cycling. The attending scientists agreed to provide their results for inclusion in *Oceans Alive's* educational materials.

The advanced program also focused on marketing techniques. The Board of Directors faced the task of marketing an environmental awareness program without calling it education. "The program had to be marketable and sexy enough to attract people who would choose to participate in marine education," said Orcutt.

There are corporations in Florida, Hawaii and Japan who are interested in the program, she said. The Hilton Hotel chain has specifically expressed interest.

To promote the *Oceans Alive* concept a working model, presently under construction in Denver, Colorado, will be exhibited around the nation. Ultimately, program founders hope to create a marketable and educational project that would be successful worldwide.

The benefits of *Oceans Alive* will carry on even though the Club Lanai era has come to a close. Long hours building the facility, developing educational materials, educating tourists and maintaining the program infrastructure, has fueled the staff's long-term commitment to developing ocean awareness in everyone. Orcutt says there is still much work to be done, but the ground work had been laid for a productive future.

Photo by Annie Orcutt

The Snorkelarium

Of Interest

MOP News

• MOP welcomes Nelle Phillips as assistant editor of *Seawords*. She is a junior Liberal Studies student interested in marine mammal psychology.

• Special thanks to Norton Chan for redrawing the *Seawords* logo. It looks great!

• The Marine Option Program is sponsoring a mountain bike/hike outing around Kaena Point on Saturday, November 16. Interested participants must sign up in the MSB room #229 prior to the trip so that adequate transportation of both bikes and bodies can be provided. The group will meet in front of the MSB at 8:30 a.m. Please bring a lunch, sunscreen and enough water for the entire day. It's going to be a great outing, so don't miss out. Sign up today!

• A reminder to students who are interested in presenting their skill projects at the Annual MOP Student Symposium. It is scheduled for Saturday, March 7, 1992 on the UHH campus. To complement the occasion, a boat trip on Kealakekua Bay aboard the *Fair Wind* has been arranged for Sunday, March 8.

A call for papers will go out around December 1991 and the abstract deadline will be Feb. 7, 1992. Be prepared to send a hard copy and a diskette, either in ASCII or Word Perfect, to the UHH MOP Campus.

• Maria (Zaiger) and Paul Daugherty announce the August 29, 1991 birth of their son, Ross Kahakuloa. He weighed 7 lbs., 7 oz.

Maria is a MOP and BML alumna who now lives in Kealakekua, Hawaii.

Publications

• Anne Doubilet and photographer David Doubilet have written a children's book titled *"Under the Sea from A to Z"*, which is sure to be a great gift for snorkelers of all ages. The book covers 26 topics from anemones to zebrafish and includes numerous facts on each. A world map detailing geographical locations is also included. The book is available from Crown Publishers for $14.95.

• *"Wetlands and Shallow Continental Water Bodies,"* is the product of a SCOPE project, which combines research on freshwater wetlands and shallow water bodies. The publication is designed to survey the state and status of wetlands around the world and their roles in landscape and biospheric processes. Copies can be purchased through SPB Academic Publishing bv, The Hague, The Netherlands, 1991 (ISBN 9051-030460)

• *"Oregon's Ocean,"* a 28-minute film/video documentary of marine life in Oregon's waters, has been produced by the Oregon State University Sea Grant College Program. The video can be purchased for $24.95 from Oregon Sea Grant, Oregon State University, ADS 402, Corvallis, OR 97331-2134.

Employment/Volunteer

• **Fishery Biologist:** The National Marine Fisheries Service is looking for someone to assist with a comprehensive inventory of living marine resources in the Northeastern U.S. Basic qualifications include a B.S. in biological sciences and familiarity with computers. Salary varies with experience for the two-year position, which is available immediately. Interested applicants should send form SF-171, OPM form 1170 and a list of college courses or transcripts to: Personnel Operations Branch, Eastern Administration Support Center, U.S. Department of Commerce, Room 411, 253 Monticello Ave., Norfolk, VA 23510.

• **Student Fisheries Aide:** A general assistant is being sought to prepare and conduct field work, log data, maintain equipment and perform general office duties at the DAR Punchbowl Street office. Applicants must be full-time students and able to work 20 hours per week at a maximum pay rate of $7.68/hr.

If interested send your resume to: Mike Yamamoto, Division of Aquatic Resources, Department of Land and Natural Resources, 1151 Punchbowl St., Room 330, Honolulu, HI 96813.

• **Research Assistant:** Dr. Ken Marten, Head Scientist for Project Delphis, is investigating dolphin self-awareness behavior at Sea Life Park. He needs a highly motivated graduate student to volunteer time for the quantitative analysis of behaviors that have been videotaped during the study.

Qualifications for the position include strong organizational skills and attention to details. A background in experimental psychology is also desired. Training and supervision will be provided in a 699-type directed reading/research project for the right student.

The applicant must be able to work 10-20 hours per week. The position is available immediately. Interested students should contact Dr. Marten at 259-8264.

• The crew of the UHH research vessel, *Farnella*, is looking for physical science majors, preferably with geological backgrounds, to participate in an on-going geological ocean floor mapping survey of U.S. Territorial waters out to the 200-mile limit. GLORIA, which stands for Geologic Long Range Inclined ASDIC, is being conducted using advanced sonar mapping techniques. While in the Hawaiian Islands head scientist, Dr. Homa Lee, will pick up volunteers for the second leg of the trip on November 24 and return December 19. For more information contact John Coney at the UHH MOP office (808) 933-3544.

Conferences

• The Second International Zebra Mussel Research Conference will be held November 19-22, 1991 in Rochester, New York. The four-day program sponsored by the Great Lakes Sea Grant Network, will focus on new research in the biology, impact and control of the zebra mussel in North American waters.

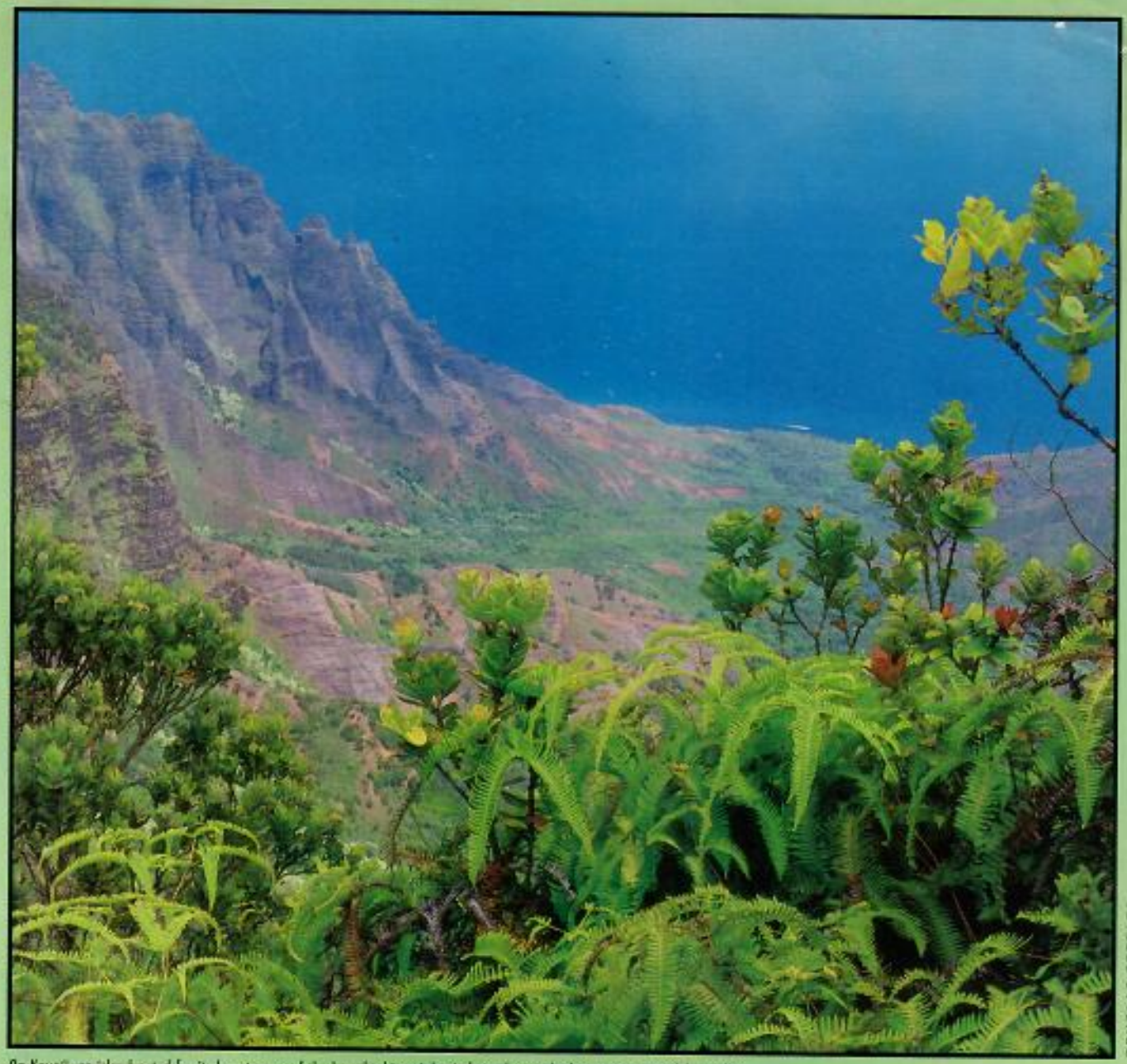
For more information contact: New York Sea Grant, Hartwell Hall, SUNY College at Brockport, Brockport, NY 14420-2928; or call (716) 395-2638; fax (716) 395-2466.

DOUGLAS PEEBLES

LĀ

Known until recently as the Pineapple Island, Lāna'i is now emerging as the latest grand resort getaway

Left: Reminiscent of an English country manor, The Lodge at Kō'ele nestles among tall pines in Lāna'i's cool uplands.
Facing page: The island abounds in petroglyphs, ancient Hawaiian rock carvings, and efforts are being made to preserve them. (Recent research indicates that chalking in the carvings, as pictured, is detrimental to their conservation.)



DOUGLAS PEEBLES

On Kaua'i, an island noted for its beauty, one of the breathtaking sights is from the overlook into pristine Kalalau Valley.

tortuous trails the Hawaiians once used to climb up the valley. Ko'olau killed a sheriff who went in after him, and Ko'olau himself died in the valley in 1896, outlaw to some, hero to others.

Don't for a moment think of hiking into Kalalau from the lookout. The ancients trails have eroded dangerously beyond recognition, and veteran hiker Davis—who hasn't even made it down into the valley himself—can recall at least eight hikers over the years who have died trying.

Winds and clouds are guardians of the view of Kalalau; this vision is not open to everyone. It is not uncommon for visitors to arrive up the 15-mile road from hot, dusty Kekaha and find the valley completely obscured by clouds. As one disappointed man reported recently:

"Nothin' happening."

Ah, but at the Kalalau Lookout, there is no such thing as nothing happening. Even in the fog, there's the sudden flight of the red *'apapane* (a Hawaiian honeycreeper) out of a rare "white rainbow," an unusual optical effect. There's a subtle parting of the cloud veil, revealing a tantalizing glimpse of a cliff, or the beach.

Environmental educator David Boynton has lived in Kōke'e for years and knows the lookout's moods better than anyone—its fogs, its rains, its sudden bursts of sun. "The thing about this place," he says, "is it happens all day long."

HOW TO GET THERE:

TO NU'UANU PALI STATE PARK: Take the H-1 freeway from Waikīkī to the Pali Highway exit. The lookout exits from Pali Highway are to the right, just before the tunnel when coming from Honolulu.

TO PĀLĀ'AU STATE PARK, MOLOKA'I: Take Highway 460 from the west side of the island, or Highway 450 from the east. Turn onto Highway 470 which intersects these near Kaunakakai, and follow it directly to the park.

TO KALALAU LOOKOUT, KŌKE'E STATE PARK: Take Highway 50 along the sunny west side of Kaua'i, to the sugar mill town of Kekaha. About a mile past the mill, the road forks into Highway 55 and leads up to Kōke'e. Keep going after you come to the Kōke'e Lodge enclave, and follow the road to the end.

NA'I—
A NEW ERA


DOUGLAS PEEBLES

BY
PAT PITZER

FOR DECADES LĀNA'I WAS THE WORLD'S LARGEST pineapple plantation. Now the little island has been transformed from plantation to resort destination. No longer the Pineapple Isle, it is known as "The Private Island," a peaceful get-away-from-it-all place with two handsome hotels, modest in size, grand in style.

It's the biggest change to come to Lāna'i since James Dole bought the island back in 1922 and converted it from ranchland to a giant pineapple plantation. Pineapple, which has been Lāna'i's mainstay ever since, is now being phased out, turned into a chapter in the island's history by competition from other countries where the fruit can be grown more economically.

Lāna'i is a small island—just 140 square miles—and 98 percent of its land is owned by Dole Food Co., which developed the two resorts there. The company last year changed its name from Castle & Cooke, which was founded in Hawai'i by two missionaries in 1851 and eventually acquired James Dole's pineapple company and Lāna'i land. Lāna'i Co., a Dole Food subsidiary, is responsible for all its operations on the island.

Rockresorts, which manages both hotels, gave preference in hiring to the displaced pineapple workers. Most of them are now employed in the hotels; some are working in diversified agriculture, which has supplanted some of the pineapple. And many young Lanaians who previously left the island because the only jobs were in the pineapple fields, are now returning to their home island to participate in its new opportunities.

Even as it enters a new era, Lāna'i retains its quiet rural charm, the unhurried, uncrowded atmosphere that make this island so appealing, along with the remarkably friendly people that are the island's greatest asset.

Nestled in the cool uplands, above the little town of Lāna'i City, where nearly all of the island's 2,500 residents live, is The Lodge at Kō'ele. Towering over it are tall sentinels of Norfolk pines that are as much a symbol of this island as pineapples.

The Lodge is reminiscent of an English country manor, yet still seems to fit in this Island highland setting. Though the 120-room hotel just opened in 1990, it has a historical look, with a Victorian-style verandah encircling it. Inside, the Great Hall is at once impressive and comfortable, with antiques mingling with overstuffed chairs. Huge stone fireplaces at either end provide cheery warmth that is welcome in the upcountry, even in Hawai'i.

Just a 20-minute drive away, on a bluff overlooking a lovely crescent beach and bay, is the Mānele Bay Hotel. In a balmy, palmy atmosphere more typical of Hawai'i, it has the air of a charming seaside Mediterranean villa with a Polynesian accent. Its 250 guest rooms are spread out among several low-rise tile-roofed buildings interspersed with tropical gardens with pools and waterfalls. Each of the two resorts on the small island has its distinctive character.

"They complement each other," says Kurt Matsumoto, general manager of The Lodge at Kō'ele. "Visitors enjoy having the option of spending the day at the beach, the night in the cool uplands, or vice versa." Rates at both hotels start at $295 and go up from there to elite suites, complete with butler.

Matsumoto is a prime example of one of the young people who left the island because of the lack of opportunity and who has now returned. He was born and raised on Lāna'i, where his grandparents and parents worked for Dole Plantation.

He left in 1975 to attend Oregon State University, where he graduated with a degree in hotel and restaurant management. He spent the next 10 years working for Hyatt at various hotels on the Mainland, then joined Rockresorts, spending a year in the Caribbean before returning home to Lāna'i last year.

"From a personal standpoint, nothing could be more rewarding than being here," he says. "There's a lot of pride involved in this too, not just the hotel but the success of all the people here—


PAT FITZER

Above, right: Kurt Matsumoto, born and raised on Lāna'i, is back on his home island as general manager of The Lodge at Kō'ele.
Below, right: Sol Kaho'ohalahala, pictured at an ancient Hawaiian village site at Hulopo'e Beach, shares his knowledge of Lāna'i history and lore with visitors.

and the reputation of the island."

Matsumoto describes why visitors find Lāna'i appealing: "It's a hideaway destination. I think we offer something very much needed today. Hawai'i has lost something of its reputation as a getaway. Lāna'i still offers what a lot of people used to come to Hawai'i for—a real restful vacation. We still have the peace and charm the rest of Hawai'i once had.

"There's a feeling of community here. There's just a certain simplicity about living here that's so nice. Lāna'i is something special. I'm lucky; it's also home."

The little town ambitiously named Lāna'i City, which James Dole built in the early 1920s, still has the air of a plantation town where time has stood still.

"Downtown" Lāna'i City is a row of cottagelike one-story frame buildings with corrugated tin roofs, bordering a large open square generously planted with the tall Norfolk pines. Three longtime establishments, Pine Isle Market, International Food and Clothing, and Richard's Shopping Center, are classic examples of the general store, Island-style. Like Hāna, Maui's Hasegawa General Store, celebrated in song, you can get just about anything you want here: groceries, clothing, hardware, appliances, and an incredible variety of other things.

Akamai Trading is a gift shop featuring items made in the Islands, including Norfolk pine bowls and *koa* wood boxes decorated with scenes of Hawaiian legends. Across the square is Lāna'i's art gallery, Island Collections, with a tasteful selection of works by Hawai'i artists.

Two small restaurants face the square, Blue Ginger Cafe, serving local-style plate lunches, saimin and pizza, and S&T Properties, which sounds like a realty company but actually is a diner with an old-fashioned soda fountain and a reputation for good hamburgers.

Lāna'i City's other restaurant is in the Hotel Lāna'i, a rustic 10-room inn, which James Dole built in 1923.


PAT FITZER

Shaded by the town's signature pines, the tiny hostelry has a quaint character and charm. Until two years ago, it was Lāna'i's only hotel.

The town has two service stations, one of which, Oshiro's, rents cars and four-wheel-drive vehicles.

Lāna'i City is still a quiet country town, and there is still plenty of country around. The island remains essentially rural. The great central basin of Pālāwai, once beribboned with pineapple fields as far as the eye could see, now is host to diversified agriculture. Lāna'i Co. has planted fields of hay, alfalfa and oats for forage crops, potentially a future export to the cattle ranches of the Big Island, Maui and Moloka'i.

The company has reintroduced cattle ranching to Lāna'i, and has established a chicken farm, a piggery, and papaya, banana and macadamia nut orchards. It will keep enough acreage in pineapple to meet the island's needs.

The dining rooms of The Lodge at Kō'ele and Mānele Bay Hotel feature these homegrown products, as well as produce raised on Lāna'i in a large organic garden. Mānele Bay Hotel general manager Mark McGuffie points out, "Now we raise about 40 percent of the food products used in the hotels. The objective is to become as self-sufficient as possible. It won't happen overnight but we're well on the way."

Gourmet dining is one of the newfound pleasures of Lāna'i. In the recently published *Zagat Hawai'i Restaurant Survey*, The Lodge at Kō'ele swept the honors, rating No. 1 in food, service and decor. Among the specialties of the menu are local game—venison and quail, fresh Island fish and dessert souffles.

Mānele Bay Hotel, too new to be rated in the survey, also has excellent cuisine, served in two dining rooms with outdoor terraces offering splendid ocean views.


BILL WITTIG-HARSY

Left: The Great Hall at The Lodge is both impressive and comfortable, with giant stone fireplaces at either end.
Facing page, above: Mānele Bay Hotel has the air of a seaside Mediterranean villa with an Island flair.
Facing page, below: Near the hotel is beautiful Hulopo'e Beach.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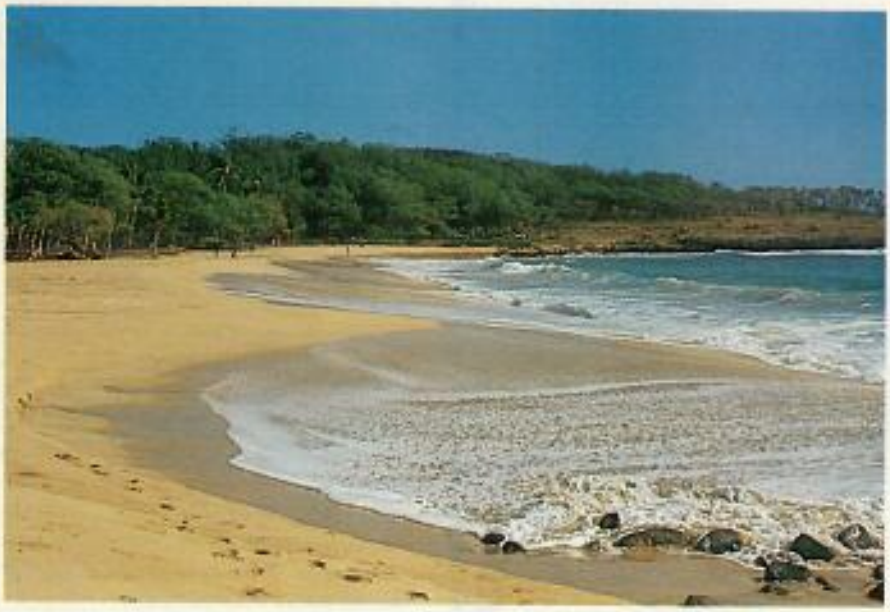
McGuffie says, "We're trying to reintroduce as much Hawaiian influence into the hotel as possible—cultural influence, decor, food." The more formal dining room, which has Hawaiian monarchy era decor, features Hawaiian food with modern adaptations.

Born in England, McGuffie gained extensive international experience in the hotel business before coming to Lāna'i last fall, a few months after the hotel opened. He tuned right in to the place and the people. He notes that about 75 percent of the hotel staff members are Lanaians, the majority of them former pineapple workers. He says, "The people here are very special—their warmth, their sincerity. They're genuinely friendly and hospitable."


PAT PITZER

On this quiet island, outdoor activities are one of the main attractions. The Lodge at Kō'ele's championship golf course, designed by Greg Norman, offers challenging play and unsurpassed scenery. *Golf* Magazine named it one of the top 10 new resort courses for 1991. There is also an older golf course near the Lodge, where Lāna'i residents play for free. Dole has plans for a future Jack Nicklaus-designed course near the Mānele Bay Hotel.

Both hotels have tennis courts and swimming pools. Mānele Bay Hotel is adjacent to Hulopo'e Beach, the island's best swimming beach, which fronts a bay that is a marine preserve, offering good snorkeling and scuba diving. The small boat harbor at Mānele Bay is the departure point for whale-watching cruises, catamaran and ocean rafting excursions, deep-sea fishing charters, and Expeditions' boat that shuttles passengers across the 9-mile channel to Lahaina, Maui.

The Lodge at Kō'ele has lawn bowling, both English and American croquet, and an executive putting course. The stable, just a horseshoe's throw from the Lodge, offers guided trail rides through countryside inhabited by axis deer, pheasant, quail and partridge, up to a ridge with a magnificent view.

Exploring the island in a four-wheel-drive or hiking are other fine ways to enjoy Lāna'i's natural beauty and tranquility. Among the sights accessible by four-wheel-drive are Garden of the Gods, an eerie landscape of rock formations, and Shipwreck Beach, which invites long beachcombing walks. There are many scenic trails for hiking. Munro Trail leads along the pine-studded ridge to the island's highest peak at 3,370 feet, Lāna'ihale. From the summit on a clear day, you can see five other islands.

The trail is named for George Munro, longtime manager of Lāna'i Ranch, who is responsible for planting the hundreds of pine trees that crown the island's uplands. The naturalist rancher also played a key role in saving the native forest at Kānepu'u by fencing it in to keep out the axis deer that roam plentifully in the wilds. The forest, home of rare native species, is now a 462-acre preserve under the stewardship of the Nature Conservancy of Hawai'i.

Long before Lāna'i was a pineapple island it was a ranching island, first sheep, then cattle. Lāna'i Ranch was in operation from 1865 until the early 1950s. The Lodge at Kō'ele and its grounds occupy the site where the ranch manager's and cowboys' homes once stood.

Elaine Ka'opūiki, born and raised on Lāna'i Ranch, recalls, "My father worked as a cowhand for a long time, then he became assistant ranch manager. I loved to go horseback riding with the cowboys when they'd go round up cattle. All the families who lived at Kōele worked for the ranch and we were all very, very close. When we had a lū'au, it was a *big* lū'au. It was so wonderful. People would come from all over and they'd party sometimes for days." She smiles warmly at the reminiscence.

Ka'opūiki's father and mother spoke fluent Hawaiian, and she grew up with a sense of her Hawaiian heritage.

For 40 years now she has been the island's *kumu hula* (hula master and teacher). Her dancers perform regularly at both the Lodge and Mānele Bay Hotel. She is also a musician and a storyteller, who regales visitors with Hawaiian music and tales of old Lāna'i.

Her nephew, Solomon "Sol" Kaho'ohalahala, is director of cultural resources for Rockresorts on Lāna'i.

He is a fountain of fascinating information on the Hawaiian culture and the history and lore of Lāna'i.

He and his staff conduct historical tours of the island. "A place comes to life because of the stories attached to it," he says. "Visitors find out what a site means, its history and legends, and this gives them an appreciation of the island of Lāna'i."

The tours are very popular, as are his historical slide presentations, and the hotels' demonstrations and displays of traditional Hawaiian crafts, such as lei making and *lau hala* (pandanus leaf) weaving.

The Lodge's Kurt Matsumoto says, "I think a lot of people come to the Islands but don't really get to experience what Hawai'i's like. That's a shame, because Hawai'i really does have a unique culture. It's important to preserve Hawaiian cultural things within the community."

Kaho'ohalahala is also chairman of the Lāna'i Archaeological Committee, a joint effort of Lāna'i Co., the state Historic Preservation Office, the Office of Hawaiian Affairs, Hui Mālama Pono o Lāna'i and Lanaians for Sensible Growth. Its purpose is to identify important historical and cultural sites on the island, to preserve them and put into place interpretation, so people will understand and appreciate them.

One such history-rich site is at Hulopo'e Beach Park near the Mānele Bay Hotel. Kaho'ohalahala has created an interpretive historical tour for the shoreline. Near the water are extensive lava rock wall remnants of an ancient Hawaiian village, dating to A.D. 900.

From this site you can see a point on the island of Kaho'olawe called KealaiKahiki, which is also the name of the channel between the two islands. The name translates as "the way to Tahiti," and it is believed that voyaging canoes were launched from this site on Lāna'i during the period of back-and-forth voyages between Tahiti and Hawai'i, from around the year 900 to 1250.

Kaho'ohalahala is working with Bishop Museum on the preservation-interpretation program for two other important archaeological sites on the island. At Kaunolū on the south shore are the remains of an ancient Hawaiian fishing village, site of the summer home of King Kamehameha I and the remnants of a *heiau*, a temple. This was a *pu'uhonua*, a place of refuge where those who had broken the *kapu* (taboos) or were being pursued by an enemy could find sanctuary.

Lāna'i has a wealth of petroglyphs, ancient Hawaiian rock carvings, and a major site is at Luahiwa. Says Kaho'ohalahala, "Access to both sites is difficult now, but by summer, when we have the interpretation in place, access will be improved."

Another project of his has been assembling 200 artifacts from Lāna'i that are in the collection of Honolulu's Bishop Museum and bringing them back to their island of origin for display at the Lāna'i Conference Center at Mānele Bay Hotel.

The Conference Center and both hotels are decorated with murals and other artwork done by local artists. More than 20 Lāna'i artists were involved in the project, creating images that relate particularly to their island, such as petroglyph designs, or Lāna'i legends and history, flora and fauna.

Sol Kaho'ohalahala conducts seminars for all employees of both hotels, sharing with them his knowledge of Hawaiian history in general and Lāna'i

Continued on page 64

Continued from page 20

in particular. The wide-ranging sessions cover the culture, legends, place names and native plants. The hotel staff members will share with visitors what they learn.

In the lobby of the Mānele Bay Hotel are two large murals with scenes from a legend of Lāna'i. It is the legend of the young chief who drove out the evil spirits from the island, making it safe for human habitation. Kaho'ohalahala presents it to the employees so they can tell guests the story behind the murals. Here is a condensed version:

The tale is set in the 1400s. Lāna'i at that time was inhabited by evil spirits, and humans feared to venture there. Kaululā'au was the son of the high chief in Lele, which today is Lahaina, Maui. He was known as a *kolohe* youth, a rascal. His disobedience and mischief-making finally led his father to banish him to Lāna'i, the place of evil spirits. If he survived, he was to build a bonfire on the shore as a signal.

The canoe paddlers drop him off on Lāna'i and he meets all the evil spirits. He senses they are going to kill him. They ask him, "Where are you going to sleep tonight?" He tells them, "On the reef offshore, where the big waves break." Instead, guided by his *'aumakua*, his ancestral guardian spirit, he sleeps in a cave. That night the evil spirits search for him in the high surf and many are drowned. By this and other ruses Kaululā'au outsmarts and destroys them until only one ghost is left.

Kaululā'au goes around Lāna'i closing the waterholes, leaving open only one that has a pandanus tree over it. Then he climbs the tree so his reflection shows in the well. Seeing it, the spirit thinks Kaululā'au is in the well and leaps in. The youth jumps from the tree and covers the well with a rock, getting rid of the last ghost. He lights a fire on shore that can be seen across the channel on Maui.

His father crosses the channel with canoes to escort Kaululā'au home to Lele. The young chief is acclaimed as a hero for ridding Lāna'i of the evil spirits. The people of Maui decide Lāna'i is now a safe place to live and they begin to settle on the island.

Kaho'ohalahala concludes the tale: "Some people say that without Kaululā'au, none of us would be here."

His own family has been on Lāna'i for five generations. "My father and grandfather were cowboys at Kō'ele, so we grew up with horses and were able to travel all over the island on cowboy trails. I'm one of 10 children in the family. My father spent all his spare time fishing and hunting to provide for the family. That's how we grew up, and fishing and hunting are still part of the Lāna'i lifestyle today."

Kaho'ohalahala went to Washington state for college, then returned to Lāna'i, determined to learn more about his Hawaiian heritage. "I knew some cultural things, sang the songs, danced the dances, but needed to learn the language and history. I talked to all the *tūtūs*, the elders of Lāna'i, and they were very sharing with their stories and insights. I feel responsible to be a link between my children and their children's generation and pass down the stories given me by my grandparents' generation.The fulfillment of my life on Lāna'i is to pass on all the things they shared with me."

Beyond preserving Lāna'i's stories and sites, Kaho'ohalahala says, "The spirit of the people is the most important quality to be preserved—that genuine aloha that the people of Lāna'i have."

th result from the sudden subsidence of a volcano's flank. Strong rthquakes in the past have damaged buildings, water tanks, and idges, and have disrupted water, sewer, and telephone lines. ocally, such damage can be intensified where soft, saturated diments amplify earthquake ground motions. Earthquakes also gger rockfalls and other kinds of landslides, fracture the ground, d cause confined bodies of water to slosh back and forth. Indirect ects from shaking, such as fire, can be even more severe than rect effects.

Only a few earthquakes in Hawaii have been strong enough to use severe and widespread damage. The frequent earthquakes used directly by magma movement do not seriously endanger life property; most damage resulting from the strongest earthquakes this type has been related to the falling of loose objects. The ongest historical earthquake, in 1868, was centered beneath the uth coast of the Island of Hawaii (Wood, 1914). It caused despread and locally major damage across the entire island, ggered a destructive mudflow near the community of Pahala, and as accompanied by a devastating tsunami. The combined effects of is earthquake claimed 40–50 lives. A similar earthquake in 1975 used widespread damage, and an accompanying tsunami claimed o lives (Tilling and others, 1976).

TSUNAMIS

Tsunamis, also called seismic sea waves or tidal waves, are ge, rapidly moving ocean waves. Most tsunamis are associated h earthquakes and are generated when an abrupt movement of the an floor displaces a large mass of water. Tsunamis also have ulted directly from volcanism and from landsliding. Tsunamis t have originated around the rim of the Pacific Ocean at great tances from Hawaii have destructive effects similar to those that ginate locally, and they are discussed along with locally generated namis.

Tsunamis reportedly have swept onshore to heights as great as m above sea level at some localities in the world, but the ximum recorded height reached by such a wave anywhere in awaii has been 16–17 m (Tilling and others, 1976). The heights d distances inland reached by different tsunamis, and on different asts by the same tsunami, however, have varied greatly. The namis of November 29, 1975, reached as high as 14.6 m on the uth coast of the Island of Hawaii (Tilling and others, 1976), but ves were only 1–2.4 m high on other parts of that island and less an 1 m high on the other islands. Recently, Moore and Moore 984) have suggested that coral-bearing gravel deposits on some of islands, formerly interpreted as beaches formed during high nds of sea level, are actually the result of a truly giant wave ssibly generated by a submarine landslide.

Although the effects of tsunamis that originate at great dis- nces are similar to those generated locally, the latter are potentially re dangerous because the time between their origin and arrival at shoreline may be too brief to warn and evacuate people or operty.

Tsunamis sometimes move onshore as turbulent waves that can damage or destroy virtually everything in their paths. People may be battered or drowned, buildings moved off their foundations or knocked over, trees uprooted, and boats carried inland. As the waves recede, they may carry people and property out to sea. Tsunamis can also rise quietly as they move onshore and inundate nearshore areas. The salt water can kill crops, poison soil, corrode metal, and damage objects and structures in other ways. The actual effects of a tsunami at any specific site will be determined by the details of local topography, both offshore and onshore, and the direction of approach of the wave, and they are difficult to predict.

The locally generated tsunami of April 2, 1868, destroyed most villages along the south coast of the Island of Hawaii and killed an estimated 46 people (Brigham, 1909, p. 495–496; Hitchcock, 1909; Wood, 1914). Five successive tsunamis that accompanied the earthquake of November 29, 1975, caused the loss of two lives and about $1.4 million in property damage.

Tsunamis have been reported in Hawaii about 50 times since the early 19th century (Macdonald and others, 1947). Those of 1837, 1868, 1877, 1946, 1960, and 1975 caused major damage. The tsunaumi of 1946 originated in Alaska and reached the islands without warning; it caused 150 deaths and $25 million damage (Macdonald and others, 1947; Shepard and others, 1950). Although adequate warnings accompanied the 1960 tsunami, which originated in Chile, they were not fully heeded, and the toll included 61 deaths as well as millions of dollars of property damage (Eaton and others, 1961).

HAZARD ZONES

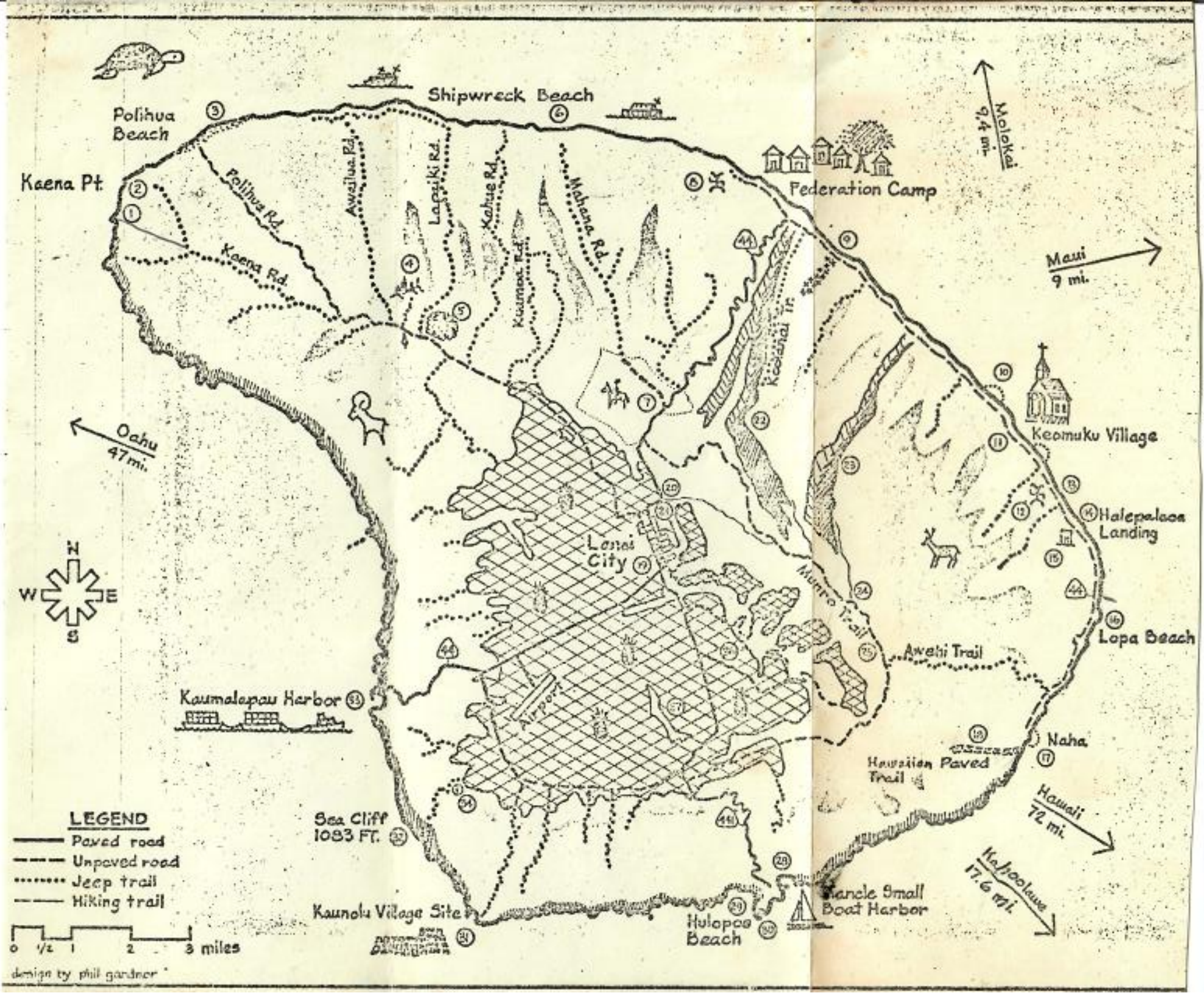
Volcanic-hazard zonation maps have been prepared only for the Islands of Hawaii and Maui. Volcanic eruptions on the other islands are so unlikely in the near future that similar hazard zonation is not warranted. Likewise, no hazard-zone maps have been drawn for earthquakes or tsunamis. The threat from earthquakes is widespread across the islands, and earthquake effects are strongly influenced by local conditions. The danger from tsunamis exists only along the coasts of the islands in a narrow zone whose width depends on local topographic conditions. The danger from large tsunamis is somewhat greater along the southeast and southwest coastlines of the Island of Hawaii, because highly destructive tsunamis are occasionally generated there by large landslides.

The hazard-zone maps distinguish areas in which the general level of hazard is different from that of adjacent areas. However, the level of hazard can vary considerably within any hazard zone, either gradually or abruptly. Direct volcanic hazards, for example, decrease in magnitude gradually across zones away from active vents. For such hazards as lava flows, the frequency with which a specific site is affected decreases with increasing distance; for other hazards such as tephra and gases, the severity of effects diminishes gradually with increasing distance. Such gradational changes in the hazard may extend across an entire zone. Abrupt changes in magnitude of hazard within a zone commonly occur along sharp topographic features, and local topographic features in a zone may have a magnitude of hazard very different from that of the zone as

PLACES OF INTEREST

1. Largest heiau on Lanai
2. 1837 exile colony for women
3. Old breeding grounds of sea turtles
4. Garden of the gods.
5. Native dry land forest
6. Beachcombing
7. Riding club horse pastures
8. Bird man of Lanai petroglyphs
9. Coral ridge
10. Hawaiian fish ponds
11. Church, coconut grove, abandoned bldgs. Maunalei Sugar Co. site until 1901
12. Kahea Heiau petroglyphs
13. Japanese Monument
14. Old landing used for shipping sugar cane
15. Ruins of concrete building
16. Beachcombing
17. Hawaiian fish pond, house ruins
18. Stone masonry trail paved by ancient Hawaiians
19. Lanai Lodge
20. Koele Park, photo history Dole Plantation
21. Golf course, 9 holes free to the public
22. Maunalei Gulch. Island water supply is pumped from here. Closed to the public.
23. Hauola Gulch. Over 2000 ft. deep.
24. Lanaihale 3370 ft. elevation
25. Munro Trail. Views of 5 islands
26. Luahiwa Petroglyphs
27. Palawai Basin. Volcanic crater. Site of Lanai Mormon Colony 1861 to 1864.
28. Public park, boat launching ramp and slips.
29. Swimming, snorkeling, surfing, white sand beach.
30. Sweetheart Rock. Hawaiian bird shrine.
31. Historic Landmark. Hawaiian village and Halulu Heiau used by King Kamehameha I
32. Highest sea cliff on Lanai
33. Commercial boat harbor
34. F.A.A. OMNI radio
35. Dole Pineapple plantation

Island of Lanai


Shipwreck Beach
Polihua Beach
Kaena Pt.
Polihua Rd.
Awalua Rd.
Lapaiki Rd.
Kahue Rd.
Kaumea Rd.
Mahana Rd.
Kaena Rd.
Federation Camp
Molokai 9.4 mi.
Maui 9 mi.
Keomuku Village
Halepalaoa Landing
Lopa Beach
Oahu 47 mi.
Lanai City
Munro Trail
Awehi Trail
Kaumalapau Harbor
Airport
Naha
Hawaiian Paved Trail
Hawaii 72 mi.
Kaiolaolawe 17.6 mi.
Sea Cliff 1083 FT.
Kaunolu Village Site
Hulopoe Beach
Manele Small Boat Harbor
N
W
E
S
LEGEND
Paved road
Unpaved road
Jeep trail
Hiking trail
0 1/2 1 2 3 miles
design by phil gardner

Lana'i

Volume 4, Issue 9

"O Ka Honu O Polihua"

An ancient Hawaiian chant describes the fire goddess Pele feasting on the turtles of Polihua and provides a clue to the natural history of endangered green turtles in Hawaiian waters. In fact, according to George H. Balazas, Zoologist with the National Marine Fisheries Service, "the only site in the Hawaiian Islands with a well-documented history of nesting sea turtles is Polihua, a mile long white sand beach on the northern shore of Lana'i."

By combining the mythic traditions as well as more modern accounts, Dr. Balazas has pieced together a fascinating story of the famous turtles of Polihua, which has been published in "Elepaio", the journal of the Hawaii Audubon Society. The following information is taken from that article, which Dr. Balazas has kindly sent to The Lana'i Times.

To begin with, the very name, Polihua, translated as "eggs in bosom" is the only Hawaiian location where the place name is descriptive of eggs on a beach. "The available information suggests that Polihua was an important breeding site for the Hawaiian Green turtle...until the late 1800's or early 1900's....In view of the protected status of sea turtles under the U.S. Endangered Species Act, a synthesis of historical information about Polihua...may be helpful to the recovery of the Hawaiian stock." For example", Balazas suggests, "Polihua could prove to be one of the best places in Hawaii to do experimental restocking of green turtles aimed at re-establishing a nesting colony."

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Address Correction Requested

Times

September 15, 1992

"Ke' The Turtle of Polihua"

"Linoleum cut by Joana Varawa"

Hawaiian Legends

A very old story about the fishing god, Aiai, tells that he traveled around the Hawaiian islands establishing fishing shrines (koa), many of which still stand at favored fishing places. " At Kaena he marks a stone which turns into a turtle and this explains how turtles came to Hawaiian waters and why they come to the beach to lay their eggs, and this is the reason for the name Polihua ." (Ruth Beckwith, Hawaiian Mythology)

Ruth Tabra, in her book on Lana'i, recounts the Pele chant — "Ua ono o Pele i kana i'ia o ka honu o Polihua" — and translates it as "Delighted, Pele feasts on flesh of turtles from Egg-nest Cape."

Mary Pukui translates an old Hawaiian proverb "Na honu ne'e o Polihua" as "The moving turtles of Polihua".

And Kenneth Emory, who conducted archeological investigations during the

continue on page 6 Turtles

MANELE ROAD TO BE REPAVED

Repaving of the Manele Road will begin on Monday September 21st and continue on workdays to Friday, November 16. During that time the public can expect short delays although there will always be one lane kept open. Work will be done by the paving contractor, Hawaiian Bitumuls, with material supplied by Lana'i Rock and Concrete. So schedule your trips down and up the hill accordingly and don't cut it to the minute if you expect to get to work on time or catch the Expeditions ferry.

continue from page 1 Turtles

1920's and talked to some of the old Hawaiian residents, translates Poli-hua as "nest egg (descriptive). Beach. A place famous for sea turtles."

Emory also described two archeological sites on the east side of Polihua Valley which he believed might be fishing shrines (koa). Near Polihua is the great heiau (ancient temple) at Kaena -iki, the largest religious structure on Lana'i. It is nameless now, the once living ceremonies forgotten, but it might be linked to the ancient fishing culture of the island.

Exploitation

With the abolishment of the kapu system in 1819, the historic controls on natural resources were destroyed. Turtle flesh, which was once probably reserved for chiefs and ceremonial occasions became food for anyone. Nesting turtles were particularly vulnerable because they had to come to the beaches to lay their eggs and were easily hunted and killed.

Kahaulelio, a Hawaiian writing a series of newspaper articles in 1902, described the turtles of Polihua and the method of catching them. "Polihua at Lana'i 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....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 go to Polihua to catch turtles, you need all your strength."

Charles Gay wrote that in the early 1900's "turtles laid their eggs in the sand above the high water mark (at Polihua). I have seen turtles that weighed in excess of five hundred pounds on this beach and were capable of carrying three medium sized persons."

That the turtles of Polihua were green turtles seems to be confirmed by the chant and the proverb which names the turtle as "honu"...the green turtle, as opposed to "honu'ea"...the hawksbill. In addition, the large size of the turtles mentioned by Gay and Kahaulelio is consistent with the known size of the of the adult green turtle, but not the hawksbill, which is smaller. Further confirmation is provided by the fact that the turtles were taken for food as the hawksbill was considered poisonous and not eaten.

Current Information

Dr. Balazas has accumulated a great deal of more recent information about the turtles of Polihua from interviews and correspondence. He notes that "a stone image of a "turtle god" is reported to be at Polihua...there are also reports of a turtle petroglyph located at Polihua.

Two people remembered catching turtles at Polihua during the 1920's. "The sharp decline in nesting during subsequent years has been attributed to the construction of roads, increase in traffic to the north shore, and easier access for taking turtles on the beach.... Other possible adverse factors to nesting...include changes in coastal vegetation and heavy erosion at higher elevations."

However there have been reports of attempted nesting at Polihua during later years: in 1954 a nest was reportedly seen; in 1968 a turtle was seen "up on a northshore beach"; in 1971 a turtle was seen at the water's edge; in November, 1977, two large green turtles were seen mating off the northeastern shore; in July, 1981 two very large turtles were seen "20-30 yards up the beach"; in the spring of 1983 a large turtle was seen in the early morning returning to the water; and in August, 1983, a large turtle was seen in the shoreline at Awalua.

During the 1960's and early 1970's green turtles were intensively hunted off Lana'i and Molokai for the restaurants and [illegible] a fisherman wrote on his monthly catch report that "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 noted that turtles caught in past years off Molokai could be recognized as having been ashore on Lana'i by the tar stains on their undersides.

Another factor in the decline of green turtles might be pollution. In 1978 a fisherman speared a female green turtle who "was found to have large pieces of black and white plastic bags packed throughout its intestines."

The Future

What the future holds for the ancient turtles of Polihua is up to us. Vulnerable on the beaches, the turtles cannot continue if they cannot nest in peace. Dr. Balazas suggests that systematic surveys could ascertain the present status of" ka honu o Polihua", and that the beach could be utilized for experimental restocking.

Perhaps our vision could contain an image of a sanctuary at Polihua where the great beasts could bask and play and bring forth their young undisturbed by hunters or curiosity seekers — a sanctuary in the sun and a glowing tribute to the foresightedness of Lana'i.

Tagging Summary from Lanai during 10/1/84 - 9/15/02

Tag Numbers	Date	Carapace Length (cm)		Weight (lbs)	Capture Method
		Straight	Curved		
7861, 7862	10/22/1984	---	39.5	---	Hand grab
7861, 7852	10/22/1984	---	---	---	Hand grab
V11, V12	06/01/1991	---	60.0	---	Hand/Snorkel
V13, V14	06/01/1991	---	59.0	---	Hand/Snorkel
V15	06/01/1991	---	60.0	---	Hand/Snorkel
R976 (6/3/93), R977 (6/3/93), V16	06/01/1991	---	61.0	---	Hand/Snorkel
H867 (6/25/92), V402, V403	01/04/1992	---	74.0	---	Hand/Snorkel
V404, V405	04/28/1992	---	39.0	---	Net
H612, H613, H614	06/24/1992	---	64.5	---	Hand/Snorkel
H615, H616, H617	06/24/1992	---	52.0	---	Hand/Snorkel
H618, H619	06/24/1992	---	46.0	---	Hand/Snorkel
H620, H621, R998 (6/3/93), R999 (6/3/93)	06/24/1992	---	64.5	---	Hand/Snorkel
H622, H623	06/24/1992	---	52.5	---	Hand/Snorkel
H624, H625	06/24/1992	---	59.0	---	Hand/Snorkel
H633, H634	06/24/1992	---	44.5	---	Hand/Snorkel
H635, H636, H637	06/24/1992	---	81.0	---	Hand/Snorkel
H638, H639, H640	06/24/1992	---	46.5	---	Hand/Snorkel
H641, H642, H643	06/24/1992	---	---	---	Hand/Snorkel
H644, H645	06/24/1992	---	51.5	---	Hand/Snorkel
H646, H647	06/24/1992	---	46.0	---	Hand/Snorkel
H648, H649, H650	06/24/1992	---	70.0	---	Hand/Snorkel
H651, H652, H653	06/24/1992	55.2	59.0	---	Hand/Snorkel
H654, H655, H656	06/24/1992	38.7	41.0	19.0	Beach Net
H657, H658, H659	06/24/1992	52.6	57.0	57.0	Beach Net
H625, H666	06/25/1992	---	---	---	Hand/Snorkel
H627, H628	06/25/1992	---	62.0	---	Hand/Snorkel
H629, H630	06/25/1992	---	56.0	---	Hand/Snorkel
H631, H632	06/25/1992	---	58.0	---	Hand/Snorkel
H660, H661	06/25/1992	---	62.5	---	Hand/Snorkel
H662, H663	06/25/1992	---	56.0	---	Hand/Snorkel

Tagging Summary from Lanai during 10/1/84 - 9/15/02

Tag Numbers	Date	Carapace Length (cm) Straight	Carapace Length (cm) Curved	Weight (lbs)	Capture Method
H864, H865	06/25/1992	---	47.0	---	Hand/Snorkel
H868, H869, J9 (6/3/93)	06/25/1992	---	50.0	---	Hand/Snorkel
H870, H871, R990 (6/3/93)	06/25/1992	---	67.0	---	Hand/Snorkel
H872, H873	06/25/1992	---	47.5	---	Hand/Snorkel
H874, H875	06/25/1992	---	69.0	---	Hand/Snorkel
H876, H877, H879	06/25/1992	52.1	56.5	48.0	Beach Net
H880, H881	06/25/1992	---	52.0	---	Hand/Snorkel
H882, H883	06/25/1992	---	49.5	---	Hand/Snorkel
H884, H885, H900	06/26/1992	---	63.5	---	Hand/Snorkel
H886, H887, H888	06/26/1992	---	82.0	---	Hand/Snorkel
H889, H890	06/26/1992	---	74.0	---	Hand/Snorkel
H891, H892, R989 (6/2/93)	06/26/1992	---	61.5	---	Hand/Snorkel
H893, H894, H895	06/26/1992	---	66.0	---	Hand/Snorkel
H896, H897	06/26/1992	---	55.0	---	Hand/Snorkel
H898, H899	06/26/1992	---	62.5	---	Hand/Snorkel
H926, H927	06/26/1992	---	62.5	---	Hand/Snorkel
H928, H929	06/26/1992	---	43.5	---	Hand/Snorkel
H930, H931	06/26/1992	---	67.5	---	Hand/Snorkel
H932, H933	06/26/1992	---	75.5	---	Hand/Snorkel
H934, H935	06/26/1992	---	57.0	---	Hand/Snorkel
R883, R884, R885, R886	06/01/1993	---	59.5	---	Hand/Snorkel
R887, R888, R889, R890	06/01/1993	---	60.0	---	Hand/Snorkel
R891, R892, R893, R894	06/01/1993	---	54.5	---	Hand/Snorkel
R895, R896, R897, R898	06/01/1993	---	67.5	---	Hand/Snorkel
R899, R900, R901, R902	06/01/1993	---	60.5	---	Hand/Snorkel
R903, R904, R924, R925	06/01/1993	61.3	67.0	---	Beach Net
R905, R906, R907, R908	06/01/1993	---	63.0	---	Hand/Snorkel
R909, R910, R911, R912	06/01/1993	---	72.5	---	Hand/Snorkel
R927, R928	06/01/1993	---	47.0	---	Hand/Snorkel
R930, R931, R932, R933	06/01/1993	---	67.0	---	Hand/Snorkel
R913, R916	06/02/1993	---	75.5	---	Basking on coral head

Tagging Summary from Lanai during 10/1/84 - 9/15/02

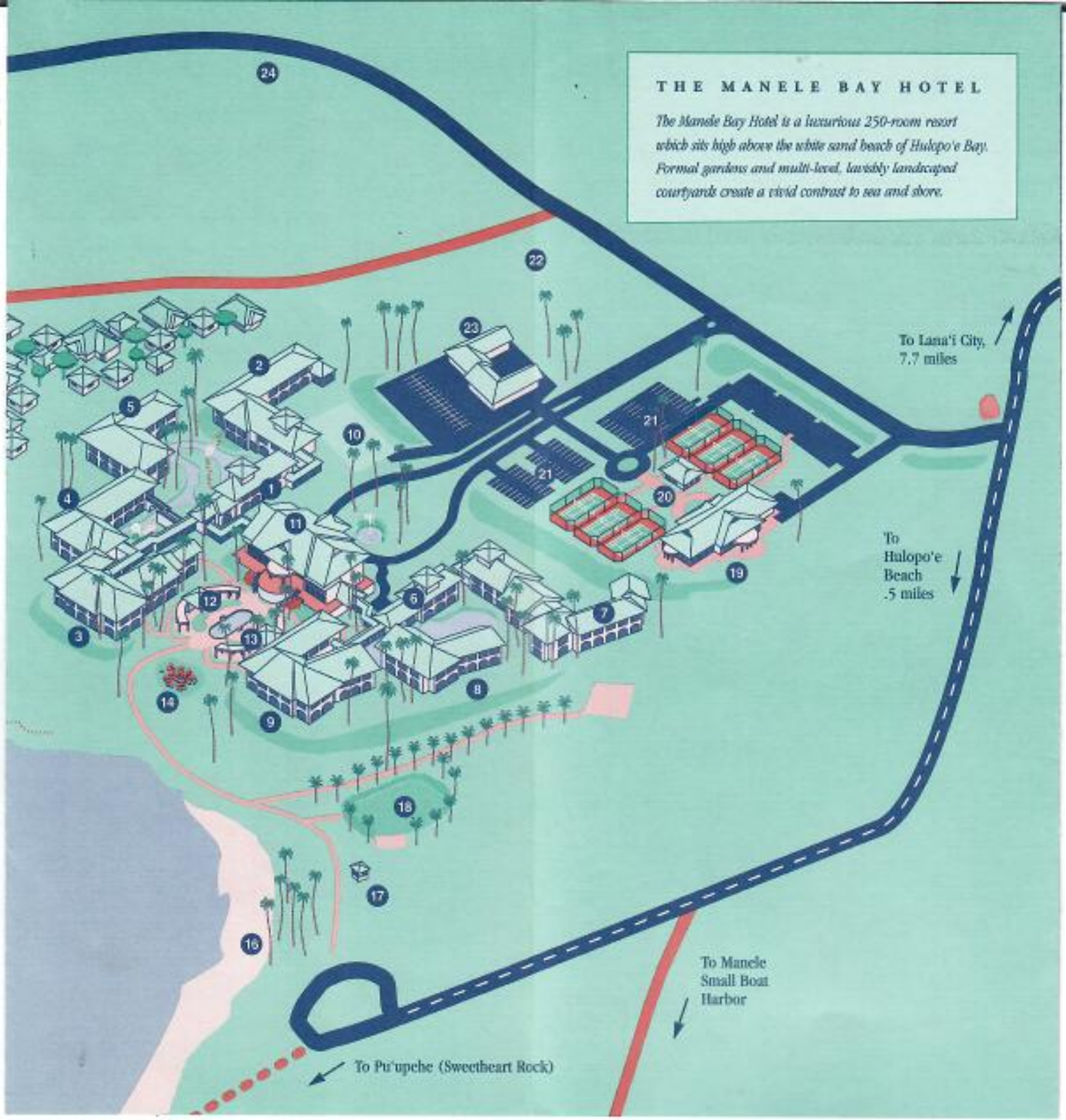
Tag Numbers	Date	Carapace Length (cm) Straight	Curved	Weight (lbs)	Capture Method
R917, R920	05/02/1993	---	81.0	---	Basking on coral head
R921, R922, R923	05/02/1993	---	59.5	---	Hand/Snorkel
R926, R929, R934, R935	05/02/1993	---	68.0	---	Hand/Snorkel
R936, R939	05/02/1993	---	70.5	---	Hand/Snorkel
R940, R941, R942, R943	05/02/1993	---	58.0	---	Hand/Snorkel
R944, R945, R946, R947	05/02/1993	---	73.0	---	Hand/Snorkel
R952, R953, R954	05/02/1993	---	62.5	---	Hand/Snorkel
R955, R956, R957	05/02/1993	---	53.0	---	Hand/Snorkel
R958, R959, R960	05/02/1993	---	45.5	---	Hand/Snorkel
R961, R962	05/02/1993	---	54.0	---	Hand/Snorkel
R963, R964	05/02/1993	---	57.5	---	Hand/Snorkel
R965, R966, R967	05/02/1993	---	65.0	---	Hand/Snorkel
R968, R988, R989	05/02/1993	47.5	50.5	---	Beach Net
R970, R975	05/02/1993	47.3	51.0	---	Beach Net
R971, R972	05/02/1993	---	46.5	---	Hand/Snorkel
R973, R974	05/02/1993	---	40.5	---	Hand/Snorkel
R990, R991, R992, R993	05/02/1993	55.5	60.0	---	Beach Net
R994, R995, R996, R997	05/02/1993	62.5	67.0	---	Beach Net
8725, 8727, 8728, 8729	05/03/1993	---	70.0	---	Hand/Snorkel
8730, 8731, 8732, 8733	05/03/1993	---	70.5	---	Hand/Snorkel
8734, 8735, 8736	05/03/1993	---	44.5	---	Hand/Snorkel
8737, 8738, 8739	05/03/1993	---	46.5	---	Hand/Snorkel
8740, 8741, 8742	05/03/1993	---	77.5	---	Hand/Snorkel
8743, 8744	05/03/1993	---	44.0	---	Hand/Snorkel
8745, 8746, 8747	05/03/1993	---	49.5	---	Beach Net
J5, J6, J7, J8	05/03/1993	---	58.0	---	Beach Net
R978, R979	05/03/1993	---	47.0	---	Hand/Snorkel
R981, R982, R983	05/03/1993	---	65.5	---	Hand/Snorkel
R984, R985, R986, R987	05/03/1993	---	56.0	---	Hand/Snorkel
V406, V407	10/29/1995	---	48.0	---	Feeding
V408, V409	01/16/1998	---	79.0	---	Beached

Tagging Summary from Lanai during 10/1/84 - 9/15/02

Tag Numbers	Date	Carapace Length (cm)		Weight (lbs)	Capture Method
		Straight	Curved		
V410, V411	11/25/1998	---	74.0	---	Beached
V412, V413	04/03/2002	---	59.0	---	Incidental net capture
V414, V415	06/23/2002	---	70.0	---	Basking
V416, V417	06/23/2002	---	99.0	---	Basking

Summary of Recovered Turtles from Lanai during 7/1/89 - 9/15/02

Tag Numbers	Date		Curved Carapace Length cm		Year Interval	Growth cm/yr
	Original	Recovered	Original	Recovered		
BBA408, Y425, Y427	07/05/1989	01/11/1991	76.0	---	1.5	---
H867 (6/25/92), V402, V403	01/04/1992	05/25/1992	74.0	75.5	0.4	3.8
H864, H865, H866	06/24/1992	01/18/1993	41.0	42.5	0.5	3.0
H838, H839, H840	06/24/1992	08/01/1993	46.5	48.0	0.9	1.7
H891, H892, R969 (6/2/93)	06/26/1992	08/02/1993	61.5	64.5	0.9	3.3
H820, H821, R998 (6/3/93), R999 (6/3/93)	06/24/1992	08/03/1993	64.5	69.5	0.9	5.6
H838, H839, H840	06/24/1992	08/03/1993	46.5	48.0	0.9	1.7
H848, H849, H850	06/24/1992	08/03/1993	70.0	73.5	0.9	3.9
H868, H869, J9 (6/3/93)	06/25/1992	08/03/1993	50.0	54.0	0.9	4.4
H870, H871, R980 (6/3/93)	06/25/1992	08/03/1993	57.0	71.5	0.9	8.0
R976 (6/3/93), R977 (6/3/93), V16	06/01/1991	08/03/1993	61.0	68.5	2.0	3.8
10994, 11019	04/14/1992	11/21/1994	---	---	2.6	---


THE MANELE BAY HOTEL
The Manele Bay Hotel is a luxurious 250-room resort which sits high above the white sand beach of Hulopo'e Bay. Formal gardens and multi-level, lavishly landscaped courtyards create a vivid contrast to sea and shore.
To Lana'i City, 7.7 miles
To Hulopo'e Beach .5 miles
To Manele Small Boat Harbor
To Pu'upehe (Sweetheart Rock)
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RESORT MAP

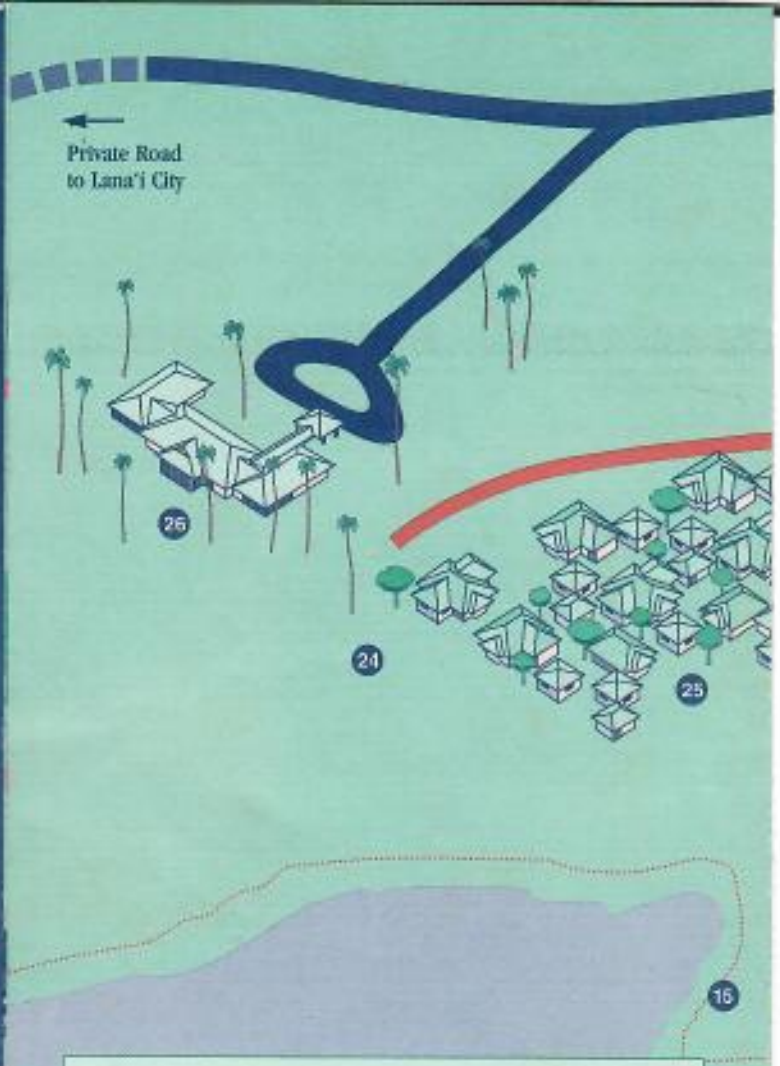
THE ISLAND OF LANA'I

HAWAII

E Komo Mai Lana'i

WELCOME TO LANA'I

THE LODGE AT KOELE
THE MANELE BAY HOTEL
LANA'I, HAWAII



1 Orchid (2101-2106, 2151-2156)
2 Gardenia (2201-2218, 2251-2268)
3 Plumeria (2301-2316, 2351-2366)
4 Lotus (2401-2413, 2451-2465)
5 Ginger (2501-2513, 2551-2565)
6 Coral (2601-2604, 2651-2664)
7 Starfish (2701-2722, 2751-2772)
8 Angelfish (2801-2810, 2851-2860)
9 Dolphin (2901-2916, 2951-2966)
10 Practice Putting Green
11 Main Building:
Concierge, Gift Shop, Butler Suites, Spa, Children's Room, Ihilani Dining Room, Hale AheAhe Bar, Hulopo'e Court Restaurant, Library, Beauty Salon
12 Pool Cabana
13 Pool Grille
14 Ancient House Platform
15 Fisherman Coastal Trail
16 Hulopo'e Beach
17 Beach Kiosk
18 Luau Grounds
19 Lana'i Conference Center
20 Tennis Center
21 Guest Parking
22 Challenge at Manele Golf Course, Jack Nicklaus designer
23 Service Building
24 Manele Bay Estates
25 The Terraces, Manele Bay
26 Challenge at Manele Clubhouse

1 Tennis Courts
2 Stables
3 Guest Parking
4 Lawn Bowling
5 Ka'lokahi Okamalamalama Hawaiian Church
6 Rooms 301-326 (lower)
7 Rooms 351-376 (upper)
8 Trophy Room
9 Gift Shop
10 Swimming Pool, Koele Fitness Facility, Bicycle Depot
11 Library
12 Croquet Lawns
13 Terrace Restaurant
14 Suites 101-110
15 Bar, Music Room
16 The Dining Room
17 Rooms 201-226 (lower)
18 Rooms 251-276 (upper)
19 Orchid House
20 Reflecting Pool
21 'Yacht' Club
22 Koele Putting Course
23 Experience at Koele Golf Course, Greg Norman designer
24 Experience at Koele Parking
25 Experience at Koele Clubhouse
26 Villas at Koele
27 Cavendish Golf Course

THE LODGE AT KOELE

Koele was the historic center for ranching operations on the island. Presently, Koele is the site of The Lodge at Koele, a luxurious 102-room resort. The hotel combines the elegance of an English manor with the rustic comfort of old Hawai'i.

MAP LEGEND

Public Paved Roads

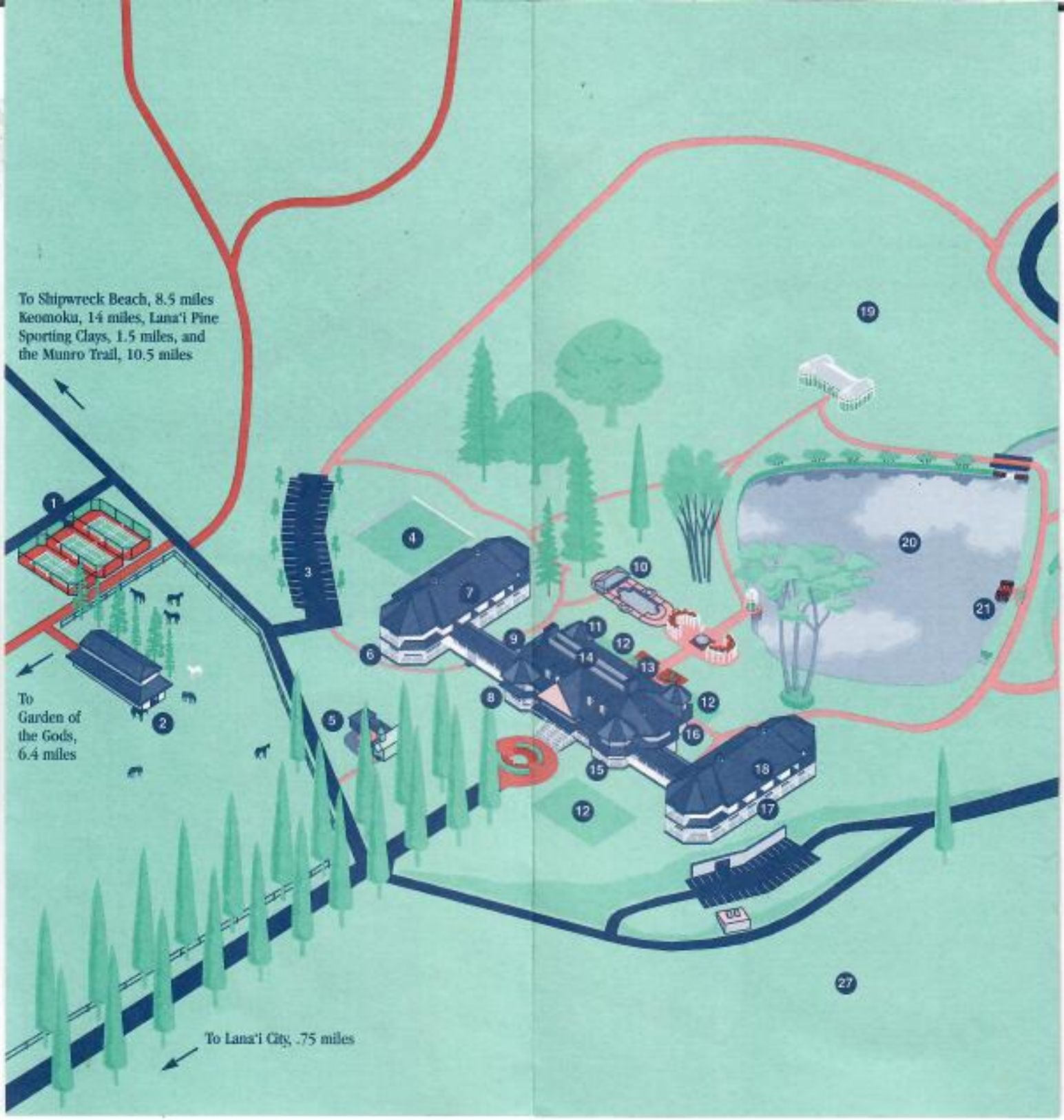
Private Paved Roads

Unpaved Roads

Trail

Walking Paths

Golf Carts Only


To Shipwreck Beach, 8.5 miles
Keomoku, 1.4 miles, Lana'i Pine
Sporting Clays, 1.5 miles, and
the Munro Trail, 10.5 miles
To
Garden of
the Gods,
6.4 miles
To Lana'i City, .75 miles
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