

# THE ELEPAIO

Journal of the  
Hawaii Audubon Society



For the Better Protection  
of Wildlife in Hawaii

VOLUME 33, NUMBER 12

JUNE 1973

## STATUS OF MARINE TURTLES IN THE HAWAIIAN ISLANDS

By George H. Balazs \*

### INTRODUCTION

Of the 5 genera of marine turtles which exist in the world today, only 3 are found in the waters around the Hawaiian Islands. The most abundant is the Pacific Green Turtle (*Chelonia* sp.), while the Hawksbill (*Eretmochelys* sp.) is sighted infrequently. Both of these animals inhabit relatively shallow areas where various forms of algae are available for grazing. This underwater vegetation is the Green Turtle's primary source of food, thus it is classified as a herbivore. In this respect the animal is unique in that few large organisms utilize this algae as food to any great degree, thus little competition for food exists. From an ecological point of view Green Turtles represent a valuable position in the marine food chain by being capable of transforming plant material directly into animal flesh. In addition to eating algae, Hawksbills are known to eat small crabs and other crustacea.

The third genus of marine turtle which frequents Hawaiian waters is the Leatherback (*Dermochelys* sp.). The habits of this salt water reptile are pelagic, that is, it is an inhabitant of the open ocean. Differing from other marine turtles by not having a hard shell, this animal is thought to be the world's largest living reptile. Individuals up to 1,000 pounds and 7 feet in length have been reported. Examination of stomach contents shows that Leatherbacks feed upon jellyfish, crustacea and algae. Their occurrence in Hawaiian waters is very rare and visits to the island chain are apparently made only while passing through from one area of the Pacific to another. Few of these animals have been caught near Hawaii and those reported were mostly captured by accident (e.g. entangled in trolling lines). Although this turtle has never been highly valued economically due to its soft shell and the reported unpalatability of its flesh, a limited market for eggs and extracted oil does exist in some areas. Because only a few of its nesting beaches remain unexploited by man, this animal has been declared an endangered species by the U.S. Department of Interior.

The Hawksbill turtle has a shell that is highly prized as an item from which jewelry and other ornaments can be fashioned. The decorative "tortoise-shell" comb is a valued commodity in markets throughout the world. In addition to having an edible flesh and valuable shell, a demand by tourists for stuffed and mounted animals has helped send these creatures down the road to extinction. In recent years even the day-old hatchlings have been exploited. Exporters in the Philippines have attempted to market these animals to aquarium fanciers in Hawaii, and shops in Okinawa occasionally offer them for sale. The above combination of factors has jeopardized the animal's survival and reduced its numbers to such a degree as to also justify placing it on the U.S. Endangered Species List. In an effort to control the international commerce of endangered species, products derived from animals on this list may not be imported into the United States. Unfortunately Hawksbill shell, along with rare animal skins, continues to be transported into the United States from lesser developed countries. Proof can be seen in several establishments in Honolulu where tortoise-shell jewelry, whole shells and stuffed animals with foreign labels are offered for sale. Although the word "shell" is commonly



used, the more correct term for the product is "laminae" - the thin horny plates which cover the outer surface of the bony shell. It is important to make a distinction between the two words. Only 1 or 2 pounds of laminae are obtained from an adult Hawksbill while the entire shell itself may weigh more than 15 pounds. Thus in a recent case where a major airline was charged with importing several hundred pounds of Hawksbill "shell," the number of animals representative of this laminae may have been in the hundreds and not 10 or 20 as might first be suspected.

Hawaii's most abundant and frequently seen marine turtle is the Pacific Green. Live specimens of this animal can be seen at Sea Life Park, the Waikiki Aquarium and the Kahala Hilton Lagoon on Oahu. Some of the natural grazing habitat of this animal around the main islands includes Kaneohe Bay on Oahu, Makaalae Point and the Hana area on Maui, and the North shore of Lanai. Green Turtle fillets are served in restaurants on most of the islands. Besides having a palatable flesh, cartilage commonly called "calipee" from the underside of the animal is used to make turtle soup. Green Turtles are also stuffed and sold as curio items. To describe this animal as being abundant would probably be in error because many local residents have observed that the number of turtles sighted in recent years has decreased. This apparent decrease may be due to the fact that the pounds of turtle reported as being caught in recent years has sharply increased, probably following greater demands for turtle steak by the tourist industry. Although large catches were sporadically reported in the late 1940's and 1950's, the trends presently displayed indicate that more turtle is now being taken than ever before. Table 1 was compiled from reports issued by the Hawaii State Fish and Game Division. Fishermen holding a commercial fish and game license are required by law to report, by species, all catch that is sold for profit. Thus the turtle data presented do not include animals captured by: (1) commercial fishermen but not offered for sale, (2) recreational fishermen and scuba divers, and (3) individuals who are not reporting transactions. These categories undoubtedly represent substantial numbers of turtles being taken.

Table 1. Whole Body Weight and Value of Commercial Marine Turtle Catch Reported for Hawaiian Waters for Years 1948 through 1971

YEAR	POUNDS	U.S. \$ VALUE	YEAR	POUNDS	U.S. \$ VALUE
1948	17,650	\$ 2,154	1960	3,739	\$ 527
1949	15,168	2,016	1961	709	139
1950	11,588	1,733	1962	477	48
1951	5,144	1,050	1963	380	79
1952	2,731	533	1964	1,609	321
1953	9,466	2,214	1965	1,510	57
1954	3,040	483	1966	4,715	1,053
1955	11,126	1,731	1967	5,021	1,173
1956	6,819	1,025	1968	3,350	2,400
1957	696	195	1969	10,175	2,820
1958	3,207	1,171	1970	12,506	5,017
1959	714	90	1971	19,884	9,850
			1972	25,583	-

Green turtles are captured in Hawaii by several methods. These include (1) laying nets on the surface which will entangle the animal when it comes up for air, (2) slipping a noose over a flipper and subsequently dragging the animal to the surface, (3) wrestling the animal to the surface by hand, (4) harpooning the turtle while it is on the surface, (5) spearing the animal from beneath the surface, (6) killing the animal with an explosive powerhead spear, and (7) shooting the animal with firearms. Methods 4 and 5 are illegal for commercial purposes and methods 6 and 7 are illegal for any purposes. On occasion turtles have been caught on baited hooks. In Hawaii most turtles are sold by fishermen directly to the user (e.g. restaurant, small fishmarket, etc.). Turtle is very seldom found on the wholesale auction markets of either Honolulu or Hilo.

#### REPRODUCTION AND MIGRATION

All marine turtles reproduce by periodically migrating to nesting beaches where the female leaves the water for several hours to dig a nest above the high tide mark. As many as 175 "leathery" eggs may then be deposited in the sand pit. After covering the egg mass the female once again enters the ocean leaving the young to hatch, dig



themselves out and make their own way in a very hostile environment. Many qualified researchers suspect that the particular nesting beach to which the animal travels for reproduction is, in fact, the location where that turtle itself hatched many years before. However, final proof of this theory will have to wait for a suitable method of tagging a hatchling and the subsequent identification of the same animal at a future date while it is nesting.

It has been positively determined that adult marine turtles return to the same beaches on recurrent seasons to nest. In addition, it is known that animals migrate to these beaches over long areas of open ocean from grazing areas which have an adequate food supply. The exact method of navigation used to find the beaches is still unknown but it is thought that olfactory chemoreception plays an important part. Probably because the open ocean voyage is strenuous and depletes body reserves significantly, migration and nesting takes place only once every 2 to 4 years. Classic research in all these areas has been carried out by Dr. Archie Carr of the University of Florida, the world's foremost authority on marine turtles. His studies have shown that the population of Green Turtles inhabiting the coast of Brazil migrate some 1,100 miles to Ascension Island in mid Atlantic to nest and that feeding pastures off Nicaragua, Panama and Columbia sustain populations which nest in Costa Rica.

Continuing reduction in numbers of marine turtles throughout the world has mainly been due to the animal's susceptibility to capture by man at nesting time both on the beach and in the sea immediately adjacent to the nesting sites; as well as to overfishing in the grazing pastures. The plight of marine turtles is widely recognized. Many sites which formerly supported large colonies of nesting animals now stand virtually unused. Studies carried out in the Caribbean, the Indian Ocean, Malaysia and the Pacific and Atlantic coasts of Mexico show that total population numbers are decreasing. Whether mature adults are removed from the breeding population at the nesting beach or in the grazing habitat makes little difference; the net effect is still the loss of a reproducing member of a delicate colony.

Nesting of Green Turtles took place on some of the main Hawaiian Islands just 40 years ago. Documented sightings of turtles coming ashore were made at: Mokapu Peninsula, Kailua and Makapuu Beaches on Oahu; the West coast of Molokai and the North shore of Lanai. It seems reasonable to assume that sites also existed on Kauai, Maui, Kahoolawe and Hawaii, however the author has been unable to obtain substantiated reports of past nestings on these islands. Today no animals are reported nesting on any of the main Hawaiian Islands. If any still do, it would be so infrequent as to best be left unreported because of possible human interference.

The Hawaiian Islands National Wildlife Refuge extends Northwest from Nihoa Island to Pearl and Hermes Reef, a distance of some 800 miles. Fortunately for the Hawaiian population of Green Turtles, the Hawaiian Monk Seals and many species of birds, this area was afforded complete protection by the United States Government. Under the direction of the Department of Interior, Bureau of Sport Fisheries and Wildlife, entry to the Refuge is strictly controlled. In addition, an active conservation program is currently being carried out by the limited Bureau personnel available. The past history of this chain of reefs and small volcanic islands is exceedingly grim to recall. Americans and foreigners pillaged the wildlife in such an unmerciful manner that complete restoration of the balances of nature can never be totally achieved. Even today, surveillance of the area is difficult due to its remoteness. On several small sandy islets, notably French Frigate Shoals and Pearl and Hermes Reef, remain the final nesting sites of Hawaii's Pacific Green Turtles. No other kind of turtle has been reported nesting in these areas. Each year between May and July Green Turtles congregate at these shores, breed within a half-mile of the beaches and leave the water at night to lay eggs on sandy beaches. For the past eight years, as other duties allowed, administrators in charge of this area have tagged, weighed and measured over 700 Green Turtles that have come ashore. The majority of these turtles were tagged while "basking" in the sun. This particular habit seems to be unique to Hawaii's Green Turtle population and probably represents a method of warming the animal's body since the Wildlife Refuge is at the northern most limits of marine turtle nesting sites. In addition a few turtles have been tagged while coming ashore to nest. Attached to the front flipper, each metal tag bears an identifying number and return address. Eleven tags have been returned from



captured animals since the program began and all of these were taken from animals harvested in the waters around the major inhabited Hawaiian Islands. In addition many tagged animals have been observed on the same beach during subsequent seasons. No turtle tagged in the Wildlife Refuge has ever been recaptured in any other area of the Pacific Ocean. These facts show that at least a part of the Wildlife Refuge turtles are the very same animals found grazing around the major Hawaiian Islands.

Tagging turtles on the nesting beaches is a difficult task. Sporadic transportation, lack of manpower, and necessary involvement with other species has limited the intensity of tagging nesting turtles. For this reason it has not been possible yet to determine the total number of turtles in the Hawaiian population. This has been done with some degree of accuracy in other areas of the world and this censusing has formed a basis for showing whether actual numbers are increasing or decreasing. A concentrated tagging program extended through entire seasons could provide this necessary data for the Hawaiian Green Turtles.

#### GREEN TURTLE GROWTH AND DEVELOPMENT

After a 50 to 60 day incubation period, fully developed 1-ounce hatchlings break free from their eggs. When enough of the eggs have hatched, the slow ascent through the sand to the surface begins. Four or 5 days of digging may be required before the hatchlings reach the surface. Studies have shown that a minimum number of animals are required for the team work effort needed to reach the surface. Once the hatchlings have ascended to a level slightly beneath the surface, temperature dictates the time of final emergence. The cooling effect of night is usually the signal for leaving the nest. Once on the surface and out in the open, brightness cues from the horizon orient the animals in the proper direction for finding the ocean. At the Wildlife Refuge nesting sites, eye witness accounts testify to the environmental dangers for hatchling turtles. Crabs and birds prey on the small reptiles as they move toward the water. Once in the ocean, sharks, ulua and other reef fish devour them. In spite of all the odds, one or two apparently survive to adulthood from each clutch of 100 eggs.

After rapidly swimming away from the nesting beaches the turtles are not seen again until they are about one-year old, at which time they have attained a weight of 2 to 8 pounds and a shell length of 12 to 16 inches. This first year is described as the "lost year" in a marine turtle's life. What they eat and where they go is unknown. Occasionally Japanese fishing vessels arrive in Honolulu from the Wildlife Refuge area with freshly hatched turtles aboard. These turtles are known to be attracted to lights and thus are probably attracted to lighted ships at night where they are easy prey for capture by crew members.

Data available indicate that Green Turtles become sexually mature when they are between 4 and 8 years old. At that time they may weigh as much as 250 pounds and have a shell length of 36 inches. After reproductive age is reached, growth in the wild is exceptionally slow, averaging as little as 1/10 inch per year in shell length.

#### CONSERVATION AND LEGISLATION

Concern by private citizens and governments throughout the world over the dwindling number of marine turtles and the continuing increases in turtle harvest has led to the passage of much needed conservation legislation. Whether the protection afforded is adequate and soon enough in coming, only time will tell. In the Pacific Basin, where entire colonies have not yet been destroyed as they were in the Caribbean, certain island nations have recognized the critical situation which exists concerning the survival of marine turtles. French Polynesia, Tonga, Fiji, Samoa, the U.S. Trust Territory of the Pacific Islands and Midway Island have all passed restrictions which help protect the turtle both on the beach and in the water. Most of these laws have stressed which sizes may be taken and during what months. In addition, in some areas (e.g. French Polynesia) turtles may not be taken for commercial purposes but only for home use. Queensland, Australia, gives full protection for all marine turtles and their eggs.

In the continental United States attempts to conserve the remaining stocks of turtles along coastlines have led South Carolina, Georgia and Texas to provide complete protection. The State of Florida has laws which restrict the capture of turtles by imposing a size limitation and a season.

In the Hawaiian Islands National Wildlife Refuge, all marine turtles are protected while on land and within the non-navigable waters of the reef areas. Outside the



60 fathom curve, which in many cases is less than a mile offshore, they are completely unprotected from U.S. fishermen. Foreign fishing vessels are required to remain at least 12 miles from these islands. Around the major Hawaiian Islands and within the navigable waters of the Wildlife Refuge, marine turtles are completely under the jurisdiction of the Hawaii State Fish and Game Division. The only Hawaii State Law relating to these animals appears in Section 188-25 of the Hawaii Revised Statutes under the heading "Fishing with firearms and spears." This act states that

"(a) It shall be unlawful for any person to pursue, take or kill any turtle, crustacean, mollusk, aquatic mammal or fish other than sharks in the waters of the State with firearms as defined in section 134-1 or to pursue, take or kill any crustacean with a spear" and further that

"(c) It shall be unlawful for any person to sell or offer to sell any turtle or fish other than sharks taken or killed with a spear, provided that turtles or fish may be lawfully taken or killed with a spear for home consumption only."

Violation of this section is punishable by a fine of not less than \$10 nor more than \$50, or imprisonment for not less than 10 nor more than 20 days, or both. In other words, no real State restrictions exists which will help protect and perpetuate these creatures. Even the endangered Hawksbill and Leatherback can be legally taken at any size and in any quantity within Hawaiian waters (outside of Wildlife Refuge) because no Federal or State regulations would be violated. A lack of awareness by Hawaii's law-makers and administrators on the plight of marine turtles throughout the world has undoubtedly been responsible for the scarcity of conservation laws.

In 1971, a report (FAO/UN No. 482/71) dealing with the marine turtle resources in the Pacific was prepared by Dr. Harold Hirth, a consultant for the United Nation's Fisheries Development Agency Project. A section of this report deals with marine turtles in the Hawaiian Islands. Based on Dr. Hirth's knowledge and findings, the following recommendations were made:

The sale of stuffed marine turtles of all sizes should be prohibited and turtle meat and soup eliminated in hotels and restaurants.

An in-depth study should be made on one or several of the nesting atolls in the Wildlife Refuge during the peak nesting season.

A tagging project should be started on the feeding areas of Maui.

Increased cooperation between State and Federal agencies is essential on matters concerning turtles, since the Green Turtles nesting in the Wildlife Refuge (under the jurisdiction of the latter) may well be the same individuals feeding around the main Hawaiian Islands (under the jurisdiction of the former).

All available information on Green Turtles in the Wildlife Refuge should be published as this would be an important contribution to the ecology and taxonomy of the little known Central Pacific Green Turtle.

Perhaps a more widespread concern within the State of Hawaii for the survival of our commercially exploited turtles will result from the publication and distribution of such reports. The opportunity to manage and protect an entire colony of Green Turtles at both their nesting and their feeding grounds is still available in Hawaii. Nowhere else in the world does such a possibility now exist.

As a potential focal point of the Pacific, it would behoove Hawaii to promptly implement both research and legislation that will ensure the continued existence of its marine turtles.

\*Hawaii Institute of Marine Biology, University of Hawaii, P.O. Box 1346, Kaneohe, Oahu 96744, January 1973

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Editor's Note: For more information on the endangered turtles see March 1972 AUDUBON, Volume 74, No. 2, pp. 24-34: Great Reptiles, Great Enigmas by Archie Carr

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Audubon's position statement to Representative Richard H. Wasai, Chairman, and members of the Committee on Parks and Fish and Game Management by Mae E. Hull, 19 March 1973  
Re: House Resolution 41 - Requesting the people of Hawaii to aid in the preservation of the Green Sea Turtle which is considered an endangered species throughout the world.  
House Bill 1635 - Making an appropriation for research management studies of the



population of the Green Sea Turtle in Hawaiian waters and steps which may lead to the preservation and increase of that population.

...The sea turtles, like many native fishes and native birds are not as common as they used to be. Modern man has been using up the natural resources of these islands faster than they can be replenished. We are long overdue in taking stock of Hawaii's unique marine and land natural communities and planning for their conservation so that no more Hawaiian species needlessly become extinct.

The Hawaii Audubon Society supports the intent and substance of HR 41 and HB 1635. These two measures together are an important package in starting a green sea turtle conservation program now. Controlling the taking and sale of sea turtles can begin in a few months through regulations adopted by the Division of Fish and Game. Such prompt regulation will be encouraged by adoption of this resolution, even though the Division has authority to initiate such a regulation without a legislative resolution.

However, without more information about the ecology of the green sea turtle, regulation would be based on incomplete data. Research studies on the biology, life history and movement of sea turtles in Hawaiian waters is essential for effective management. Since almost all of the nesting of the Hawaiian turtle is thought to take place in the Leeward Islands, principally French Frigate Shoals, some of the research would be in cooperation with the US Bureau of Sport Fisheries and Wildlife that manages the Hawaiian Islands National Wildlife Refuge. Since the commercial value of the sea turtle catch has been increasing significantly in recent years and overexploitation may be the major factor in the decline of the turtle population, funding for research may be available also from the federal Commercial Fisheries Research and Development Fund. But the State has primary responsibility for its own resources and the people of Hawaii are the primary losers when a native resource is depleted, so a sufficient appropriation by this Legislature is necessary to start a research program this year.

It is useful to keep in mind the attitudes and practices of the ancient Hawaiian toward their natural resources. They had learned wisely how to live in harmony with the natural elements of land and sea, generation after generation. They were pragmatic conservationists. They understood their resources and used them with care--they didn't use them up! Honu, the sea turtle was a useful resource. The dark greenish turtle meat, called lu'au, was relished as a delicacy. The Hawaiians ate turtles and left turtles for the next generation. The sea turtle was part of their life: "Turtle, turtle, come up to breathe--e honu, e honu, e puha"--a special turtle hula.

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#### Waterbird Observations - Kanaha Pond, Maui

By Eugene Kridler

On April 18, 1973 I made a thorough census of the waterbird populations of Kanaha Pond. Visibility was excellent. Steady trade winds estimated at 10-15 knots were blowing. Water levels of the pond were low. The upper ends of the back units were completely dry as was the area of small islets in the second unit where stilts at times nest when conditions are favorable.

Results of the census are as follows:

Mallard	1	Hawaiian Coot	112	Ruddy Turnstone	16
Pintail	17	Hawaiian Stilt	242	Sanderling	11
Shoveler	425	Golden Plover	320	Wandering Tattler	1
		Semi-palmated Plover	1		

A sample of 100 golden plover revealed that 62 were in full breeding plumage while 38 were in various stages of incomplete breeding plumage.

The semi-palmated plover was observed for 3-4 minutes in good light at a distance of 25-30 ft. with 7X binoculars. It remained standing on a small mudbar until I drove away. The mallard was a drake in full plumage and was loafing among the other ducks on the shore.

Some low level aerial courtship of stilt was observed, but most birds were engaged in feeding or resting. One was seen to swoop down several times at a female shoveler and cause it to fly off a short distance. Both birds were first observed among an assorted group of 20-25 shovelers, 10-12 stilt, 4-5 coot and several plover loafing or quietly feeding on a bank and shallow water in the interior of the pond. No courtship activity by ducks was noted, and there appeared to be no pairing.



READERS' NOTES:

HONOLULU STAR-BULLETIN, 28 April 1973, page A-11: Our Vanishing Land Shells by Harry Whitten

A favorite hobby in Hawaii a few years ago was collecting land shells, found usually on 'ohi'a trees in the mountains.

Many Islanders had boxes filled with their collections which they proudly displayed to friends or visitors--shells that might be colored green, blue, pink, brown, yellow, black or maroon.

Hikers still find land shells occasionally in the mountains, but serious collectors are few today; there aren't nearly as many shells to collect.

Over-collecting in the 100 years from 1830 to 1930 had much to do with decimating the number of land snails whose shells attracted collectors, according to Yoshio Kondo, Bishop Museum malacologist.

Along with certain birds, mammals and plants, the land snails are endangered species. Kondo estimates that 50 per cent of the 1,061 species of land snails that once existed here are now extinct. As examples, he cites the genus *Achatinella*, endemic to Oahu and which had 41 species. Of these, 14 are considered extinct, 25 are rare and endangered, and only two are not rare.

Kondo lists three other causes besides over-collecting as leading to decimation of the land snails--destruction of native forests, introduction of foreign plants, and the predation by *Euglandina*, a carnivorous snail that was brought in from Florida to control the African snail.

He points out that Hawaiian land snails are vulnerable because they live in small colonies, their reproduction rate is low, and they didn't move around much. They are so sedentary that their migratory rate must be measured in centuries rather than years, Kondo says.

Agriculture has destroyed lowland forests so that nearly all lowland species of land snails are now extinct. Cattle, sheep, goats, feral pigs and deer have denuded forests, prevented reseeding and thus destroyed habitats for tree snails.

In an interesting footnote to history, Kondo mentions that Mānoa and Nuuanu Valleys used to be good places to find the land snail known as *Achatinella stewartii*.

In the early 1900s groves of kuku were cut down to allow the kind of mushroom known as pepeiao to grow on decaying kuku logs for the Chinese food market. The land snail disappeared with the kuku groves.

Foreign plants have diluted native forests and cut off food supplies for the snails, which do not adapt to the introduced plants. The guava is one of the few introduced plants that the snails have adapted to.

The false staghorn fern smothers great acreages of mountain ridges. Snails can't live under its canopy; those that fall off trees are unable to return to them.

Old-time land shell collectors used to tell how they would find different species on each different mountain ridge. The reduction in total numbers and species lessens still more the variety in Hawaii's natural life. ...

HONOLULU STAR-BULLETIN, 5 May 1973, page A-13: Two New Homes for the Birds by Harry Whitten

Work will get under way soon on the \$68 million reef runway project that has been opposed by some conservation organizations.

In the meantime, work has already begun on a project to improve two bird habitats to substitute for the 186 acres of habitat that the reef runway will displace.

The Governor has released \$178,950 for construction of the two habitats, both of which are on the shores of Pearl Harbor and which are used to some extent by waterfowl now. The work on the habitats is expected to improve them greatly as breeding areas for such endangered species as Hawaiian stilt and Hawaiian coot, according to David L. Olsen, assistant wildlife administrator of the U.S. Bureau of Sports Fisheries and Wildlife.

One habitat, at Honouliuli on the ewa side of West Loch, is in old salt settling ponds which sometimes dry out. The plan is to build five impoundment areas, with nesting islands for coot and stilt, and to assure a stable water supply with an electric pump. The area totals 31 acres, of which 23.3 acres will be in the diked area.

The second habitat, of 25 acres, will be on Waiawa Peninsula, near Pearl City.



This is land fill area that has been used by the Navy; an existing pond will be diked into two ponds, and a constant water supply will be assured.

Olsen explains that the nesting islands will offer excellent protection from predators, such as mongoose, which have taken heavy toll of eggs and young of waterfowl. The Hawaiian gallinule, migratory ducks, and other migratory waterfowl are also expected to use the habitats.

The Navy has set aside the land for the new habitats, which will be administered by the Bureau of Sports Fisheries and Wildlife.

William P. Mull, president of the Hawaii Audubon Society, says his organization considers the habitat improvement plan a good one and supports it. However, he said he has questioned if the 56 acres of new habitat will be adequate to replace the 186 acres of breeding and feeding habitat that will be lost by construction of the reef runway.

The Audubon Society has been one of the organizations that has opposed going ahead now with the reef runway. Mull said the society won't oppose the runway project if it can be convinced the project will accomplish its purpose of reducing noise and improving safety. He says the society claims that data on the project are inadequate and that all environmental impact statement requirements have not been met. ...

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SMITHSONIAN, May 1973, Vol. 4, No. 2, pp. 22-29: What's Human about Man is His Technology by Sir Peter Medawar

A distinguished British scientist argues that we are inseparable from our tools and must now choose to evolve a new set.

...Criers of ecologic doom are as misguided as fatalistic Edwardians who were enthralled by Omar Khayyam. The word "ecology" derives from the Greek for "house", and household management is the most backward branch of our technology, and therefore the one most urgently in need of development. An entirely new technology is required, one founded on ecology in much the same way as medicine is founded on physiology. If this new technology is accepted, I shall be completely confident of our ability to put and keep our house in order.

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AMERICAN FORESTS, March 1973, Vol. 79, No. 3, pp 12-16, 65-67: Humanizing the Earth by Rene J. Dubos

...Many of man's interventions into nature have, of course, been catastrophic. History is replete with ecological disasters caused by agricultural and industrial mismanagement. ...The disastrous ecological consequences of many past and present human activities point to the need for greater knowledge and respect of natural laws. ...That the wisdom of nature is often short-sighted is illustrated by the many disasters that repeatedly affect plants and animals in their undisturbed native habitats. ...Most surprising is the fact that even without environmental changes caused by human interferences or accidental cataclysms, nature failed in many cases to complete the recycling processes which are considered the earmarks of ecological equilibrium. ...Paradoxically, man helps somewhat in the completion of the cycle when he burns peat, coal, or oil, because he thereby makes the carbon and minerals of these fuels once more available for plant growth. The trouble with this form of recycling is that the breakdown products of the fuels are so rapidly put back into circulation through air, water, and soil that they overload contemporary ecological systems. ...Nature is not always a good guide for the manipulation of the forces that affect the daily life of man; but undisturbed Nature knows best--far better than ordinary human intelligence--how to make men aware of the cosmos and to create an atmosphere of harmony between him and the rest of creation. Humanizing the earth thus implies much more than transforming the wilderness into agricultural lands, pleasure grounds, and healthy areas suitable for the growth of civilization. It also means preserving the kinds of wilderness where man can experience mysteries transcending his daily life, and also recapture direct awareness of the cosmic forces from which he emerged.

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Excerpts: Minutes of the Hawaii Audubon Society General Meeting, 15 January 1973 by Mae E. Mull, Corresponding Secretary

...William Mull reported on the Honolulu Christmas Count made on December 17th.



Wayne Gagne gave a detailed report of the Big Island Volcano Christmas Count made on December 30, centered on the summit of Kulanui Cone of Mauna Loa. Mr. Gagne compared the 1972 observations with the Society's earlier Christmas Counts of 1954-56 in the Volcano area. ...

Wayne Gagne reported that he and Jim Jacobi observed two probable Oahu Creepers on Poanoho Trail recently. Alex McGregor commented that Erckel's Francolin has been sighted in the drylands area above Kaena Point on Oahu. Charles van Riper and Alan Hart mentioned that they found a flock of palila easily in the manane forest 100 yards from the Puu La'au cabin on Mauna Kea.

In response to a question, it was noted that the proposal to liberate Axis Deer on the Big Island as a game mammal is held in abeyance pending the release of an Environmental Impact Statement by the State Division of Fish and Game.

In connection with the Big Island, Mr. Gagne commented on the significance of Kilauea Forest Reserve for endemic birds and plants. Hapu'u harvesting and feral pig populations continue to alter the native ecosystem. Drastic changes with loss of habitat for endangered species will result if the Bishop Estate carries through its plan for koa logging in Kilauea Forest Reserve.

Mr. Mull summarized other activities of the Society during the previous month. Along with other conservation groups involved, the Society plans to appeal the decision of the District Court on the Reef Runway Project. The major issue is the adequacy of the Environmental Impact Statement. Audubon members and friends will be given the opportunity to make donations toward the costs of the suit in the 9th Circuit Court of Appeals.

The Society has requested an Environmental Impact Statement on the effects to Kanaha Pond of the proposed Wailuku-Kahului Sewage Plant on Maui.

The Society made a donation of \$20.00 toward the printing of information on the status of the Green Sea Turtle for distribution to State legislators and other public officials.

Society officers and students presented recommendations to the Governor's Environmental Council for better protection and education in Hawaii's unique natural environment on January 11.

Concerning the Kaluakoi Corporation application to inject saline water into the Molokai Irrigation System for the purpose of getting potable water for the planned West Molokai urban-resort complex, the Society made critical comments on the Statement of Non-Impact issued by the Department of Land and Natural Resources. The irrigation system was constructed for agricultural use, partly with federal funds, and the increased chloride content of the pipeline water will affect present residents and farmers who have nothing to do with the Kaluakoi urban development. The Society requested full disclosure of environmental impact, but the application was approved by the Board of Land and Natural Resources. ...

The president introduced Mr. Maurice Taylor who is working in Hawaii now for the Division of River Basin Studies of the US Bureau of Sport Fisheries and Wildlife. Mr. Taylor discussed the work of his office in analyzing development projects of water areas, projects that require permits from the Army Corps of Engineers or US Coast Guard, and projects with Environmental Impact Statements affecting fish and wildlife. Mr. Taylor's office is assessing the impact of the proposed Maui Sewage Plant on Kanaha Pond. The pond is an extremely valuable habitat of the endangered Hawaiian Stilt, Hawaiian Coot and migratory shorebirds and ducks. There is fear that the sewage effluents to be pumped into disposal wells under Kanaha Pond may emerge into the pond itself. The sewage plant is to be located between the beach and the pond in an area that had previously been designated for recreational use. In addition to Hawaii, Mr. Taylor's office covers federal water projects on Samoa, Guam and the Trust Territories.

Mr. David Olsen, Division of Refuges, US Bureau of Sport Fisheries and Wildlife, gave an informative commentary on the excellent color films taken by Eugene Kridler of Nihoa and Laysan Finches, Nihoa Millerbird, seabirds, turtles and seals on the Hawaiian Islands National Wildlife Refuge. A public hearing on Wilderness status for the Refuge will be held in Honolulu soon, probably in early April 1973.

A state-wide waterbird count will be taken on January 18th. Mr. Olsen said that Mr. Marshall Dillon had arrived in Honolulu recently as an enforcement officer concerned



with the protection of US and foreign birds and other animals listed as endangered by the US Department of the Interior. Mr. Olsen discussed briefly Bureau plans for the newly acquired Hanalei Refuge, Kauai, for Hawaiian waterbirds. ...

19 February 1973 by Tonnie (Laura) Casey, Recording Secretary

...The Kaneohe Outdoor Circle made a request that the Society do a bird species study on the Heeia Pond area. Mr. Mull reported that it wasn't justifiable to be called a native bird habitat for its saving, but that it had other assets such as being a good quality open space. ...

Mr. Wayne Gagne then introduced Mrs. Virginia Brooks who is working on a State Wide Trail System for the State of Hawaii. She reported that the "Ma Ala Hele" - State Wide Trail concept had a multitude of problems. Some of these included legislation, personnel for mapping trails, cooperation in zoning and parking areas, and policing such a system. Mrs. Brooks illustrated the concepts using the Puako to Kailua-Kona "King's Trail" as an example of many of the problems that the system is faced with.

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Field Notes from Mary E. Abbott, Ontario, Canada, 24 February 1973

...I was in Hawaii only 11 days, but did have a most interesting time photographing birds--plovers, doves, Brazilian cardinals, boobies and herons at the Sea Life Park and the lovely stilts on Maui. Also photographed the wandering tattler.

My friend and I were intrigued by the exotic stranger in Foster Botanical Gardens. ...The custodian in the park told us it was thought to be a white-crested laughing thrush. Is that report authentic? ...

We have snow here now--some zero and 10° below weather (for 2 or 3 nights) recently. I am trying to keep alive at my feeders an immature chipping sparrow that appeared in my garden for the Christmas count on December 16. It is the first winter record ever for this county. So far he has managed well, so should survive now. This winter we are fortunate to have purple finches in fair numbers.

I might mention we made an unsuccessful attempt to enter the Kaneohe Marine Corps Air Station...However, we did walk along the pond and photographed the frigatebird, although not at close range. I have beautiful close-ups of the nene on our way up to the crater. It was a delight to hear the white-eye and the call of shama thrushes and Brazilian cardinals. It was a wonderful 11 day holiday. ...

Comments by Mae E. Mull: ...In response to your inquiry about the exotic bird you watched in Foster Botanical Gardens, the custodian's identification of it as a white-crested laughing-thrush is correct. Apparently it is an intentionally or accidentally released caged bird. Presently this species is on the prohibited list for entry into Hawaii.

There is this reference in Dr. Andrew J. Berger's new book, HAWAIIAN BIRDLIFE... on page 250: Family Timaliidae (Babblers). Garrulax leucolophus, white-crested laughing-thrush; origin, India, Himalayas, Burma. A pair reported breeding on the slopes of Diamond Head during 1969 (ELEPAIO, 30:76).

...We have had other reports recently about the unafraid and showy laughing-thrush in Foster Gardens.

Dr. Berger estimates that about 150 exotic bird species have been introduced into Hawaii. Fortunately, many of these have not sustained breeding populations. Some of the introductions have been very successful in adapting to their new environment and may be harmless or even helpful in control of exotic insects in urban areas. Because our main interest is protection of native birds and their habitats, we have serious questions about some established introductions like the Japanese white-eye as a carrier of bird disease and competitor for food and living space with the remaining native forest birds. ...

From Terese Todd, Victoria, Canada, 1 March 1973

...During a recent month long visit to Hawaii, spent mostly near Kaanapali Beach on Maui, I visited many parts of the Island in search of birds.

At Kealia Pond Wildlife Refuge I was delighted to find black-necked stilts and black-crowned night herons. ...There was a better opportunity to see the stilts again,



at closer range, on a later visit to the Kanaha Bird Sanctuary, near Kahului. ...

However, to get to the point of this letter, I was walking north on Kaanapali Beach on the morning of February 19 when I saw a long line of large white birds approaching me over the ocean, just off shore, flying south. There were thirty-five or more pure white birds flying abreast in a slightly bent line. (They were difficult to count as they changed places frequently.) They flew with bowed wings and an easy wing beat. Their necks were tucked in and their long, black legs, held close to their body, reached beyond their tails. The only other color was the yellow of their bills.

I feel sure they must have been common egrets, but as they are listed as casual or accidental visitors to Hawaii by Peterson I would like to know if they, too, have been introduced or was I fortunate enough to have seen a rare sight. ...

Comments by Mae E. Mull: ...The flock of large white birds with long legs extending beyond the tail that you saw flying off Kaanapali, Maui, are certainly cattle egrets.

Sizeable numbers of cattle egrets were intentionally released on the five major Hawaiian islands in 1959 for the purpose of controlling insects damaging to cattle. These introduced egrets are well established now with large rookeries on Oahu and apparently breeding colonies on the other islands as well. They are often seen in fields with cattle, perching on the backs of their hosts. Cattle egrets also favor sugar cane fields being harvested and irrigation settling basins. We have seen hundreds at a time in the cane fields near Pearl Harbor.

The Hawaiian stilt and Hawaiian coot that you saw at Kanaha and Kealia Ponds are endemic Hawaiian waterbirds on the US List of Endangered Species--they are threatened with extinction unless permanent, protected habitat is set aside now for their continued existence. ...

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#### ALOHA to new members:

Junior: Anne Abe, 3065 Booth Road, Honolulu, Hawaii 96813  
Michael DeCrow, 47-184 Kam Hwy, Kaneohe, Oahu 96733

Regular: Edward Davison, 2033 Muuanu Ave, Apt 16-C, Honolulu, Hawaii 96817  
Jonathan Hegele, 5256 Papai St., Honolulu, Hawaii 96821  
Walter P. Protzman, 53 East Broad St., Hopewell, New Jersey 08525  
Mrs. Billie Smith, 4470 Kahala Ave., Honolulu, Hawaii 96816  
Mrs. Hannah Bonsey Suthers, 53 East Broad St., Hopewell, New Jersey 08525  
WO-1 John A. Wilder, Box 20, MAVSTA Midway Island, FPO SF 96614

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The annual index will be mailed to members only upon request, so if you are interested in receiving a copy, please send in your reservation before July to Kojima, 725-A 8th Ave. Honolulu, Hawaii 96816

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

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#### JUNE ACTIVITIES:

- 10 June - Field trip to Waahila Ridge to study native forest birds. Bring lunch, water, and if possible your car. Transportation cost (\$3.50) to be paid to the drivers. Meet at the State Library on Punchbowl Street at 8:00 a.m. Leader: William P. Mull, telephone 908-6798.
- 11 June - Board meeting at McCully-Moiliili Library, 6:45 p.m. Members welcome.
- 18 June - General meeting at the Waikiki Aquarium Auditorium at 7:30 p.m. Speaker: Wayne Gagne Topic: Recent Trip to Midway (color slides)

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#### HAWAII AUDUBON SOCIETY EXECUTIVE BOARD:

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