

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.

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, 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 turtles 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 indicated 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.