

TESTIMONY BY GEORGE H. BALAZS, HAWAII INSTITUTE OF MARINE BIOLOGY,  
UNIVERSITY OF HAWAII, CONCERNING RESEARCH AND PRESERVATION OF SEA  
TURTLES IN HAWAIIAN WATERS.

March 19, 1973

In a recent issue of Audubon Magazine, Dr. Archie Carr, the world's foremost authority on sea turtles, has stated (4) that

"Today the plight of sea turtles is widely known, and efforts to learn more about them and slow their decline are in progress almost wherever they occur. (This) concern was dangerously slow in coming."

Unfortunately for Hawaii, it appears as though the plight of our sea turtles is not widely known, and at present little effort is underway to learn more about them so that we may slow their decline. Subjective observations by numerous local residents seem to indicate that the number of sea turtles in our waters has decreased noticeably in recent years. Hawaii State Fish and Game Division records show that the commercial exploitation of these salt water reptiles has increased drastically over the past 9 years. A low of 380 lb was reported in 1963 while a record high of 25,583 lb was reported in 1972. A large portion of this commercial catch now enters the tourist industry to be sold as turtle steak. Since turtles that are captured but not sold for profit need not be reported to the Fish and Game Division, it is unknown how many additional animals are taken each year for home use.

Can our population of sea turtles continue to sustain such large harvests and still remain viable? Will sea turtles gradually vanish from our islands' waters as they have in many other areas of the world? Although turtle nesting beaches in the Northwestern Hawaiian Islands are protected by the Federal government, virtually no protection is afforded



by the State government to the same sea turtles while they are around our major islands. Any number of turtles may be taken for any purpose, at any size and at any time of the year. Clearly, research and protection are both urgently needed if Hawaii is to prevent from having one of her unique creatures sent down the road to extinction.

In 1969 Dr. John Hendrickson, marine turtle specialist and former Director of Oceanic Institute, stated (5) that preliminary data on Hawaii's turtles gave the

"subjective impression that Hawaiian turtle populations are over-exploited, under-protected, and declining at a significant rate."

Further, he urged that research be set up as soon as possible to determine the size and range of our population. In 1971 Dr. Harold Hirth, marine turtle consultant for the United Nations, issued a report (6) which recommended that the commercialization of turtles in Hawaii be stopped and that intensive research be initiated so that valuable information could be obtained on our little studied turtle colony. In 1973 Dr. Archie Carr indicated ( ) that he would like to

"see a complete moratorium on the taking of all sea turtles throughout the Hawaiian Islands until a careful survey of breeding, feeding and basking populations could be made".

I have submitted copies of pertinent material to the committee which may help to further describe the endangered state of sea turtles and to illustrate why it is essential that research on turtle populations be carried out now if effective programs for protection and perpetuation are to be formulated.

#### References

- \*1. Balazs, G.H., Status of Marine Turtles in the Hawaiian Islands. Hawaii Institute of Marine Biology, Kaneohe, Hawaii. January, 1973.

- \*2. Balazs G.H., Proposed Research Study of Marine Turtle Populations in the Hawaiian Islands. Includes an expenditure breakdown. Hawaii Institute of Marine Biology. January, 1973.
3. Carr, A.F., Personal Communications. 1973.
- \*4. Carr, A.F., Great Reptiles, Great Enigmas. Audubon, Vol. 74, No.2. 1972.
5. Hendrickson, J.R., Report on Hawaiian Marine Turtle Populations. in IUCN N.S. 20:89-95. Morges, Switzerland. 1969.
6. Hirth, H.F., South Pacific Islands- Marine Turtle Resources. Report for the Fisheries Development Agency Project. 102:2, F.A.O. Rome, 1971.

\* - Material submitted to the committee along with this testimony.



TESTIMONY BY GEORGE H. BALAZS, HAWAII INSTITUTE OF MARINE BIOLOGY,  
UNIVERSITY OF HAWAII, CONCERNING HB 1635 WHICH RELATES TO RESEARCH  
AND MANAGEMENT FOR THE CONSERVATION OF SEA TURTLES IN HAWAIIAN  
WATERS.

March 28, 1973

4

In a recent issue of Audubon , the magazine of the National Audubon Society, Dr. Archie Carr, the world's foremost authority on sea turtles, states that:

"Today the plight of sea turtles is widely known, and efforts to learn more about them and slow their decline are in progress almost wherever they occur."

Unfortunately for Hawaii, it appears as though the plight of our sea turtles has not been widely known, and at present only limited effort is underway to learn more about them so that we may slow their decline. Although no definitive data exists on population size, subjective observations by numerous local residents seem to indicate that the number of sea turtles in our waters has decreased noticeably in recent years. Hawaii State Fish and Game Division records show that the commercial exploitation of these salt water reptiles has increased drastically over the past nine years. A low of 380 lbs of sea turtle was reported taken in 1963 while a record high of 25,583 lbs was reported for 1972. A large portion of this commercial catch now enters the tourist industry to be sold as turtle steak, thus increases in exploitation can be expected to continue so long as our visitors create a demand. Since turtles that are captured but not sold for profit need not be reported to the Fish and Game Division, it is unknown how many animals are taken each year just for home use. It is also unknown how many commercial turtle sales go completely unreported to the Fish and Game.

Can our population of sea turtles continue to sustain such seemingly large harvests and still remain viable? Will sea turtles gradually vanish from our Islands' waters as they have in many other areas of the world? Although turtles in the Northwestern Hawaiian Islands are completely protected by the U. S. Bureau of Sport Fisheries and Wildlife, virtually no protection is afforded by the Hawaii State Government to the same sea turtles while they are around our major islands<sup>1</sup>. Any number of turtles may be taken for any purpose, at any size and at any time of the year. During the 1971 legislative session, the Department of Land and Natural Resources urged that funds be provided for a research management study of sea turtles in Hawaiian waters because scientific knowledge is lacking about these valuable animals<sup>7</sup>. Clearly intensive research is urgently needed if Hawaii is to prevent from having one of her unique creatures sent down the road to extinction.

In 1969 Dr. John Hendrickson, marine turtle specialist and former Director of Oceanic Institute, stated<sup>5</sup> that preliminary data on Hawaii's turtles gave the:

"subjective impression that Hawaiian turtle populations are over-exploited, under-protected, and declining at a significant rate."

Further, he urged that research be set up as soon as possible to determine the size and range of our population. In 1971 Dr. Harold Hirth, marine turtle consultant for the United Nations, issued a report<sup>6</sup> which recommended that the commercialization of turtles in Hawaii be stopped and that intensive research be initiated so that valuable information could be obtained on our little studied turtle colony. In 1973 Dr. Archie Carr indicated<sup>3</sup> that he would like to:



"see a complete moratorium on the taking of all sea turtles throughout the Hawaiian Islands until a careful survey of breeding, feeding and basking populations could be made."

I have submitted copies of pertinent material to the committee along with my testimony which I hope can help to further clarify the endangered state of sea turtles throughout the world and to illustrate why it is essential that research on turtle populations be carried out. Only through adequate and comprehensive research studies can effective programs for protection, perpetuation and management be formulated.

#### References

1. \*Balazs, G. H., Status of Marine Turtles in the Hawaiian Islands. Hawaii Institute of Marine Biology, Kaneohe, Hawaii. January, 1973.
2. \*Balazs, G. H., Proposed Research Study of Marine Turtle Populations in the Hawaiian Islands.
3. Carr, A. F., Personal Communications, 1973.
4. \*Carr, A. F., Great Reptiles, Great Enigmas. Audobon, Vol. 74, No. 2. 1972.
5. Hendrickson, J. R., Report on Hawaiian Marine Turtle Populations. in IUCN N. S. 20:89-95. Morges, Switzerland. 1969.
6. Hirth, H. F., South Pacific Islands - Marine Turtle Resources. Report for the Fisheries Development Agency Project. 102:2, F.A.O. Rome, 1971.
7. Testimony to the Honorable Richard A. Kawakami, Chairman House Committee on Lands from Mr. Sunao Kido, Chairman, Board of Land and Natural Resources, relating to HB 1218 (Preservation of the Green Sea Turtle). 1971 Legislative Session, April 1, 1971.

\* Material submitted to the committee along with this testimony.

TESTIMONY PRESENTED BY GEORGE H. BALAZS ON SEPTEMBER 21, 1973,  
CONCERNING REGULATION 36 WHICH RELATES TO THE PROTECTION OF MARINE  
TURTLES IN HAWAIIAN WATERS

Although the plight of marine turtles has been widely recognized in other areas of the world, a concern for these animals in Hawaiian waters has been slow in coming. As no Hawaii State regulations exist for the protection and perpetuation of marine turtles (other than the outlawing of firearms for harvesting and the prohibition of the sale of speared animals) proposed protective measures offered by the State Fish and Game Division represent positive action to ensure the continued viable existence of our marine turtle colony. In the words of Dr. Archie Carr, the world's foremost authority on marine turtles:

"If things are left as they are, the commercial sea turtle industry seems certain to go on cynically mining to exhaustion its sources of supply."

In my opinion, sufficient knowledge is presently at hand to warrant the utmost concern for Hawaiian turtles. I have arrived at this conclusion after investigating various aspects of Hawaii's marine turtles over the past two years. Although initially only involved in research on the captive rearing and nutritional aspects of these animals at the Hawaii Institute of Marine Biology, I soon became increasingly concerned about the welfare of the natural populations. Little effort was being directed toward determining the status of this resource in Hawaii and evaluating whether or not its distribution and numbers were being reduced. In addition to examining our own situation, I have also researched the status of marine turtles at other localities in order to learn what was being accomplished to slow their decline.

I would like to present some of the important aspects of this information which I have collected in order to justify the enactment of the regulations which are being proposed. In general, my discussions will deal with the following topics: 1) the present status of the three species of turtles found in Hawaiian waters, 2) the conservation laws and regulations which protect marine turtles that are currently in effect in other States and countries, 3) the recommendations for the State of Hawaii which have been offered by qualified marine turtle biologists familiar with our situation, 4) the results of research which was conducted during this year's breeding season at French Frigate Shoals in the Hawaiian Islands National Wildlife Refuge, and 5) the results of studies which I have conducted on turtle catch statistics compiled by the State Fish and Game Division.



Summary of Significant Information Relating to  
Marine Turtle Regulation 36

G. H. Balazs

1. Three types of marine turtles are found in Hawaii; two are on the Endangered Species List (hawksbill and leatherback) and one (green) is officially listed throughout the world as "depleted."
2. Hawaii has the largest and last remaining green turtle colony in the United States.
3. No State laws presently exist to protect or perpetuate Hawaii's turtles.
4. Many countries and States are already aware of the threatened status of marine turtles and have implemented conservation measures.
5. Within recent history nesting took place on several of the major Islands, however the only nesting site left today is at French Frigate Shoals (approximately 480 miles NW of Honolulu).
6. Three prominent marine turtle biologists have expressed great concern for our unique turtle colony.
7. Recent intensive research at French Frigate Shoals has shown the total green turtle breeding population to be less than 1,100 individuals. An earlier estimate made in 1968 placed the size at between 2,600 and 5,200 animals.
8. Green turtles reach sexual maturity when they are between 33 and 36 inches (mean wt. 210 lbs) straight line upper shell length. Nesting green turtles at French Frigate Shoals ranged from 33 to 41 inches.
9. Studies on turtle catch statistics revealed that: 1) extremely large increases have occurred in pounds of turtle caught over the past ten years; this appears to have followed increases in tourism; 2) the mean weights of turtles taken is significantly below the size at which sexual maturity occurs (107 vs 210 lbs); 3) during 1972 only six people in the entire State hunted turtles for profit; the most earned by any one person was \$5,003.
10. Hawaiian turtles will continue to be subjected to increases in exploitation during coming years unless the personal gain incentive is removed.
11. Based on all available information, it is highly unlikely that Hawaii's green turtle colony can remain viable if the present exploitative pressures are allowed to continue.



Before closely examining each one of these topics, it may prove beneficial to briefly state some of the more important facts of the life history and biology of marine turtles. Since the major portion of my testimony will deal with the green turtle, the facts pertain specifically to this species. However, in general the other types of marine turtles exhibit most of these same traits. To summarize then, green turtles: are air-breathing, salt water reptiles; reach sexual maturity sometime between 6 to 13 years of age; weigh as much as 250 lbs and measure 33 to 36 inches upper shell length when first reaching sexual maturity; reproduce only once every two to four years; migrate long distances from feeding areas to nesting beaches for reproduction; lay several clutches of 100 eggs each within each nesting season; lay eggs on the same beaches during subsequent nesting seasons and are not known to change places of reproduction; exhibit high mortality (at least 99 percent) during the first year of life; have few predators except large sharks and man after reaching adult size; have not been successfully restocked by releasing young or transplanting eggs in depleted areas; are slow to recover from overexploitation; were formerly abundant in many areas of the world but have been subsequently decimated by indiscriminate hunting; and can provide benefits to man if managed wisely. Keeping these basic facts in mind, I would like to proceed and discuss each of the major topics which I have outlined, starting with the present status of the three types of marine turtles that are found in Hawaiian waters.

Of the five genera (or major types) of marine turtles which exist in the world today, only three are represented around our islands. These include the Pacific green (Chelonia sp.), the hawksbill (Eretmochelys sp.) and the leatherback (Dermochelys sp.). The hawksbill and the leatherback are only infrequently seen. Both of these animals are vanishing species throughout the world and do not occur in large numbers at any one location. The hawksbill has been commercially decimated for its laminae or "tortoise-shell," which can be made into fine polished jewelry. Numbers of leatherbacks have been drastically reduced due to the destruction of nesting habitats and to the taking of eggs for food in lesser developed countries. Both of these animals are included in the United States' List of Endangered Foreign Fish and Wildlife. That is, they are

"in immediate danger of extinction and their continued survival is unlikely without the implementation of special protective measures."

Under international agreement, these animals or any products derived from these animals may not be imported into the United States or moved between cooperating countries. Because this Federal law deals only with international transportation, and because no Hawaii State law presently exists to protect these animals, both the endangered hawksbill and leatherback can now be killed in Hawaiian waters without violating any regulation.

Hawaii's third type of turtle is the Pacific green. Green turtles are officially listed by the International Union for the Conservation of Nature (the recognized world organization for conservation) as 'depleted.' That is

"although they still occur in numbers adequate for survival, the animal is, ~~although they still occur in numbers adequate for survival, the animal~~ although they still occur in numbers adequate for survival, the animal has been depleted considerably and continues to decline at a rate which gives cause for serious concern."



Several kinds of green turtles (e.g., Chelonia mydas, Chelonia agassizi) have been recognized in different areas of the world. Although more taxonomic work needs to be conducted, there is reason to believe that green turtles found in the Hawaiian Archipelago are genetically unique from those of other geographic locations.

Next I would like to review some of the conservation laws that are now in effect in other countries and states. Concern by private citizens and governments throughout the world over the dwindling numbers of marine turtles and the continuing increases in turtle harvests has led to the passage of much needed conservation measures. Whether the protection afforded in each case is adequate and soon enough in coming, only time will tell. A list of some of the countries which protect marine turtles and a brief abstract of each law follows:

Trust Territories: Complete protection for eggs and all sea turtles less than 26 inches in carapace length.

Kingdom of Tonga: Complete year-round protection for eggs and for turtles with a carapace length of less than 35 inches. Protection for all turtles of all sizes between November and March. Complete protection for leatherbacks of all sizes at all times.

Fiji Islands: Complete year-round protection for eggs and for turtles with a carapace length of less than 35 inches.

Panama: Full protection for green turtles.

Ascension Island: Full protection for all turtles and eggs.

British Indian Ocean and Seychelles Islands: Complete protection for turtles and eggs.

Europa Island (France): Full protection for all turtles and eggs.

South Africa: Full protection for all sea turtles and eggs.

Queensland, Australia: Full protection for all sea turtles and eggs.

Tahiti (French Polynesia): Sale of sea turtles prohibited in all of French Polynesia.

States in the U. S. mainland which have seen fit to protect marine turtles include the following:

New York: No hawksbill, Atlantic ridley or leatherback turtle may be imported, transported or sold.

Delaware: Illegal to possess, transport or sell any hawksbill, Atlantic ridley or leatherback turtle.



North Carolina: Unlawful to take, disturb or destroy any sea turtle or eggs at any time during the months of May, June, July, August and September.

Connecticut: Hawksbill turtles or any part thereof may not be sold or offered for sale.

South Carolina: Unlawful to kill, offer for sale or sell any sea turtle or eggs.

- Florida:
- a) Unlawful to take, kill or possess a green turtle from the east (Atlantic) coast of Florida.
  - b) Unlawful to take, kill or possess any other species of sea turtle from the east coast of Florida, during the months of May, June, July and August.
  - c) Unlawful to take, kill or possess any turtle from the west coast of Florida except those in territorial waters having a carapace length of more than 26 inches.
  - d) Unlawful for any person to take, kill or possess any green turtle from Monroe county (Florida Keys) unless such turtle has a carapace length of more than 41 inches.

Georgia: Total protection, sea turtles or eggs may not be taken at any time.

Texas: Unlawful to take, kill or disturb any sea turtle or eggs in or from the waters of the State.

California: Unlawful to import into the State for commercial purposes, to possess with intent to sell or to sell any part or product of any sea turtle.

It might be valuable to point out at this time that Hawaii has the responsibility of safeguarding the largest remaining colony of green turtles left in the United States. Although loggerheads (Caretta sp.) and several other species of turtle are still frequent nesters in a few of the Southern states, very few green turtles are found nesting. One estimate places the total number of greens utilizing mainland U. S. beaches during recent years at less than 50 individuals. Juvenile green turtles are sometimes seen along Gulf coasts, however these are only migrant visitors. Besides having the largest green turtle colony in the U. S., Hawaii has the only one in the world that can be protected and managed under a single government's jurisdiction at both the feeding and breeding grounds. Although Hawaii's breeding grounds are Federally protected (Hawaiian Islands National Wildlife Refuge), no protection is afforded in the feeding grounds. The practice of only safeguarding a turtle's breeding grounds while allowing unchecked exploitation to occur in the feeding areas is no longer sufficient for adequate conservation. Because Hawaii's green turtles are being subjected to substantial increases in commercial exploitation, there may now be sufficient justification for placing this animal on the Department of Interior's United States' List of Endangered Native Fish and Wildlife.



Several recognized specialists on marine turtles have examined Hawaii's situation. Dr. Archie Carr of the University of Florida and Dr. Harold Hirth of the University of Utah have both visited the Hawaiian Islands and made preliminary investigations on our turtle populations. Dr. John Hendrickson of the University of Arizona studied Hawaii's turtles while serving as Director of Oceanic Institute here on Oahu. All three of these authorities are members of the I. U. C. N. Marine Turtle Specialists Group. This group is composed of ten members from various countries and are dedicated to the conservation and better understanding of the world's marine turtles. Recommendations which have been offered by these gentlemen include the following:

Dr. Harold Hirth: In 1971 a report (FAO/UN No. 482/71) on marine turtle resources in the Pacific was prepared by Dr. Hirth, then a consultant for the United Nation's Fisheries Development Agency. In the section of this report that dealt with turtles in the Hawaiian Islands, it was recommended that "The sale of stuffed turtles of all sizes should be prohibited and turtle meat and soup be eliminated in hotels and restaurants." Further recommendations indicated that in-depth studies throughout the entire Hawaiian Archipelago were necessary in order to more fully understand the dynamics of this colony.

Dr. John Hendrickson: In 1969 Dr. Hendrickson presented a paper on Hawaiian turtles to a meeting of the Marine Turtle Specialists Group in Morges, Switzerland. In this paper it was pointed out that there were no laws governing the taking of marine turtles around the major islands and that increases in the tourist industry were producing greater demands for exotic luxury foods such as turtle steak. Further it was stated that while "green turtles are no longer considered common enough to support full-time professional net fishermen, every Tom, Dick and Harry who happen upon a turtle have the strong incentive to capture it. A 200 lb turtle represents perhaps \$50 plus a good meal for family and friends, in addition to a shell to keep or sell." It might be added that the same turtle now sells closer to \$200, thus making the personal gain incentive all the more attractive. Dr. Hendrickson also stated that calculated values for the predation on green turtles "conformed with the subjective impression that Hawaiian turtle populations are over-exploited, under-protected and declining at a significant rate." In addition, it was noted that the State Fish and Game Division would probably encounter difficulties in trying to protect marine turtles because the 'local citizenry included a large proportion of people who were closely tied to the sea by culture, custom and emotion, and that in this regard they would be jealous of restrictive regulations.'



Dr. Archie Carr: In January of 1973 Dr. Carr indicated to me that he personally "would like to see a complete moratorium on the taking of all sea turtles throughout the Hawaiian Islands until a careful survey of breeding, feeding and basking populations could be made." He also stated that he was very glad to see an awakening of interest in Hawaiian sea turtles and hoped that the efforts to protect them would be given the support needed.

The need to do further in-depth research on Hawaiian turtle populations was stressed by each of the aforementioned authorities. I would like to note that a request (HB 1635) by Representative Anson Chong for funds necessary to conduct such research presently resides in the State Legislature. Passage in the House has already been effected, and during the next session the Bill's approval in the Senate seems very likely. It is apparent that many of our State legislators are already aware of Hawaii's responsibility for safeguarding our country's last green turtle colony.

My next area of discussion will be a presentation of some of the significant results obtained from scientific research which I conducted in cooperation with the U. S. Fish and Wildlife Service during this years green turtle breeding season at French Frigate Shoals. It may be beneficial to first briefly review our present knowledge on the breeding status of green turtles in the Hawaiian Archipelago. Some of the important points are as follows:

- 1) There are no longer any nesting sites left on any of the major Hawaiian Islands. As short a time as 60 years ago there existed one major nesting site and at least five sites of lesser importance. Today there are none.
- 2) The only remaining nesting areas are located in the Northwestern Hawaiian Islands, specifically the Hawaiian Islands National Wildlife Refuge. Within this Refuge, several small sand islands at French Frigate Shoals account for 95 percent of all green turtle nesting.
- 3) Research carried out by U. S. Fish and Wildlife personnel has revealed that the turtles tagged at French Frigate Shoals migrate back to the major Hawaiian Islands. Tag returns have been obtained from around five of the inhabited Islands (Kauai, Oahu, Molokai, Maui and Hawaii). These results are in agreement with work conducted in other areas of the world which has demonstrated that green turtles migrate long distances to nesting beaches and subsequently return to feeding areas where the major portion of their life is spent. It can therefore be concluded that French Frigate Shoals is the only remaining breeding grounds for the feeding population which inhabits Hawaii's major islands.

One of the more important questions that has been raised concerning our green turtle colony is 'what is the size of the breeding population?' In other words, how many sexually mature individuals are there to contribute offspring for maintaining or increasing numbers of the total population? No censusing work of this nature had been conducted at the nesting sites through entire breeding seasons due to the limited number of Fish and Wildlife personnel and to necessary involvement with many other threatened species which utilize the Refuge islands.

Our work at French Frigate Shoals accomplished this goal, although it will be wise to do repeated studies in coming years. Our work concentrated on East Island, an 11 acre sand islet within the Shoals. Previous observations by



Fish and Wildlife personnel indicated that East Island hosted the greatest number of nesting turtles of the ten sand islands present. Our work confirmed this observation to be correct. A total of 67 females nested on East Island during the study. Numbers nesting on the other islands were determined by making surveys every second day and counting nesting pits. From these data it was possible to make a valid estimate of the total breeding population (both males and females) using French Frigate Shoals (assuming a three-year breeding cycle, an equal sex ratio, and allowing for a very liberal 20 percent addition to account for animals that may have been missed either before or after the study was conducted.) The total value arrived at came to 1,074 animals. An estimate made in 1968 by Dr. Hendrickson which was based upon all available data at the time placed the French Frigate Shoals breeding population at between 2,600 and 5,200 animals. In view of our more recent 1973 study it would appear that drastic reductions have occurred in the breeding population, although there is always the possibility that the earlier estimates were in error. Whatever the explanation, the fact remains that any turtle colony with a total breeding population of only slightly less than 1,100 individuals that is being subjected to increasing commercial exploitation is most definitely in an insecure position.

In addition to census information, valuable data on the size distribution of the Hawaiian nesting population was obtained. Our work revealed that the smallest nesting turtle measured 33 inches in straight line upper shell (carapace) length, while the largest individual was 41 inches. Dr. Archie Carr's 17 years of tagging work in the Caribbean has shown that the majority of green turtles reach sexual maturity at a shell length of between 33 and 36 inches. Research by U. S. Fish and Wildlife personnel has shown that Hawaiian turtles between 33 and 36 inches average about 210 lbs in weight. It will be very important to keep these two points in mind when I discuss Hawaii's catch statistics, particularly that portion dealing with the mean weight of the turtles being taken for commercial purposes.

Licensed fishermen in Hawaii are required by law to report to the State Fish and Game Division all turtles that are sold. Information contained in these catch reports include numbers caught, pounds caught, pounds sold and value, method of capture and area where taken. Turtles that are not sold do not have to be reported. In an effort to learn as much as possible about the commercially taken turtles, all catch data on file at the State Fish and Game Division was compiled and analyzed. Mr. Michio Takata was kind enough to make available all of these records for my study. Mr. Randal Chau of the University's Marine Options Program spent many hours over the past six months under my direction tabulating pertinent data. These statistics greatly added to our knowledge of turtle populations around the major Islands. Such information is difficult to come by since no congregated nesting presently exists and animals are dispersed over many miles of coastal water.

Although some large yearly catches were reported in the late 1940's and 1950's, trends displayed since 1963 indicate that more turtle is now being taken than ever before. For the calendar year 1963, a low of 380 lbs was reported while in 1972 it rose to 25,583 lbs. Up to date information shows that for the first 6 months of 1973 the reported catch has already exceeded 14,900 lbs indicating that a record high will again be established for this year. It is



interesting to note that the pounds of turtle taken since 1963 follows the increasing trends of tourism, and that much of the incentive to exploit turtles is provided by restaurants and hotels that depend on tourism for a large portion of their business. If this is the case, it then logically follows that a few fishermen are eroding a unique Hawaiian resource to provide an exotic luxury food for short term mainland visitors. It is unfortunate that those to suffer the most from this practice will be the low income, less fortunate residents of Hawaii. The turtle that could have been captured for home use to provide additional meat will now be all the more difficult to find.

Several months ago, in the course of discussing the drastic increases in turtle taken in recent years, it was stated that 'the larger number of animals killed proved that the population was in no danger since they were so abundant.' It was my feeling that such an argument was the reasoning of the Buffalo hunter who felt that the next large herd was always over the next hill. The low reproduction rate of turtles makes them quite different from fish and other marine organisms that spawn hundreds of thousands of young each year.

Since the reports submitted by commercial fishermen are uncheckable and rely solely on individual integrity, there is always the possibility of non-reporting or under-reporting. For example, for the years 1957 through 1969 absolutely no turtle catch reports were given for the Island of Kauai. During 1970, 1971 and 1972, 830, 855 and 200 lbs, respectively were reported for Kauai. One wonders just how much of the true catch these values represent since more than several restaurants on Kauai serve turtle steak. One also wonders how many pounds the sport fishery and 'home' catch represent. In Dr. Hendrickson's presentation to the I. U. C. N. Marine Turtle Specialist Group it was pointed out that the home catch plus the unlicensed commercial catch probably far exceeded the reported commercial catch in Hawaii.

Of particular interest from the studies of catch statistics were the mean weights of the animals taken commercially. For the recent high poundage years of 1969 through 1972, mean weights for turtles were 114, 135, 131 and 150 lbs, respectively. For the first 6 months of 1973, turtles averaged 107 lbs. These data show that many of Hawaii's turtles are being removed from the population before they ever have a chance to become sexually mature and reproduce. Green turtles that weight 107 to 150 lbs will measure between 25 and 29 inches in upper shell length. As I emphasized earlier, nesting first takes place when animals are a minimum of 33 to 36 inches. The size restriction placed in the proposed Regulation 36 will give our turtles the opportunity to grow to adult size and reproduce before they are subjected to hunting by man.

The question has been presented more than once that 'if we eliminate commercial fishing for turtles would this not put a lot of people out of work and take away their means of support?' An investigation of this aspect revealed the following facts: 1) In 1970 there were only eight fishermen in the entire State responsible for all the commercially taken turtle. The most earned by one person was \$2,765 while the other seven averaged \$321 (range \$17 - \$992) each. For 1971 there were also eight fishermen,



the most earned by one person being \$6,350 while the other seven averaged \$521 (range \$25 - \$2,684) each. During 1972 only six fishermen in the State captured turtles for profit and only one made slightly more than \$5,000 while the rest averaged \$1,116 (range \$28 - \$2,899). From this information it is apparent that turtle taking is mainly a part-time business.

One other point of interest is that some of the old time turtle fishermen who have quit the business have noted the reduction in numbers that turtles have undergone in Hawaii. As an example, in 1968 one fisherman wrote on a catch report 'that between 1948 and 1950 he used to take at least 100 turtles in four to five days in the feeding grounds between Molokai, Lanai and Maui - but for some reason there were no turtles there now.'

In conclusion I would like to ask all fishermen to endorse the proposed turtle regulations for the benefit of the species. Since the coming of man over 230 vertebrate species have become extinct; half of these have been lost in the past 100 years. Extinction is a very absolute thing, because once the animal is gone, it is gone forever. We must learn to adopt a philosophy that attempts to get animals off the Endangered Species List, not onto it.

To the restaurants that have provided the incentive for the exploitation of Hawaiian turtles, I would like to issue a special plea. Consider the facts which I have presented and set your own individual self-interests aside and willingly support this ban on the sale of turtle meat. Replace the turtle on your menu with other equally attractive and exotic luxury foods, such as our locally grown Malaysian prawns. Finally, I would like those restaurants that have benefited from the exploitation of Hawaii's green turtles to consider giving assistance to research on the captive rearing of green turtles. Help support our studies so that one day you may again serve turtle steak - steak that is obtained from domestically raised animals specifically for this purpose.

## PROPOSED PROTECTION FOR MARINE TURTLES

PREPARED BY: George H. Balazs

Recognizing the fact that title to all wildlife belongs to the State in its sovereign capacity, and that the State holds this title in trust for the people of Hawaii, and that the State has a right and an obligation to protect, perpetuate and control wildlife within its boundaries, the following bill for an act relating to the protection of marine turtles is hereby proposed:

1. It shall be unlawful for any person to take, sell, kill, possess, mutilate or in any way disturb any Leatherback (Dermochelys sp.) or Hawksbill (Eretmochelys sp.) in or from the territorial waters of the State of Hawaii.
2. It shall be unlawful for any person to take, sell, kill, possess, mutilate or in any way disturb any green turtle (Chelonia sp.) in or from the territorial waters of the State of Hawaii which surround the Hawaiian Islands National Wildlife Refuge.
3. It shall be unlawful for any person to take, sell, kill, possess, mutilate or in any way disturb any green turtle in or from the territorial waters of the State of Hawaii which surround the major islands (Hawaii, Maui, Kahoolawe, Lanai, Molokai, Oahu, Kauai and Niihau) excepting green turtles having a straight line carapace measurement of more than thirty-four (34) inches.
4. It shall be unlawful for any live marine turtle to be held in captivity or transported within or across the boundaries of the State except by special permit which will be granted by the Division of Fish and Game only for educational or scientific purposes. The number of animals held for such purposes by any one person or institution shall not exceed that as deemed reasonable, prudent and necessary by the Division of Fish and Game.
5. Any officer or agent authorized by the Division of Fish and Game shall have authority to execute any warrant to search for and seize any animal or animal product held in violation of sections 1, 2, 3 or 4 of this act. Such material shall be held pending proceedings in any court of proper jurisdiction. Upon the conviction of any person charged with a violation of section 1, 2, 3 or 4 of this act the animal or animal product seized shall be forfeited and either released, offered to a recognized institution for scientific or educational purposes, or destroyed.
6. Any person convicted of violating any section of this act shall be fined not more than \$500 or imprisoned not more than 6 months or both.



State of Hawaii  
Department of Land and Natural Resources  
Honolulu

Draft #8  
(4/1/74)

DIVISION OF FISH AND GAME

\*\*\*\*\*

The Board of Land and Natural Resources, in conformity with and pursuant to Chapters 187 and 190, Hawaii Revised Statutes, and every other law hereunto enabling does hereby adopt the following regulation relating to the protection of marine turtles.

REGULATION 36. RELATING TO THE PROTECTION OF MARINE TURTLES.

SECTION 1. It shall be unlawful to mutilate, injure, take, kill, possess, disturb, sell or offer to sell leatherback turtles (Dermochelys sp.), hawksbill turtles (Eretmochelys sp.) and green sea turtles (Chelonia sp.) or any parts thereof or the eggs or nests thereof from or within the State of Hawaii and waters subject to its jurisdiction, except as provided in Sections 2 and 4 of this regulation.

SECTION 2. It shall be lawful with a permit issued by the Board of Land and Natural Resources to:

- a. take or possess marine turtles or their eggs for scientific, educational or propagational purposes.
- b. take or possess green sea turtles for home consumption from the waters surrounding the eight major islands (Hawaii, Maui, Kahoolawe, Lanai, Molokai, Oahu, Kauai and Niihau) provided that the upper shell length is 36 inches or more (straight line measurement) and provided further that the turtle may be gutted and/or cut up into not more than five parts with one of the parts being the whole upper shell with the entire head attached and all parts shall be kept together until the permittee leaves the shore area for his home.
- c. possess or sell the eggs or offspring of captive green sea turtles or products thereof.
- d. possess with intent to sell or to sell marine turtles or products thereof acquired prior to the effective date of this regulation.

SECTION 3. It shall be unlawful to use nets for the taking of green sea turtles.

SECTION 4. Nothing in Section 1 shall be construed as making it unlawful for any person to possess for purposes other than sale marine turtles or products thereof acquired prior to the effective date of this regulation.

SECTION 5. Any person violating the provisions of this regulation shall be fined not more than \$500 as provided in Section 187-20, Hawaii Revised Statutes.



Survival Status of the Green Turtle (Chelonia agassizi) Nesting and Basking Colony at French Frigate Shoals, Northwestern Hawaiian Islands

by George H. Balazs, Hawaii Institute of Marine Biology, University of Hawaii, Kaneohe, Hawaii, U.S.A. 96744

INTRODUCTION

LONGER VERSION  
W/ TABLES & FIGURES

Although two species of marine turtles are known to inhabit the Hawaiian Archipelago, the Pacific green (Chelonia agassizi) is the only one which still occurs in any number. The hawksbill (Eretmochelys imbricata) is now an exceptionally rare species and, as in most other areas where it occurs, continued survival is questionable. Early Hawaiians were well acquainted with both of these turtles, calling the green, "Homu" and the hawksbill, "E'a". As recently as the early 1900's numerous beaches in the major inhabited islands were still used by the green turtle for nesting purposes, with areas such as Polihua on the Island of Lanai, Napali and Polihale on the Island of Kauai and Mokapu and Lanikai on the Island of Oahu serving as viable reproductive sites. Sporadic nesting continued to occur at several locations into the 1950's, however, today, for all practical purposes, turtle reproduction has been eliminated from the major Hawaiian Islands. Factors responsible for the demise included both increased and more efficient means of exploitation as well as habitat destruction. This pattern of ecological disaster for marine turtles is by no means unique to Hawaii as the same uncontrolled forces have been allowed to reduce or destroy numerous colonies at any of a number of locations in the Atlantic, Pacific and Indian Oceans.

French Frigate Shoals (Figure 1), an area extending for 26 km of shallow reefs and small sand islands located in the Hawaiian Islands National Wildlife Refuge approximately 770 km northwest of Honolulu, is today the only remaining breeding and nesting site for the Pacific



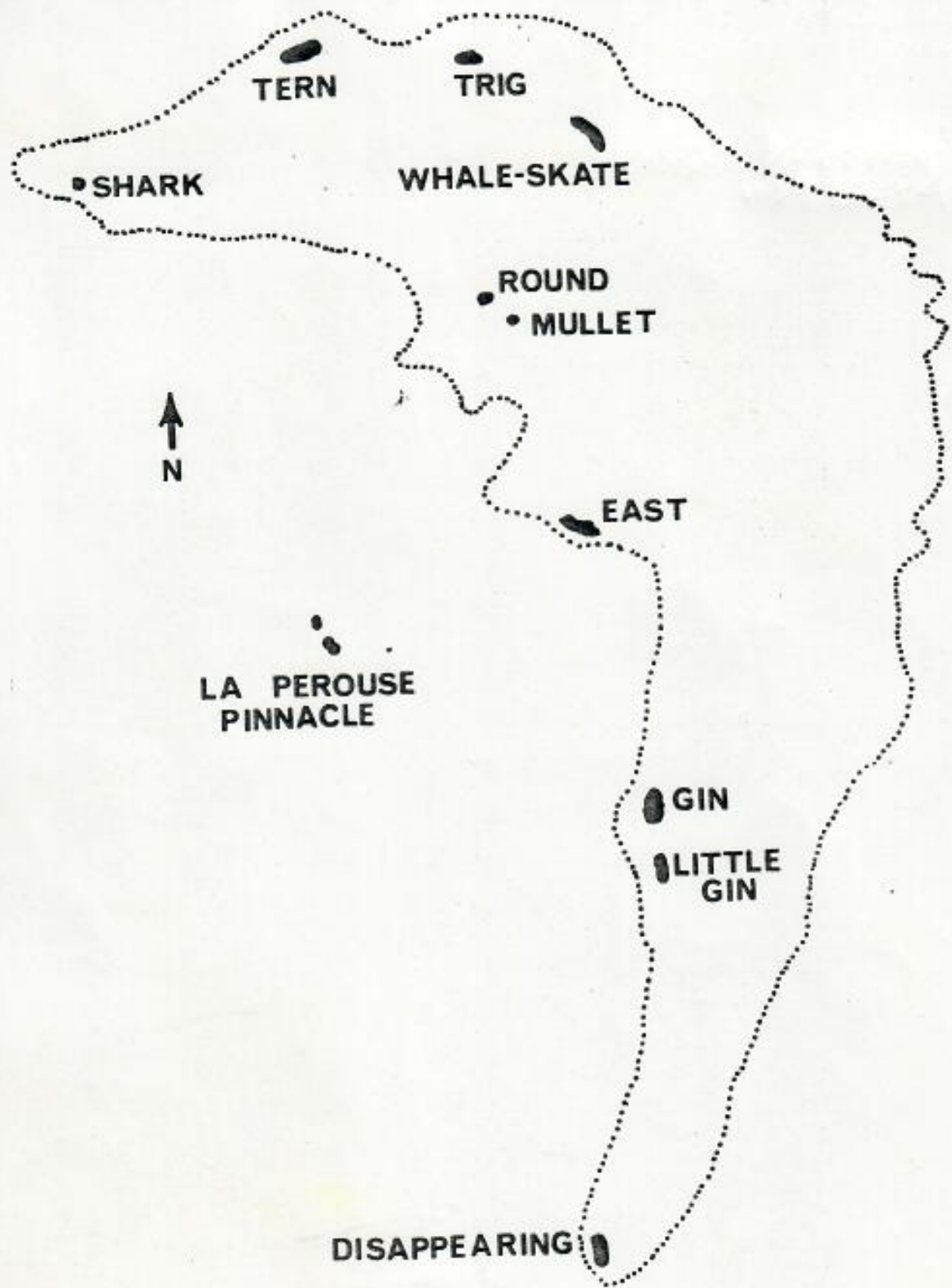


Figure 1. French Frigate Shoals ( $23^{\circ}45' N$   $166^{\circ}10' W$ ), Northwestern Hawaiian Islands.

green turtle in the Hawaiian Archipelago. Although not generally recognized, the colony utilizing French Frigate Shoals has several very distinctive characteristics. In terms of national interest, the colony represents the last aggregate nesting of green turtles left in the United States. Because the turtle's life cycle is completed entirely within the confines of the Archipelago, migration into foreign territorial waters does not occur. This is a major complicating factor in the conservation of other green turtles where feeding takes place in one country and reproduction in another. Also unique to Hawaii's green turtle colony is a basking or land emergence behavior that is displayed by both males and females only on the shorelines at French Frigate Shoals and other undisturbed islands in the northwestern portion of the Archipelago.

Because of the importance of French Frigate Shoals to the continued survival of the green turtle in the United States, investigations were initiated during 1973 to determine the status of this little studied nesting and basking colony. Although turtles have been tagged and measured at various times and locations by U. S. Fish and Wildlife personnel in the Northwestern Hawaiian Islands, no intensive research has been conducted throughout periods of reproduction. Nesting studies of this nature are essential for censusing the colony and understanding its structure and dynamics. Objectives of the investigation therefore were: 1. to conduct an intensive census-tagging study at East Island, French Frigate Shoals, during a significant portion (June and July) of the 1973 nesting season. East



Island was focused upon because earlier visits suggested that it hosted the greatest number of turtles; 2. to make periodic surveys on the five other islands within the atoll where nesting occurs in order to determine the number of turtles using these locations; and 3. to obtain data on such characteristics as: carapace measurements; re-nesting intervals and locations; number of eggs laid; and the inter-relationship of nesting and basking.

#### METHODS

Methods of investigation included the designation of 17 50 meter shoreline segments on East Island for identification purposes (Figure 2). Specific areas were not given to the non-vegetated sand and broken shell point which comprises the west end of the island. Nesting activity was monitored nightly over the entire island at two hour or less intervals and individuals were identified by spray painting consecutive numbers on their carapace. These numbers were visible from a distance, remained legible for approximately five to ten days, and were repainted when possible. Observations were made on the number of successful and unsuccessful nesting pits as well as nesting and re-nesting areas. "Nesting pit" within the context of this study referred to the depression in the ground resultant from turtle nesting activity. As numerous pits were formed before actual egg deposition, the presence of eggs in a pit was difficult to determine unless careful monitoring of nesting progress was conducted. During the latter cover-up stages of each nesting or as conditions warranted, carapace

measurements were taken and permanent tags were attached to the front flippers. Census surveys of nesting pits were periodically carried out on Tern, Trig, Whale-Skate, Gin and Little Gin Islands. New pits located during each visit were marked with colored tags for subsequent recognition.

#### FINDINGS

Findings revealed that during the period under investigation only 67 females emerged at East Island for nesting purposes. Straight line carapace lengths taken on these animals were found to range from 83.2 cm to 103.5 cm or 32 3/4 in to 40 3/4 in with a mean of 92.4 cm or 36 3/8 in (figure 3). Six turtles were observed that had been previously tagged by U. S. Fish and Wildlife personnel on visits to the atoll dating back to 1968. A comparison of measurements on these animals indicated that very little, if any, growth had taken place. A total of 340 nesting pits was formed on East during the study. Two individuals contributed 57 pits to this count with only a single successful egg deposition by one of them. Normal nesting by both turtles was seriously impaired by the loss of significant portions of their hind flippers. Counts taken during oviposition on a random sample of six turtles showed that from 85 to 144 (mean 115) eggs were laid at each successful nesting.

The number of successful nestings taking place in each of the 50 meter segments (figure 4) revealed that areas 1, 5 and 15 had the greatest number while no success resulted in areas 8, 10 or 11.



Although turtles regularly emerged at the non-vegetated west end, none were able to form suitable pits due to sand slippage. Successful nesting therefore appeared to be primarily a function of substrate quality. Reoccurrence of successful nesting on East by the same individual averaged 18 days with a range of 12 to 36 days. This relatively long interval between nestings suggested that a multiple island nesting pattern may have been displayed by some individuals. Many turtles returned to nest in the same or adjacent 50 meter area (Table 1). Only one individual re-nested on the opposite shoreline from its initial nesting.

Observations on basking turtles showed that only 26 of the 67 females or 39% identified while nesting on East were subsequently seen basking. Only one of these animals was seen basking on another island (Whale-Skate). Most basking occurred during the mid and late afternoon hours, however, on 23 different occasions male baskers were noted between 2100 and 0600 hours, often remaining emerged for up to five hours. Total numbers of animals basking declined steadily after the middle of June. This appeared to coincide with a reduction in the number of males present and mating activity observed.

During the investigation a total of 225 pits was recorded on the island of Whale-Skate, while Trig had 47, Tern 27, and Gin and Little Gin 18 each. Except for Whale-Skate, the presence of baskers on any of these islands was minimal. Estimates of the number of nesting turtles representative of the pits counted on each island were calculated by using the mean number of pits formed by each

animal on East Island. Due to the presumably atypical behavior of the two turtles with hind flipper injuries, pits formed by these animals were deleted from the total count. Sixty-five nesters using East were therefore responsible for 283 pits ( $340 - 57 = 283$ ) or a mean of 4.3 pits per animal. Pits formed on Whale-Skate were divided by 4.3 to arrive at a population estimate of 52 animals for that island ( $225 \div 4.3 = 52$ ). Similar calculations were made for each of the other islands (Table 2). Using these values, the total number of females nesting during the investigation was calculated to be 144 (East 67 + other islands 77 = 144). Since the majority of females (and males) are known to arrive at the nesting grounds prior to the onset of egg laying, it was felt that those animals censused closely approached the total number actually present. Fewer new animals were observed after July 1, further indicating that an identification of all females may have been close to accomplishment. In order to account for any possible late arrivals after the termination of the study as well as for a degree of error in nesting pit counts, the value of 144 was considered to represent 80% of the actual 1973 nesting population. Using this assumption, 180 females would have been present during the 1973 season, a liberal estimate in view of the available evidence. If the green turtles using French Frigate Shoals nest on the average, once every three years, as they do at other locations in the world, the value of 180 could be multiplied by three to arrive at an estimate for the total number of reproductive size females remaining in the Hawaiian archipelago.



No estimates were made on the number of males present within the atoll. Little data are available on sex ratios in green turtle colonies and cyclic reproductive patterns in males. Collection of such data at French Frigate Shoals would have involved considerable disruption of the unique basking behavior and was therefore considered undesirable.

Size estimates offered for the nesting population are based on the most comprehensive collection of French Frigate Shoals green turtle data to date. Previous estimates offered with caution by Hendrickson<sup>1</sup> in 1969 using limited information collected by the Smithsonian Institute, placed the combined male and female population for the 1965 season between 2600 and 5200 animals. The far lower estimate of the present study may reflect a significant population decline, a greater reliability of the data used or a combination of the two.

Two turtles tagged during the study were subsequently captured by fishermen off the islands of Oahu and Maui, representing minimum migrations of 810 km and 950 km, respectively. These recoveries further confirm earlier findings by the U. S. Fish and Wildlife Service that turtles feeding in the eight major Hawaiian Islands nest at French Frigate Shoals.

#### SURVIVAL OUTLOOK

Protection of these animals while at French Frigate Shoals has been assured over the past ten years and will probably continue due

---

<sup>1</sup> Hendrickson, J. R., Report on Hawaiian marine turtle populations. IUCN Publ. New Ser. Suppl. Pap., (20): 89-95.

to rigorous enforcement of the area's National Wildlife Refuge status, a status that has existed since 1909 but greatly ignored through 1959 with respect to the killing of turtles. By far, the greater portion of the turtle's life is spent feeding around the major Islands where until recently the animals were completely unprotected and subjected to substantial commercial pressure. In lieu of a complete moratorium, during May, 1974 the State of Hawaii adopted its first marine turtle protection regulation which bans commercialization and places a 36 inch size limit on animals taken for home consumption. The effectiveness of this long overdue protection remains to be seen in view of enforcement problems and the dangerously low nesting population level reported in this study. Survival of the colony may now only be possible by imposing a ban on the capture of all turtles while at the same time taking steps to ensure the continued undisturbed status of the single remaining nesting site. Considering the case histories of other turtle colonies throughout the world that have been similarly reduced in both range and size, it would seem unlikely that viability could be retained at French Frigate Shoals without the immediate implementation of such measures.



Table 1

Areas of successful re-nesting on East Island by  
the same individual

<u>Animal</u>	<u>Nesting sequence</u>					
	<u>1</u>	<u>2</u>	<u>3</u>	<u>1</u>	<u>2</u>	<u>3</u>
	<u>South coast areas</u>			<u>North coast areas</u>		
TC 1	4	4				
7				15	16	
10		2	5			
11	6	6				
13				16	16	16
16				17	15	14
17	7	1				
18	1	1	2			
19		1	1	13		
33	3	1				
44	2	1				
54	4	5	5			
56				12	15	

Table 2

Population estimates of green turtles nesting on  
Whale-Skate, Trig, Tern, Gin and Little Gin

Island	Nesting pits	Approximate number of animals
Whale-Skate	225	52
Trig	47	11
Tern	27	6
Gin	18	4
Little Gin	18	4
Total		77



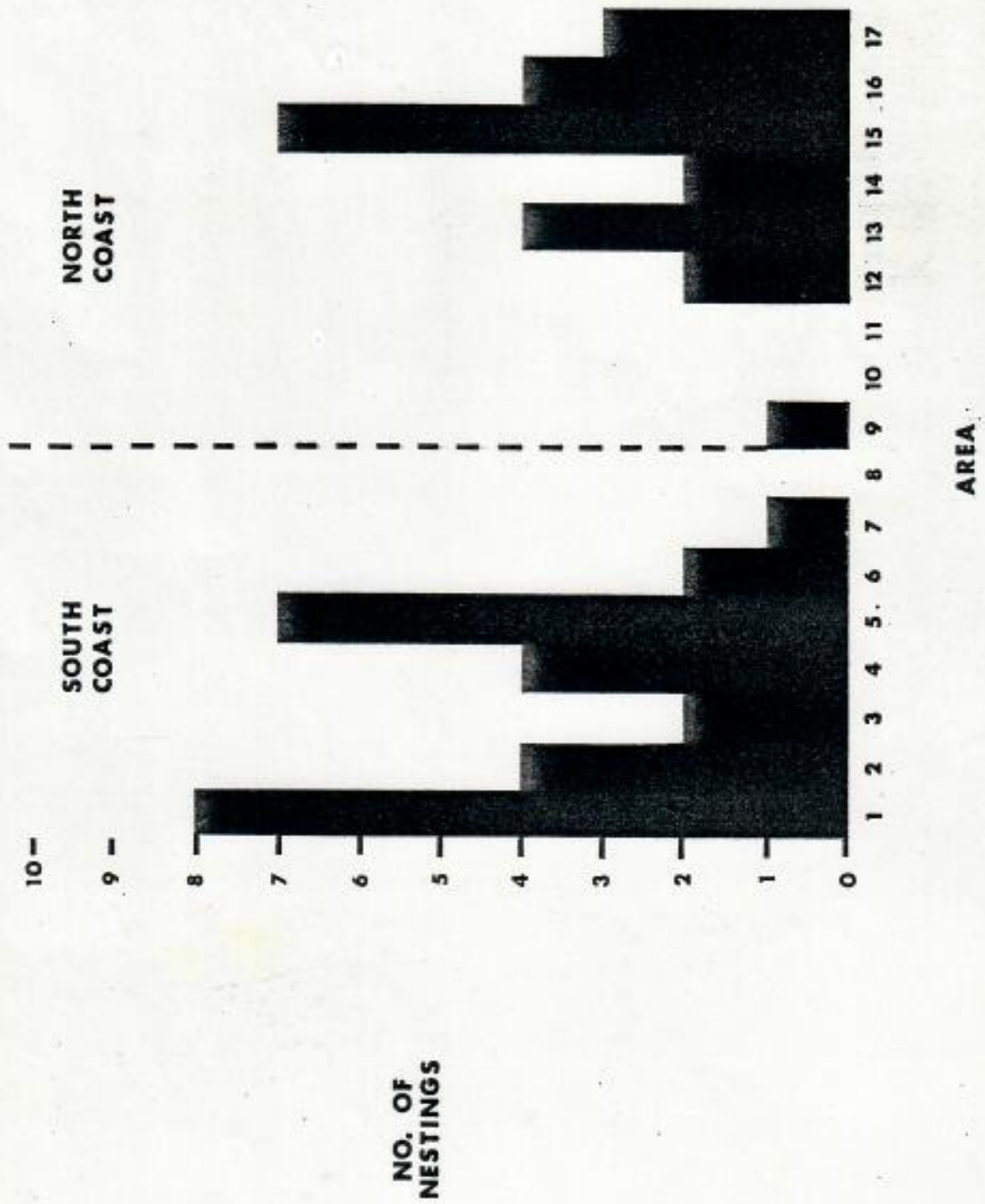


Figure 4. Number of successful nestings on East Island by area.

Table 1

Areas of successful renesting on East Island by  
the same individual

<u>Animal</u>	Nesting sequence					
	1	2	3	1	2	3
	<u>South coast areas</u>			<u>North coast areas</u>		
TC 1	4	4				
7				15	16	
10		2	5			
11	6	6				
13				16	16	16
16				17	15	14
17	7	1				
18	1	1	2			
19		1	1	13		
33	3	1				
44	2	1				
54	4	5	5			
56				12	15	



Table 2

Population estimates of green turtles nesting on  
Whale-Skate, Trig, Tern, Gin and Little Gin

Island	Nesting pits	Approximate number of animals
Whale-Skate	225	52
Trig	47	11
Tern	27	6
Gin	18	4
Little Gin	18	4
Total		77

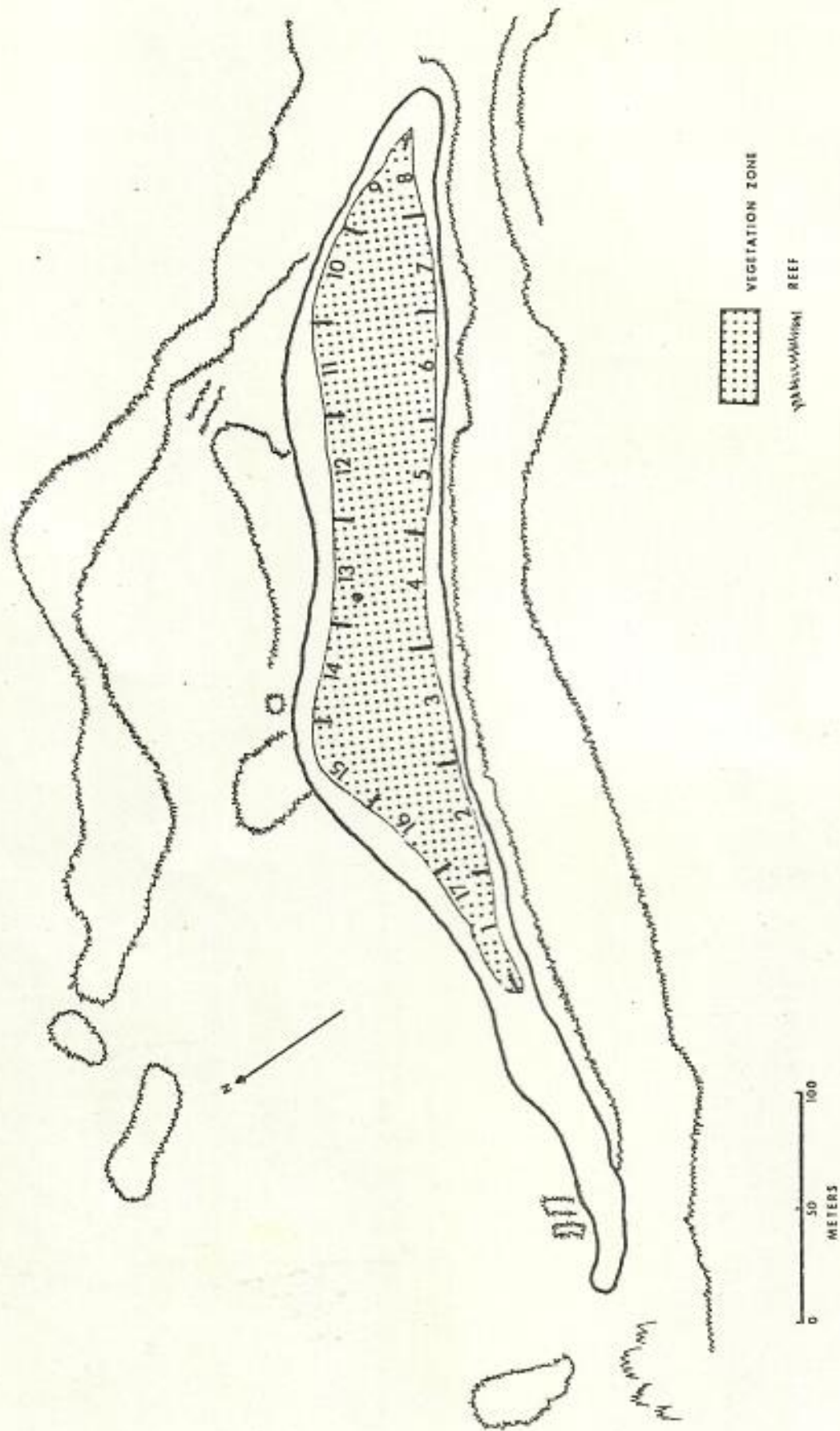


Figure 2. East Island, French Frigate Shoals.



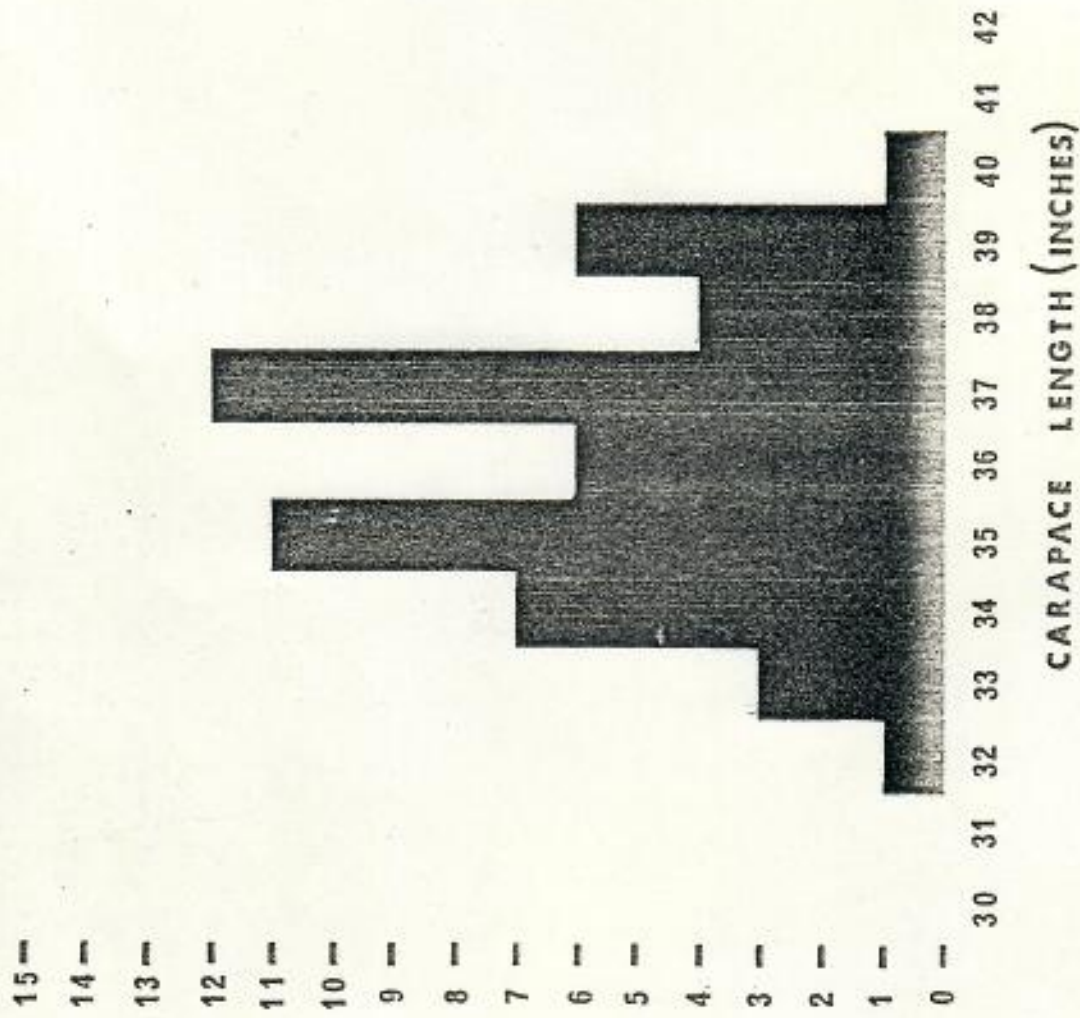


Figure 3. Frequency of straight line carapace lengths in nesting green turtles at East Island.

Table 8. Intensity of green turtle nesting on East Island

<u>Date</u>	<u>Total number of nesting animals</u>	<u>New animals</u>	<u>Date</u>	<u>Total number of nesting animals</u>	<u>New animals</u>
6-3-73	4	4	6-25	3 <sup>b</sup>	1
6-4	6	3	6-26	3	0
6-5	3	2	6-27	6 <sup>b</sup>	3
6-6	0	0	6-28	2	1
6-7	3	3	6-29	4	0
6-8	2	2 <sup>b</sup>	6-30	1	1
6-9	2	2	7-1	4 <sup>b</sup>	2
6-10	3 <sup>b</sup>	1	7-2	4	0
6-11	5 <sup>b</sup>	4	7-3	7 <sup>c</sup>	1
6-12	2 <sup>b</sup>	0	7-4	9	2
6-13	2 <sup>b</sup>	1	7-5	5	0
6-14	3	2 <sup>c</sup>	7-6	6	0
6-15	5	4	7-7	5	1
6-16	7 <sup>bc</sup>	5	7-8	5	1
6-17	6 <sup>c</sup>	4	7-9	4 <sup>c</sup>	1
6-18	10 <sup>bc</sup>	6	7-10	4 <sup>c</sup>	0
6-19	8 <sup>bc</sup>	3	7-11	4	0
6-20	10 <sup>bc</sup>	2	7-12	3	0
6-21	5 <sup>c</sup>	0	7-13	3	1
6-22	5 <sup>c</sup>	2	7-14	7 <sup>b</sup>	2
6-23	5	0	7-15	4	0
6-24	2	0			

<sup>a</sup> represents animals observed from 1900 hours to 0600 hours of the following day

<sup>b</sup> includes animal TC 14

<sup>c</sup> includes animal TC 22



Random sampling of number of eggs per nest  
deposited on East Island

---

Animal	Date	Successful nesting	Eggs deposited
TC 8	6-6-73	1st	144
16	6-10-73	1st	110
17	7-11-73	2nd	110
18	7-10-73	3rd	119
33	7-12-73	2nd	85
63	7-12-73	1st	123

---

Mean, standard deviation 115  $\pm$  19

Information supplied by Paul Kawamoto, Div. F. & G., at ASAC mtg., 20 Dec. 1974.

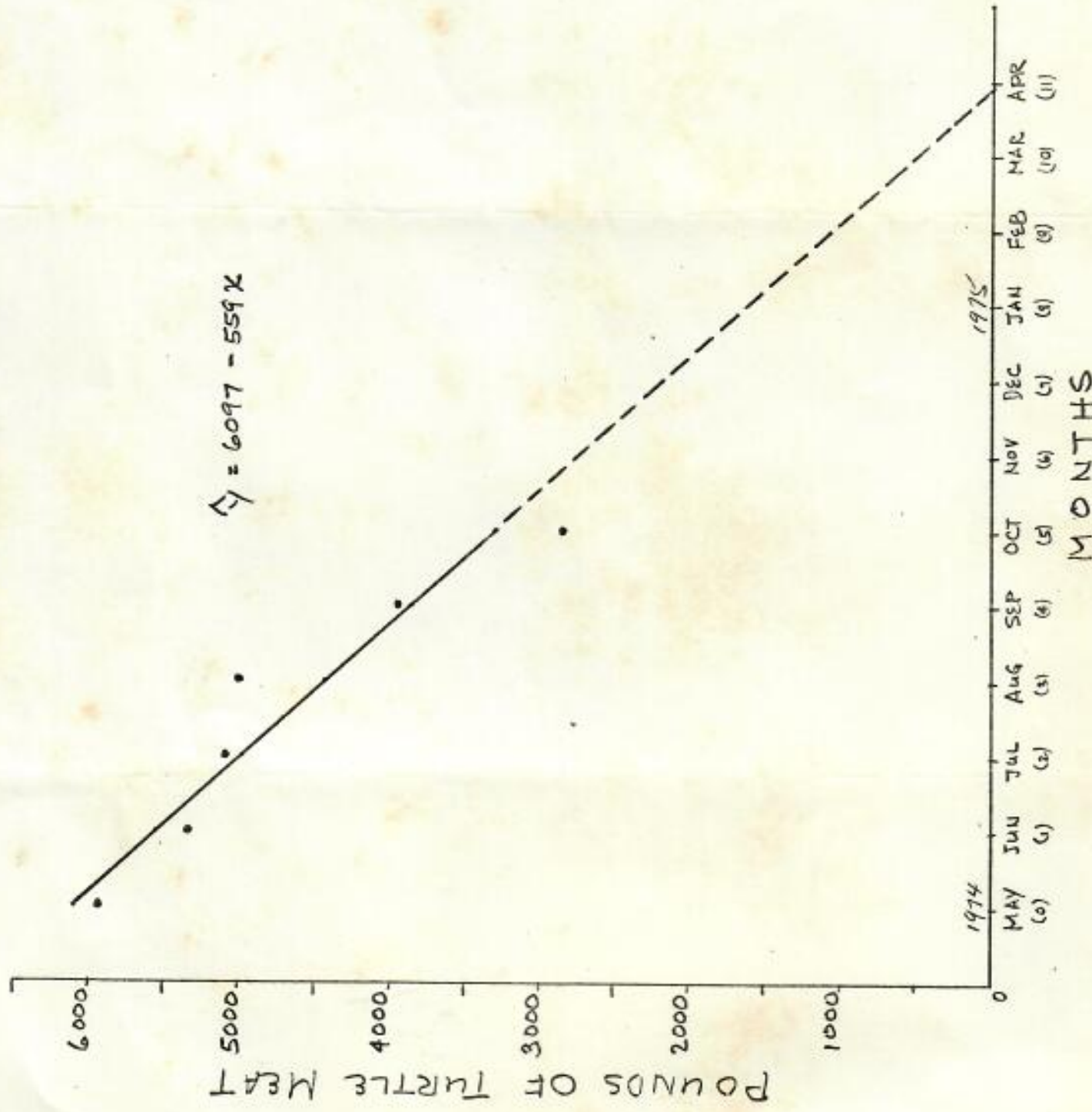
I - Number of Permitters : (to possess and sell Green Turtle meat)

Maui - 2 issued	2 active
Hawaii - 2 "	1 " (one voluntarily cancelled)
Kauai - 3 "	3 "
Molokai - 2 "	0 " (two expired 6-30-74)
Oahu - <u>6 "</u>	<u>6 "</u>
15 issued	12 active

II - Monthly Status of Marine Turtle Meat In Stock From May To October, 1974.

<u>Months</u>	<u>Total Meat In Stock</u>
May	5,927 #
June	5,345
July	5,097
August	5,007
September	3,959
October	2,863





Monthly rate of depletion of green sea turtle meat reported from May, 1974 to October, 1974.

## STATE OF HAWAII

SEA TURTLE CATCH REPORTED  
FOR YEARS 1948 to 1971Compiled by George H. Balazs  
Hawaii Institute of Marine Biology

YEAR	POUNDS	VALUE (U.S.\$)	VALUE/POUND
1948	17,650	2,154	.12
1949	15,168	2,016	.13
1950	11,588	1,733	.15
1951	5,144	1,050	.20
1952	2,731	533	.20
1953	9,466	2,214	.23
1954	3,040	483	.16
1955	11,126	1,731	.16
1956	6,819	1,025	.15
1957	696	195	.28
1958	3,207	1,171	.37
1959	714	90	.13
1960	3,739	527	.14
1961	709	139	.20
1962	477	48	.10
1963	380	79	.21
1964	1,609	321	.20
1965	1,510	57	.04
1966	4,715	1,053	.22
1967	5,021	1,173	.23
1968	3,350	2,400	.72
1969	10,175	2,820	.28
1970	12,506	5,017	.40
1971	19,884	9,850	.50



## Sea Turtle Statistics for Hawaiian Waters

	1967		1968		1969		1970		1971	
	Pounds	Value US \$	Pounds	Value US \$	Pounds	Value US \$	Pounds	Value US \$	Pounds	Value US \$
Jan	1900	610 .32	227	23 .10	*	*	883	464 .53	1625	795 .49
Feb	35	10 .29	447	41 .09	2450	147 .06	966	466 .48	769	297 .39
Mar	2550	258 .10	750	500 .67	16	10 .63	530	220 .42	3920	1702 .43
Apr	400	260 .65	1094	1094 1.00	690	*	1023	501 .49	1690	663 .39
May	*	* *	244	154 .63	*	*	2070	1149 .56	1530	686 .45
June	*	* *	264	264 1.00	*	*	182	182 1.00	3055	1088 .36
July	*	* *	324	324 1.00	*	*	500	59 .12	440	129 .29
Aug	*	* *	*	* *	150	98 .65	1147	308 .27	1875	978 .52
Sept	*	* *	*	* *	2290	890 .39	2726	762 .28	1550	1262 .81
Oct	100	12 .12	*	* *	1374	493 .36	771	264 .34	750	554 .74
Nov	22	13 .59	*	* *	1474	399 .27	*	*	1330	959 .72
Dec	14	10 .71	*	* *	1731	783 .45	1708	642 .38	1350	737 .55
Total	5021	1173 .23	3350	2400 .72	10175	2820 .30**	12506	5017 .40	19884	9850 .50

\* Not reported

\*\* Not including April

Sea Turtle Statistics for Hawaiian Waters

	1967		1968		1969		1970		1971	
	Pounds	Value US \$ 1b	Pounds	Value US \$ 1b	Pounds	Value US \$ 1b	Pounds	Value US \$ 1b	Pounds	Value US \$ 1b
Jan	1900	610 .32	227	23 .10	*	*	883	464 .53	1625	795 .49
Feb	35	10 .29	447	41 .09	2450	147 .06	966	466 .48	769	297 .39
Mar	2550	258 .10	750	500 .67	16	10 .63	530	220 .42	3920	1702 .43
Apr	400	260 .65	1094	1094 1.00	690	*	1023	501 .49	1690	663 .39
May	*	* *	244	154 .63	*	*	2070	1149 .56	1530	686 .45
June	*	* *	264	264 1.00	*	*	182	182 1.00	3055	1088 .36
July	*	* *	324	324 1.00	*	*	500	59 .12	440	129 .29
Aug	*	* *	*	* *	150	98 .65	1147	308 .27	1875	978 .52
Sept	*	* *	*	* *	2290	890 .39	2726	762 .28	1550	1262 .81
Oct	100	12 .12	*	* *	1374	493 .36	771	264 .34	750	554 .74
Nov	22	13 .59	*	* *	1474	399 .27	*	*	1330	959 .72
Dec	14	10 .71	*	* *	1731	783 .45	1708	642 .38	1350	737 .55
Total	5021	1173 .23	3350	2400 .72	10175	2820 .30**	12506	5017 .40	19884	9850 .50

\* Not reported

\*\* Not including April



NUMBERS OF MARINE TURTLES INSPECTED IN THE HONOLULU AND  
HILO MARKETS 1902-1904

	MONTH	HONOLULU, OAHU	HILO, HAWAII
Yr. 1902	January	6	-
	February	7	1
	March	19	-
	April	24	-
	May	13	-
	June	15	-
	July	14	-
	August	34	-
	September	23	1
	October	22	-
	November	11	-
	December	6	-
Yr. 1903	January	6	-
	February	9	-
	March	10	-
	April	18	-
	May	26	-
	June	29	-
	July	19	-
	August	11	-
	September	10	-
	October	13	-
	November	7	-
	December	10	-
Yr. 1904	January	9	-
	February	-	-
	March	9	16
	April	14	1
	May	24	2
	June	11	2
	July	8	1
	August	4	-
	September	82	-
	October	24	-
	November	35	-
	December	38	6

Compiled from The Commercial Fisheries of the Hawaiian Islands in 1903, by John N. Cobb.



Marijuana itself must have permit?

Restaurants selling "handmade" require to get permit?

AGRICULTURE Must Report Monthly July 31, 1974  
The amount remaining in stock (inventory)?

Dear George,

I went to the Dept. of Fish & Game and acquired what information they had. (see attached sheet) No record has been kept on # of pounds of turtle on hand prior to the 5/30 May 30<sup>th</sup> deadline for regulation 36. This sure seems strange to me; it really makes the regulation weak since a seller could claim to have had hundreds of pounds of turtle on hand and caught (continue to sell it for months). The dept. really has no recourse under the present conditions.

Anyway I also included the names and addresses of those who acquired permits for private usage. Thought you might be interested in those also.

I picked up your order on campus last week. The people there were confused about the instructions on part of your order and therefore didn't fill that portion. I picked up 3 prints (they only charged you for 2) and one slide. Please check with the department about the others.

Hope everything is going well for you. Things here are going well. See you in mid-August.

Janet

P.S. I have enclosed blank forms for the sale and taking of turtles. Thought you might be interested. Over →



7/31/74 observations on neck pen  
animals can be found on page  
113 of the turtle data book. (but on  
the rock)

as of 7/30/75

Pai

pieces of light-clip on?

PERMITS FOR THE SALE OF MARINE TURTLE PRODUCTS  
expiration: 6/30/75

Chart House (Kenny Ching) 5/31/74  
1765 Ala Moana Blvd.  
Honolulu, Hawaii ~~3770 lbs~~  
941-6660

Dot's in Wahiawa 6/18/74  
130 Mango Street  
Wahiawa, Hawaii  
622-4115 Home: 622-4905

Molokai Fisherman's Association 6/4/67  
(William Kalojai)  
P. O. Box 889  
Molokai  
553-5112 Home: 558-8297

Pineapple Hill Resort Ltd. 6/17/74  
(Jerold Macdonald)  
Lehaina, Maui 3,901 lbs June 1, 74  
669-6119

Larry L. Rawlins no issuance date  
P.O. Box 346  
Molokai  
553-5561

Sept 6, 1974  
12 issued  
3 expired

Nick's Fish Market - Maui  
9000  
2 delinquent

PERMITS FOR THE TAKING OF GREEN SEA TURTLE FOR HOME CONSUMPTION  
expiration: 6/30/75

62 issued  
29 expired  
1 reported  
40 lbs  
300 lbs  
Kaneohe Bay

Harry K. Aki 7/6/74  
608 Vineyard. Apt. 305  
Oahu

Peter Connally 7/01/74  
#9 Noholani Street  
Haiku, Maui

Michael Buck 6/14/74  
7219 Upaekas Street  
Oahu

Bernard Duarte 7/22/74  
RR #1  
Kapas, Kauai

Chanks Busby 6/7/74  
P.O. Box 245  
Molokai

Nichols A. Farin 5/30/74  
Box 252  
Honolulu, Oahu

George Carlson 5/31/74  
2234 Booth Road.  
Oahu

Gary Galihier 7/01/74  
59-175 C Ke-Mui Road  
Sunset Beach, Oahu

Robert Carroll 7/01/74  
P.O. Box 157  
Kaialapuu, Maui

Bernard Goo 7/05/74  
4732 Pelehu Road  
Kapas, Kauai

Charles Chapman 6/24/74  
45-656 Anoi Road  
Kaneohe, Oahu

Francis Hekekis 5/30/74  
624 A 12th Ave.  
Kaimuki, Oahu

Jeffrey Choi 6/05/74  
68 Terrace  
E. Hawaii, Hawaii

Dennis Heranska 6/28/74  
3290 Ilima St.  
Kauai

Winston Chun 7/05/74  
67-389 Kikea Circle  
Waiāluā, Oahu

Reuben Kaio 7/19/74  
66-182 C Waikenshile Rd.  
Haleiwa, Oahu



James Kamsi 909 Aipo Street Honolulu, Oahu	6/15/74	Albert Oshita RR1 Box 386 K Kapaa, Kauai	6/24/74
William Kamskeesina P.O. Box 1042 Hainalu, Molokai	??	Alvin Pacheu Kiliua, Kauai	7/01/74
Samuel Laolulo 2052 10th Ave. Oahu	6/15/74	Lawrence Park P.O. Box 57 Kauai	7/18/74
Bruce Koyanagi P.O. Box 531 Kelsheo, Kauai	7/02/74	Larry Rawling P.O. Box 346 Molokai	6/04/74
Ted. Lauglang 99-252 Oheoloing Pl. Aiea, Oahu	7/03/74	Edward Robello 67-233 E Kiapoho St. Wailua, Oahu	7/01/74
Joseph Manaba P.O. Box 283 Kaua, Molokai	6/24/74	Anthony Romo P.O. Box 575 Koloe, Kauai	7/05/74
Incarnation Manatao 48-009 Kam Hwy. Kaneohe, Oahu	7/03/74	Leon Severs 1650 Kansau St #816 Oahu	7/01/74
Richard Matsumoto RR1 Box 240 Lehua, Kauai	7/03/74	Ronny Tanihiro 4649 Lehua St. Kipaa, Kauai	7/19/74
Tony MC Morris 448 Pualani Street Wailuku, Maui	7/19/74	Eric Wong 1339 Maksihos Oahu	7/15/74
Clarence Mederios 2017 Makumano Honolulu, Oahu	6/06/74	Eugene Wong 1130 ??? Oahu	7/07/74
Eric Melin 167 Mahealani Pl. Oahu	7/18/74	Glen Yamashita 51-264 Kam Hwy. Kaaawa, Oahu	7/17/74
Harold Miller P.O. Box 1618 Lehina, Maui	7/18/74		
Sedeo Morikawa 768 B Panaewa Lehina, Maui	7/06/74	Peter Connally P.O. Box 585 Haiku, Maui	
Raymond Naihe P.O. Box 164 Hana, Maui	7/02/74	Mike Raymond P.O. Box 164 Hana, Maui	
Roy Nakatsu 67-644 Kane Pl. Oahu	7/19/74		

---

EXPIRED PERMITS  
6/30/74

FG \_\_\_\_\_

Division of Fish and Game  
Department of Land and Natural Resources  
State of Hawaii

No. \_\_\_\_\_

PERMIT FOR THE SALE OF MARINE TURTLE PRODUCTS

In conformity with Regulation 36 of the Division of Fish and Game, a marine turtle sale permit is hereby issued to \_\_\_\_\_  
(Firm or Individual Name)

providing for the possession and sale of marine turtles or products thereof acquired prior to the effective date of this regulation subject to the following conditions:

1. This permit is valid for the period beginning with the date of issuance and ending June 30, 19\_\_\_\_.
2. This permit is not transferable or assignable and must be visibly displayed where the marine turtles or their products are to be sold.
3. The permittee shall accurately complete a Marine Turtle and/or Product Inventory Report that describes and tallies all marine turtles or products thereof purchased, sold and/or remaining in possession of the permittee on forms provided by the Department of Land and Natural Resources and return the filled form to the Division of Fish and Game no later than 10 days following the end of each month.

THIS MARINE TURTLE SALES PERMIT WILL BE CANCELLED IF THE PERMITTEE FAILS TO COMPLY WITH ANY OF THE CONDITIONS LISTED ABOVE.

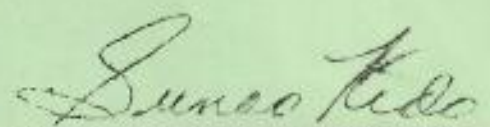
I certify that I have read the conditions of this permit and provisions of Regulation 36:

\_\_\_\_\_  
Signature of Permittee

Address: \_\_\_\_\_

District: \_\_\_\_\_ Island: \_\_\_\_\_

Phone: Business \_\_\_\_\_ Residence: \_\_\_\_\_

  
\_\_\_\_\_  
Chairman and Member  
Board of Land and Natural Resources

By: \_\_\_\_\_  
Issuing Agent

Issuance Date: \_\_\_\_\_



PERMIT FOR THE TAKING OF GREEN SEA TURTLE FOR HOME CONSUMPTION

In conformity with Regulation 36 of the Division of Fish and Game, a green sea turtle permit is hereby issued to \_\_\_\_\_

(Print Name) Last First Middle  
 for the taking of green sea turtles for home consumption subject to the following conditions:

1. This permit is valid for the period beginning with the date of issuance and ending June 30, 19\_\_\_\_.
2. This permit is not transferable or assignable and must be carried by the permittee while engaged in taking and transporting green sea turtles.
3. Turtle fishing shall be conducted only in the waters surrounding the eight major islands (Hawaii, Maui, Kahoolawe, Lanai, Molokai, Oahu, Kauai and Niihau).
4. The permittee shall not collect any turtle from any of the following areas:  
 Hanauma Bay, Oahu  
 Hawaii Marine Life Refuge (Coconut Island in Kaneohe Bay), Oahu  
 Kealahou Bay, Hawaii  
 Ahihi-Kinohiwa Natural Area Reserve, Maui  
 Northwestern Hawaiian Islands (Nihoa to Kure)  
 Any area that may be designated as a Marine Life Conservation District, Natural Area Reserve, marine sanctuary, etc., where fishing in general is prohibited.
5. Only turtles with upper shell lengths of 36 inches or more (straight line measurement) may be taken.
6. A turtle may be gutted and/or cut up into not more than five parts with one of the parts being the whole upper shell with the entire head attached, and all parts shall be kept together until the permittee leaves the shore area for his home.
7. The permittee shall not use nets for the taking of turtles.
8. The permittee shall accurately complete and submit the Green Sea Turtle Catch Report to the Division of Fish and Game no later than 10 days following the end of each month, regardless of whether he has or has not taken any green sea turtle during the month.

THIS GREEN SEA TURTLE PERMIT WILL BE CANCELLED IF THE PERMITTEE FAILS TO COMPLY WITH ANY OF THE CONDITIONS LISTED ABOVE.

I certify that I have read the conditions of this permit and provisions of Regulation 36:

\_\_\_\_\_  
 Signature of Permittee

Address: \_\_\_\_\_

District: \_\_\_\_\_ Island: \_\_\_\_\_

Phone: Business: \_\_\_\_\_ Residence: \_\_\_\_\_

*Sunao Kato*  
 \_\_\_\_\_  
 Chairman and Member  
 Board of Land and Natural Resources

By: \_\_\_\_\_

Issuing Agent

Issuance Date: \_\_\_\_\_



TESTIMONY BY GEORGE H. BALAZS, HAWAII INSTITUTE OF MARINE BIOLOGY,  
CONCERNING SENATE BILL 195 WHICH RELATES TO THE PROTECTION OF  
ENDANGERED WILDLIFE SPECIES

A need presently exists in the State of Hawaii for measures that will aid in the survival of wild animals that are faced with extinction. The provisions set forth in Senate Bill 195 fulfill this need, therefore, I strongly urge that you act favorably and expeditiously on this essential and worthy piece of legislation.

The importance of protecting the earth's vanishing wildlife populations has already been fully recognized by the Federal government. With the passage of the Lacey Act, the Marine Mammal Protection Act and the Endangered Species Act of 1973 (which replaced and strengthened the previous Act of 1969), Congress accepted, as a national responsibility, the task of aiding in the survival of the world's wildlife resources. Some of the important findings and declarations made by Congress in relation to these Acts were that:

1. Various species have been rendered extinct as a consequence of economic growth and development because of inadequate concern and conservation;
2. other species have been so depleted in numbers that they are in danger of or threatened with extinction;
3. species of wildlife are of ecological, educational, historical, recreational, aesthetic and/or scientific value to man; and
4. that the United States has pledged itself in the international community to help conserve the various species facing extinction.

Under the Endangered Species Act of 1973, animals that are considered to be in danger of extinction may not be legally imported into the country or transported across state boundaries in (interstate) commerce. Under the Lacey Act, wildlife that is taken in violation of any existing foreign law is also prohibited from being imported or transported between states. Both of these protective measures are designed to help safeguard depleted wildlife populations in the United States as well as in other countries. The present List of Endangered Fauna compiled by the Department of the Interior contains 109 animals which now receive this protection. Considering that this list is in the process of being updated, and that the Red Book Data of the International Union for the Conservation of Nature (a highly respected conservation organization based in Switzerland) presently consider more than 1,000 species to be faced with extinction, it would appear that many other members of the animal kingdom deserve, indeed require for survival, the protective laws available through our Federal government.



Although Federal laws ban the importation and sale across state boundaries of endangered species and their derived products, no provisions exist which deal with intrastate commerce, that is, commerce that apparently takes place only within the boundaries of a single state. Each individual state government must therefore assume the responsibility for assuring the survival of endangered animals by prohibiting sale within their respective jurisdictions. Some states (New York, Illinois, Delaware, Connecticut and California) have already taken this initiative by passing laws which complement and strengthen the Federal Acts. By passage of a similar measure such as the one now under consideration, Hawaii can also take an active and vital part in this conservation effort. Such action, when taken, will provide most welcomed assistance to Federal agents here in Honolulu who have the responsibility of enforcing wildlife importation restrictions.

Of considerable related interest to Senate Bill 195 is the cover-story of the January 6, 1975 Newsweek magazine. In this article, which focused the nation's attention on the timely subject of vanishing wildlife, a narration is given of man's seemingly unending "war" against the creatures of the wild. Commercial exploitation was again pointed to as being one of the most significant factors responsible for the destruction and decline of wild animal populations. Some of the products mentioned include tourists' curios carved from elephant tusks, garmets fashioned from newborn seal skins, jewelry made from tiger claws and teeth, stuffed sea turtles and crocodile shoes. A wide range of similar exotic luxury items are being offered for sale in Hawaii at this very time. For those committee members who have not had the opportunity to read this excellent Newsweek article, I have reproduced a limited number of copies for your information.

Thank you very much for allowing me the opportunity to discuss this important subject with you today.



TESTIMONY BY GEORGE H. BALAZS, HAWAII INSTITUTE OF MARINE BIOLOGY,  
CONCERNING THE NEED FOR STATE PROTECTION OF ENDANGERED WILDLIFE SPECIES

January 18, 1975

The cover story of the January 6, 1975 issue of Newsweek Magazine focused the nation's attention on the timely subject of the world's vanishing wildlife. In this article, which narrates man's seemingly unending "war" against the creatures of the wild, commercial exploitation was reiterated as one of the most important factors responsible for the destruction and decline of animal populations. Some of the products that are marketed include tourists' curios carved from elephant tusks, hats fashioned from newborn seal skins, jewelry made from tiger claws, guitar picks made from sea turtle shell and gourmet foods derived from other rare and endangered species. The evidence is clear; trade in wildlife products is rapidly and effectively helping to exterminate the animal kingdom. Through cash incentives, poor people in lesser developed areas are being induced to overexploit their valuable native resources in order to provide exotic luxury items for markets in "advanced" countries.

The need for protecting endangered wildlife has already been fully recognized by the U. S. Government. In the Endangered Species Act of 1973 (which replaced the previous Act of 1969), Congress found and declared that:

1. various species have been rendered extinct as a consequence of economic growth and development untempered by adequate concern and conservation;
2. other species have been so depleted in numbers that they are in danger of or threatened with extinction;
3. these species are of esthetic, ecological, educational, historical, recreational and scientific value;
4. the United States has pledged itself in the international community to conserve the various species facing extinction; and
5. that states should be encouraged to develop conservation programs which meet national and international standards.

Under this Act animals that are deemed to be threatened with extinction may not be legally imported into the United States or transported in interstate commerce. The present Federal List of Endangered Fauna contains 109 species which receive this protection. In view of the fact that the list has not been updated for two years, and that the Red Book Data of the International Union for the Conservation of Nature (IUCN, Switzerland) now lists more than 1,000 creatures threatened with extinction, it seems most likely that further additions will be forthcoming to the U. S. list.



Although federal law bans the importation and interstate sale of endangered species, no provisions exist which deal with intrastate commerce. Each state must assume the responsibility for assuring the survival of these animals by restricting sale within their respective jurisdictions. Some states have already taken this initiative by enacting legislation which bans intrastate sale, thereby complementing and strengthening the Federal Act. Among these states are California, Connecticut, Delaware, Illinois and New York.

In view of this action along with the growing concern among many citizens for perpetuating the earth's wildlife, it would certainly seem worthy for our legislature to give serious consideration to a comparable state endangered species protection law for Hawaii.



# Newsweek

## Wildlife In Danger

In the bush along Kenya's northern frontier, the poachers travel light, their equipment limited to a dagger, a pouch of tea and sugar, a sack of poron, perhaps, or a rifle, depending on their quarry. Nevertheless, leopards and other big cats have been almost wiped out in the area, so the poachers eagerly sought catch is elephants. For the wealthy poor Africans who stalk them, the great hunt is quite a game. Even in today's top-heavy commodity market, a pair of thousand birds can command \$2,800 in Hong Kong, where they are carved into tourist artifacts. This is more than the Kenyan game wardens charged with stopping the poaching can expect to earn in five years.

In Canada's Gulf of St. Lawrence, the hunters go out every spring in search of narwhal hump seals, whose fur is used for hats and coats. It is a bloody business. The baby seals are clubbed to death and skinned on the spot. Sometimes the skin-

ning knife is plunged into the animal before it is actually dead. The carcasses scream until death comes. The mother seals are driven off during the killing and missing. On occasion, they will come back to nurse the skinned carcasses of their offspring after the hunters have gone. In Indonesia, hunters seeking the seriously endangered orangutan (literally: man of the woods) use singular but equally brutal tactics: they shoot the mothers killing in the tree tops and try to catch the young as they fall. But many die.

In Hong Kong, old-fashioned Chinese governments least on such are endangered species of wildlife as the crab-eating mongoose, the river otter and the black dog deer—all supplied by dealers in mainland China. Most species of rhinos, tigers and the tiger are in danger of extinction. But throughout most of the Far East, pharmacists do a vigorous trade in ground rhinoceros horn and tiger whisk-

ers, thought by many to be powerful sex potions. At international airports scarcely a week passes without the arrival, dead, of numbers of rare or endangered wild creatures—killed usually by private collectors. In many cases they have been asphyxiated because of improper crating.

Last year, the producers of the television series "Born Free" had to import lion cubs from California to the Kenyan railroad town of Nairobi—where 80 years ago British settlers lived in fear of their lions from the hundreds of lion that roamed the area. In India, there were an estimated 40,000 Bengal tigers some 70 or 80 years ago. Today, only about 2,000 survive. Before the computer-aided census, there were perhaps 5 million vicuñas in the Peruvian Andes. Now there are fewer than 15,000; after all, before western man, vicuñas fleece commodities as much as \$700 a square yard. In the 1950s, members of the Lewis and Clark expedition saw great numbers of California condors. They called them "remarkably large buzzards." Now only 40 or 50 of the great birds exist.

There are only a few of the results of man's relentless and unending war against the creatures of the wild—and therefore against his own environment. The motivations for the slaughter are as various and perverse as human nature. Legal hunting and the illicit killing by poachers are one major cause. An even greater threat comes from man's ever-expanding need for more land to cultivate, which in turn strips away the habitat of the earth's wildlife. Poachers take their toll. So do roads, the pet trade and the demands of wildlife research.

Already, the Bird Data Bank of the International Union for Conservation of Nature and Natural Resources lists more than 1,000 creatures deemed threatened with extinction—some actually, some within a decade or so; many that 100 are native to the U.S. Among those creatures in the most immediate danger are almost all species of rhinoceros, the Bengal and Sumatran tigers, the Mexican grizzly bear, the red wolf, the mountain gorilla, the Arabian oryx, the Asiatic lion, the snow leopard, the delicate pronghorn native to Malawi, and the horn-billed ibis of Thailand and that rare beast, Prezewalski's horse.

The targets: Kenyan poachers remove the tusks from a dead elephant. Right, one of the last 2,000 tigers remaining in India is reflected in a pool at the Gedyu zoo.





was locally like passing through a vast zoological garden," wrote Theodore Roosevelt of a train ride through East Africa's second Akki Plain in 1899. Today, a traveler along the same route is likely to see tensely alert or sometimes fleeing animals. Tourist lodges have been forced to build watchtowers and salt licks to attract game for their patrons. But the priority of game has done little to discourage the African poachers. They take a huge variety of the beasts, especially the elephants, whose ivory brings in tens of dollars each year to poachers—and also to highly placed officials.

According to some specialists, even the legal ivory trade represents a danger to the elephant herds. "The whole system

standing of his environment and himself. But as the debate intensifies, so does the toll of animals—and the destruction knows no barriers of geography or ideology. In Asia even the giant panda, the latter-day symbol of Chinese friendship with Washington, is believed to be on the verge of extinction.

In South America, only 300 remains, and conservationists fear that any removal of the Cultural Revolution could spell the panda's doom through direct neglect. In Australia, the pouch-bear Tasmanian wolf is believed to be extinct, destroyed because it preyed on sheep, a handout nature known as the numbat is also headed for extinction. In Thailand, the gibbon has been dangerously reduced

good, is surviving along with a number of other vanishing species in zoos throughout the world (page 38), but only about 50 of the animals are thought to be at large in their native habitats.

The scope of the outrage has quickened the growing debate over how or whether endangered species can be protected and preserved. The world food crisis and the tail-spinning economies of the West have complicated the question. Some of the friends of the animals take a moral and almost atheistic stand. "If someone went out and destroyed a Brumby, everyone would scream," says Thomas Lovejoy, staff scientist at



DANGER ZONES: A gallery of 40 of the world's vanished creatures

by the export trade, which brings in perhaps three-quarters of a million dollars a year.

In South America, poaching and destruction of wildlife habitats are driving a vast army of species toward extinction. They include the tapir, otter, marsh deer, ocelot, wolf, jaguar, manatee, molly, eagle hawk and cheetah. At present, conservationists in Brazil are concentrating their efforts on saving the manatee, extinction looms as the Brazilian states, which is threatened by pollution and hydroelectric dams that block its spawning routes.

In Africa, the cradle of the world's wildlife, the encroachment of farmers and poachers have reduced the massive wildlife displays of just a quarter of a century ago to a special glimpse. "As we eat over the table's crocodiles it

the Washington office of the World Wildlife Fund. "But by destroying species, you're doing the same thing in an aesthetic sense."

Most scientists take a more practical view. Zoologists stress the scientific and ecological value of wildlife. Richard Van Gelder, a mammalogist at New York's American Museum of Natural History, puts it this way: "By exterminating species, we're destroying a source of knowledge, because animals have millions of years of experience in how to cope with the environment. Van Gelder also the case of bees, which let bees have passed a more accurate than any built by man. Much recent scientific experience (notably, the cancelled use of pesticides in medical research) suggests that many animals may hold the key to man's under-

Newsweek, January 6, 1975



The eye-eye (below) is close to extinction as a result of deforestation in its native Madagascar. Only heroic conservation efforts are likely to save this small primate, for hunting has seriously endangered the snow leopard (above), which inhabits such Asian mountain ranges as the Himalayas and the Pamirs. One species of sloth (above right) and the West African otter (right) are also on lists of endangered animals. The cod-chewing gnatcatcher (left) is protected from hunters in East Africa, and at present is in little danger of decline.







length. Thomson's gavel-like tool, which retails for about \$100.

Most Kenyan Government officials seem anxious to endorse their restrictions on the hunting of elephants for ivory, but the price of the tusks is so high and the controls so easily circumvented that huge amounts go out illegally to the ivory trade. Some comparative statistics are given in the accompanying table. The exports of ivory to Hong Kong in the amount of 140 tons. But the Hong Kong customs office reported the receipt in the same year of 223 tons of Kenyan ivory—a difference of more than 80 per cent. The conclusion seems obvious: either some Kenyan are getting bogus export permits, or some Kenyan officials are simply turning a blind eye, presumably for profit in the illicit trade.

**Depletion of habitat.** While legal and illegal hunting make a heavy dent in the world's wildlife resources, most zoologists agree that the major threat to animals today is destruction of their living space, through the expansion of man's growing population. The primary cause of environmental destruction, asserts one expert in the U.S. Office of Endangered Species, "Man's ability to destroy habitats has increased manifold over the past half century." This is particularly evident in the tropical rain forests, the Amazon alone contains a fifth of the world's species. In the desperate search for more arable land, farmers are converting wild areas to ever smaller farms. In Thailand's Pae & Yoban, farmers have slashed away

at the forest land and destroyed almost a third of the bees. It now seems doubtful that the gaffia, which feeds on juicy plants, leaves and stalks and uses the forest cover as a buffer against man, can survive in that area for very many more years.

**Scientific research.** Thousands of permits have been imported in past years into the U.S. and other Western countries for medical research, among them such endangered species as leopards and golden marmosets. However, the emergence of primate-breeding centers in these countries, together with a general leveling off of funds for U.S. medical research, seems to be reducing the effect of this threat.

**Zoos and the pet trade.** Mice are not generally endangered subjects of threatened species in recent years, except for breeding purposes. But some unscrupulous private zoos have continued to purchase exotic animals near the brink of extinction, such as the tiger and orang-utan. The augmentation of exotic animals as pet animals is also a cause for concern among wildlife biologists, who think that many species of parrots, parrots, lizards and fish have been gravely reduced in numbers as a direct result.

**Competition.** In such the same way that had many drives out grass, domestic animals introduced into new surroundings can eliminate the indigenous species. The dingo became extinct on the island of Mauritius because domestic pigs destroyed its nests. And today at least five species of a short-tailed bird called the rail are in jeopardy because rats, introduced into their habitats by man, eat their eggs.

**Pest control.** Attempts to destroy cockroaches regarded as pests are doing a variety of animals in the range of reptiles and amphibians. In two provinces of Argentina, the rare cougar is viewed as a nuisance to cattle, despite the aesthetic of naturalists to the contrary, a cougar head commands a healthy price of \$2,500. Chemical control of pests with such agents as DDT presents a threat to a variety of birds and other animals, the bald eagle and the humpback whale.

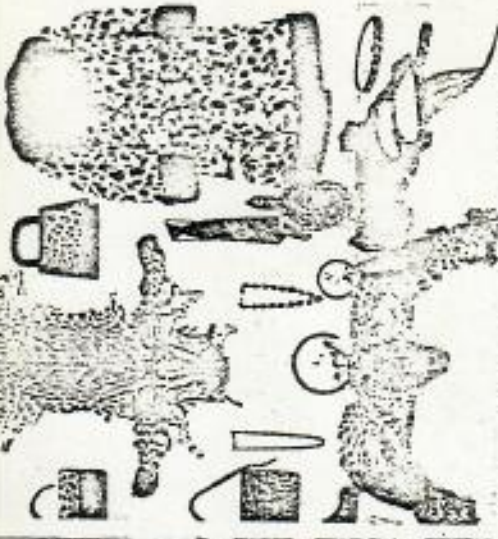
Ironically, animals can find protection when men are at war. Two years ago, members of a team from the U.S. National Science Foundation discovered that wildlife had fared better in Indochina because the war impeded economic development, halted man's encroachment onto the land and kept hunters out of the bush. Indochina is flooded from the suspension of tiger shoots. When men are busy exterminating his own

species, it seems, he has little time to kill animals.

There are other, more perceptible signs of hope for the world's wildlife. In 1973, delegates from 80 nations agreed on an international pact that could effectively eliminate commerce in a number of threatened species, including five types of whales, a variety of big cats, land turtles, parrots and certain monkeys. To date, seven countries have ratified the pact, which requires two ratifications to go into effect.

In the U.S., perhaps the most encouraging agency for preservation was the general Species Act. Under the act, the Department of the Interior gives absolute protection to any species that it terms "endangered," and as such protection on its reports deem desirable to animals on a list of "threatened species." For each listed animal, the department's Office of Endangered Species must come up with a plan to guarantee its survival.

With 100 animals already on the U.S. endangered list (including the Eastern timber wolf, the whooping crane, the Eastern cougar and the blue whale) and financial support at a minimum, this is a hard task. Biologists are working on a list of priorities for these creatures—under the critical eye of a variety of conservation and hunting groups. One major problem is the effect of government publicity on any particular creature's chances for survival. The Houston land has fewer champions than the Eastern timber wolf, explains biologist Earl Raybarger of the Office of Endangered Species, but the land is a much more common. "We're going to have pain and anguish in administering



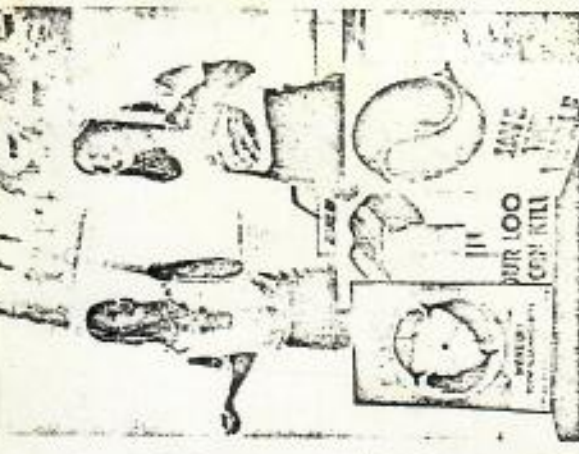
Half of smuggled profits, demonstrators against whaling

the whale show hope we will recognize that other forms of life have a right to exist."

The U.S. is not the only nation to tighten up on the legal protection of wildlife. Conservationists in Brazil have that a variety of strict laws may give some of that nation's endangered species the chance to survive, despite the difficulties inherent in enforcing practices who are sometimes abetting poachers. In the U.S., the U.S. Office of Endangered Species has established that local residents have called for new hunting seasons. In Israel, where just a few pairs of Nubian ibex existed in 1965, about a thousand of the goats now roam the wilds

of the real key to preservation of wildlife is the conservation of the dwindling natural habitats. "We must set aside areas for total protection in which human claims are only secondary," argues Dr. K.N. Reddy of the Wildlife Preservation Society of India. "We must ensure that places already allocated to wild animals and sanctuaries and set strictly as natural sanctuaries." There are hopeful signs that some of the nations with the most wildlife to lose are doing that. Despite the shortage of forest land, the Kenyan and Tanzanian governments have both given vast areas over to national parks. Says zoologist Peter Jarman, in India, the classic food shortages notwithstanding, refugees are being set aside for the few remaining tigers. Indonesia protects 30 Java one-horned rhinos on a West Java reserve, and has established a 12,000-acre reserve for orangutans in North Sumatra.

There is little doubt that adequate protection can bring some species back from the brink of extinction. In South Africa, for example, January 6, 1975



between Abu Gash and Elath. Certain other creatures, such as the Arabian oryx and New Doves, have managed to survive in zoos despite their virtual disappearance from the wild.

**B**ut however successful such breeding programs may prove, the difficulty of reintroducing once-wild animals into the wilderness seem to be insurmountable. "If wild species can cope with their natural habitat, they capture species from small breeding stocks or from farms likely to do so," explains biologist Bernard Slonek, chief of the Office of Endangered Species.

Thus, the only sure way of guaranteeing that the creatures of the wild retain their place in the ecology of the earth is to insure that they remain abundant in nature, without excessive disturbance from man. But with the earth's human population already at 3.9 billion and almost certain to rise to at least 6.4 billion by the end of the century, that prospect for the moment seems tragically remote. In the next few decades alone, for instance, millions more acres of wildlife habitat are certain to yield to the cultivators' plowshares. Some scientists share the ironic view of Keith Sedberry, former chief of the Office of Endangered Species, who points out that there are even hardy species, notably serpens and arapies, which were here long before man first appeared—and which may still be here long after he has gone.

THE HELPFUL HIPPO

The hippopotamus has a simple but significant role in the ecology of East and Central African waterways, as local residents learned to their cost. Hoping to reduce damage to their deerskin animal grazing land, they shot large numbers of hippos—but ended up with reduced supplies of grass-eating fish.





SIX-POINT PROGRAM FOR PROPOSED GREEN SEA TURTLE MANAGEMENT

STUDY IN THE HAWAIIAN ARCHIPELAGO

1. Conduct periodic intensive surveys, samplings and taggings at select feeding habitat locations adjacent to the major Islands (Kauai, Oahu, Molokai, Lanai, Maui and Hawaii).
2. Conduct seasonal intensive breeding and nesting studies at French Frigate Shoals.
3. Conduct land and aerial reconnaissance surveys directed at locating any remaining breeding and nesting activity in the major Islands.
4. Analyze existing and future turtle catch statistics and interview turtle fishermen.
5. Survey Northwestern Hawaiian Islands at periodic intervals to assess status of turtles (in cooperation with U. S. Fish and Wildlife personnel).
6. Conduct tagging studies at Midway and Johnston Atolls (in cooperation with resident personnel).

Essential biological information that will result from the study includes:

1. the proportion of the total population represented by each age group along with their abundance;
2. the distribution and range of the population;
3. the rate of individual growth and the sex ratios present;
4. the migratory patterns of each age group;
5. the reproductive potential and mortality factors that limit the population; and
6. the effects of man on the various population parameters.



TENTATIVE BUDGET FOR PROPOSED  
THREE YEAR GREEN SEA TURTLE MANAGEMENT STUDY

Item	Expenditures	
	Yearly	3-Year Total
Salaries and Wages		
Project Leader (1/2 time)	\$6,400	\$19,200
Research Assistant (1/2 time)	3,800	11,400
Consultants (turtle fishermen)	1,900	5,700
Student Help	1,200	3,600
Sub-total	13,300	39,900
Equipment and Supplies	1,575	4,725
Outer-Island Travel	500	1,500
Vessel Charter	750	2,250
Aircraft Charter	250	750
Publication Costs	75	225
Total	\$16,450	\$49,350

With the Hawaii Institute of Marine Biology (located on Coconut Island in Kaneohe Bay) as the center for project operations, various laboratory services and equipment will be available to the study at no direct cost. In addition, agencies such as the State Division of Fish and Game, U. S. Fish and Wildlife Service, National Marine Fisheries Service and Marine Options Program (Manoa and Hilo campuses) are anticipated to enthusiastically cooperate in the project, thereby providing additional indirect assistance.