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**RELATION OF THE ENDANGERED SPECIES ACT ON
CAPTIVE PROPAGATION OF WILDLIFE**

HEARING
BEFORE THE
SUBCOMMITTEE ON FISHERIES AND WILDLIFE
CONSERVATION AND THE ENVIRONMENT
OF THE
COMMITTEE ON
MERCHANT MARINE AND FISHERIES
HOUSE OF REPRESENTATIVES
NINETY-SEVENTH CONGRESS
SECOND SESSION
ON
U.S. POLICY RELATING TO RANCHING, FARMING, MARI-
CULTURE AND AQUACULTURE OF FISH AND WILDLIFE
AND THE ENDANGERED SPECIES ACT

OCTOBER 4, 1982

Serial No. 97-44

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Mr. BEAN. You could require it. You could require it at every level if you wanted to. I would question whether the proliferation of paper would result in a system that would be manageable. Indeed, that is more or less what is done with respect to scrimshaw, and it has not been manageable.

Mr. BREAUX. We have done it with scrimshaw. I know we just changed the regulations to require that. Hopefully it will work.

I think that is probably all the areas I wanted to get into.

With that, I appreciate, Mr. Weber, Mr. Bean, Doctor, your presentations and your being with us this morning.

Our next witness we would like to invite is Dr. Jim Wood, manager of the Cayman Island Turtle Farm.

Mr. WOOD. Thank you, Mr. Chairman.

Mr. BREAUX. Welcome.

STATEMENT OF JIM WOOD, MANAGER, CAYMAN ISLANDS TURTLE FARM

Mr. WOOD. Thank you, Mr. Chairman.

Mr. Chairman, I am Jim Wood. I am appearing today as the general manager of Cayman Turtle Farm, Ltd. I am essentially a zoologist. I have worked in sea turtle research for the last 14 years. The last 8 years I have been responsible for the research activities of the turtle farm.

I am grateful for the opportunity to express my views concerning captive breeding of sea turtles at our facility. I would like to present my written testimony and then just orally summarize it at this time, if I might.

Mr. BREAUX. Without objection, your entire statement will be made part of the record.

Mr. WOOD. First, I would like to establish that the operation in Cayman Turtle Farm is indeed a legitimate operation. It is no secret that during the years from 1968 through 1978, the turtle farm, originally Mariculture Ltd. then as Cayman Turtle Farm, Ltd. attained breeding stock and eggs from the wild. Such purchases were with the full consent of the governments from the countries involved and were legally imported into Grand Cayman.

I would like to emphasize that animals from the wild were acquired solely for the purpose of breeding and that a wild animal has never been processed and its product sold at the farm.

On the issue of self-sufficiency, from its inception in 1968, it was the intention of the turtle farm to develop a breeding herd to a level which would make the farm independent from wild stocks. This process due to biological constraints of the green sea turtle was a gradual one. The first known captive breeding of the green sea turtle occurred at the farm in 1973.

In 1975, the first successful reproduction by a female and male, both of which had been hatched and reared entirely in a captive environment, was achieved. By 1979, the reproductive success of our breeding herd was such that we had no need to make the egg purchases scheduled for 1979 and 1980.

During the last nine reproductive seasons, our hatching success varied between an overall hatch of 60 percent down to 17.

Reproductive performance of the been something of a disappointment that have been hatched and reared 0.3 to 33 percent. As I say, I would cess is less than initially projected, edge of factors affecting the repro far from perfectly understood.

We have had individual farm-re have had seasonal hatch rates as there is nothing inherent in our s prevents successful reproduction.

As with hatching success, survival seasons. Any intensive culture potential disease problems. We have ing and solving most of the major encountered. I am confident as w both our hatching success and survi

I would point out that we have, cient since March 1978, when the have released surplus stock number during the last 2 years. This year, 52,000 eggs and expect about 2,000 finishes.

Although our hatching is only a ticipate that this year we will prod lings.

On the issue of market stimulati versally accepted that the large wo icts has developed during the pas not a result of the activities of Cay vinced that the normal buyer of tu chase his stock from a legal sour supply and quality.

Our markets in the United Stat exclusively confined to areas wher tural heritage of turtle product us argued in a situation where a ma poached illegal product, the availa relieves at least some pressure on tl

In regard to monitoring, I would ment efforts are facilitated by a co products. However, the current exa icts illustrates that the controlled mountable enforcement difficulties.

We would be willing to cooperate to assure that our product labeling, recordkeeping assisted in the ident product.

I feel strongly that farming the aid the sea turtle conservation in relatively little was known of sea t great deal of research was necessa niques and admittedly we need to l ty such as ours offers at present a

You could require it at every station whether the proliferation in that would be manageable. It is done with respect to scrimshaw. I know we just had that. Hopefully it will work. As I wanted to get into. Mr. Bean, Doctor, your premises morning. To invite is Dr. Jim Wood, manager. nan.

NAGER, CAYMAN ISLANDS ARM

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to establish that the operation is a legitimate operation. It is not from 1968 through 1978, the turtle hatchery as Cayman Turtle Farm, which takes eggs from the wild. Such purchases of the governments from the island imported into Grand Cayman. Animals from the wild were acquired and that a wild animal product sold at the farm.

From its inception in 1968, it was to develop a breeding herd to a independent from wild stocks. Complaints of the green sea turtle captive breeding of the green

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Production by a female and male, and reared entirely in a captive facility, the reproductive success of which had no need to make the egg

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In seasons, our hatching success has dropped down to 17.

Reproductive performance of the farm-reared stock, however, has been something of a disappointment to us. That is from animals that have been hatched and reared on the farm, it has varied from 0.3 to 33 percent. As I say, I would acknowledge our hatching success is less than initially projected, but would point out the knowledge of factors affecting the reproductive process in sea turtles is far from perfectly understood.

We have had individual farm-reared stock [FRS] females which have had seasonal hatch rates as high as 85 percent indicating there is nothing inherent in our system of raising animals which prevents successful reproduction.

As with hatching success, survivability has varied within the various seasons. Any intensive culture system has associated with it potential disease problems. We have had good success in identifying and solving most of the major disease problems which we have encountered. I am confident as we learn more, we will improve both our hatching success and survivability of our animals.

I would point out that we have, in effect, been totally self-sufficient since March 1978, when the last egg purchase was made, and have released surplus stock numbering about 3,000 yearling turtles during the last 2 years. This year, we have already produced over 52,000 eggs and expect about 2,000 to 3,000 more before the season finishes.

Although our hatching is only about 50 percent complete, I anticipate that this year we will produce approximately 15,000 hatchlings.

On the issue of market stimulation, I would think that it is universally accepted that the large worldwide demand for turtle products has developed during the past several hundred years and is not a result of the activities of Cayman turtle farming. I am convinced that the normal buyer of turtle products will prefer to purchase his stock from a legal source which is consistent both in supply and quality.

Our markets in the United States prior to the ban was almost exclusively confined to areas where there was an established cultural heritage of turtle product use. It being perhaps reasonably argued in a situation where a market exists and is serviced by poached illegal product, the availability of a legal farm substitute relieves at least some pressure on the wild population.

In regard to monitoring, I would agree that, in general, enforcement efforts are facilitated by a complete ban on the sale of turtle products. However, the current example of trade in alligator products illustrates that the controlled trade need not result in insurmountable enforcement difficulties.

We would be willing to cooperate in any reasonable way possible to assure that our product labeling, documentation procedures, and recordkeeping assisted in the identification and monitoring of our product.

I feel strongly that farming the green sea turtle ultimately will aid the sea turtle conservation in the following ways: First, since relatively little was known of sea turtle biology when we started, a great deal of research was necessary in developing culture techniques and admittedly we need to learn yet more. A farming facility such as ours offers at present a unique opportunity for research

on many aspects of sea turtle biology. Granted, much of the research is aimed at solving practical farming problems, but we have found that often basic research is necessary before the practical problems can be solved.

The farm has in the past and continues at the present to offer our facility and research material to outside investigators. Over 60 scientific publications have been published either by the in-house research staff or by outside investigators using our facility or materials.

The farm certainly has contributed to local Caymanian sea turtle conservation by the release of approximately 3,000 yearlings into Caymanian waters during the past 2 years. Before this program was begun, it was a rare event to see a green sea turtle in local waters. Now local dive boat operators commonly report sightings of our turtles and I have personally seen and picked up animals that have been in the wild for over 1 year since they were released.

I am aware that there is some concern such releases will pollute the genetic composition of the Caribbean green turtle. I do not personally know of any scientific paper documenting a definite genetic difference between different populations of the Caribbean. I do suspect if such differences do exist, they are somewhat minor.

For example, the frequency of particular enzymatic alleles—and I would not think they would be of major concern to anyone except a populational geneticist. Unless it can be shown that there is a real chance such releases are detrimental to the population, the farm will maintain its policy of release rather than deliberately destroying excess animals.

As mentioned earlier, the substitution of farm turtle products for wild products will benefit the wild population. This has certainly been the case in Grand Cayman where the local population now relies upon the farm to satisfy the relatively large traditional demand. Another example of a conservation benefit of farming, the mere existence of a large number of animals confined in a controlled captive environment assures that the green sea turtle will not become extinct.

Prior to the U.S. ban the farm would have on hand between 50,000 and 80,000 animals at any given time. I would point out that the technology developed for commercial rearing could easily be used in a noncommercial way if funding were available to produce animals solely for release and restocking of the wild such as now done for a number of different types of animals.

The farm is involved in a cooperative program with the Mexican Institute. We have on hand a number of the Atlantic Ridley sea turtle. These were reared at Galveston, Tex., the first year, returned to Mexico, and then shipped to us. These belong to the Mexican Government but are being reared in Cayman in the hope we can establish when mature a viable reproductive population of this endangered species.

This completes my summary. I would be happy to answer any specific questions.

[The statement of Mr. Wood follows:]

PREPARED STATEMENT OF DR. JAMES
TURT

Mr. Chairman and Members of the

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PREPARED STATEMENT OF DR. JAMES R. WOOD, GENERAL MANAGER OF THE CAYMAN TURTLE FARM, LTD.

Mr. Chairman and Members of the Subcommittee:

My name is Jim Wood and I am appearing today as the General Manager of the Cayman Turtle Farm Ltd. I am a zoologist with a Ph.D. from the University of Arizona. My doctoral dissertation dealt with the nutritional requirements of green turtles and I have continued my research on green turtles for the past 12 years. During that time, I have authored and co-authored 19 papers dealing with various aspects of green turtles and have made presentations at several international workshops and meetings.

I am very grateful to you for this opportunity to express my views concerning captive-breeding of sea turtles at our facility in Grand Cayman.

The deliberations that have evolved around the U.S. ban on turtle imports have continued since 1978. Prior to that, I was involved in similar deliberations with the International Union for the Conservation of Nature and Natural Resources (IUCN) and other conservation groups. For all these years, the arguments against the Farm have consisted mostly of supposition, rumor and undocumented accusation. As the person who has been most intimately involved in the operation and research at the Farm throughout these years of speculation, it has been a harrowing and frustrating experience. Once again, I'd like to present the facts and the scientific evidence that I believe support the

Farm's position that the U.S. ban on maricultured products should be lifted.

Legality of Operations

First, I'd like to establish once and for all that our operations are and have been totally legal. The predecessor to Cayman Turtle Farm, Inc, was Mariculture Ltd., which began operations in 1968. Establishment of the Farm operation took place prior to the U.S. Endangered Species Act of 1973 (ESA) and prior to the establishment of the 1973 Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES). Those initial operations were conducted in the absence of any international convention and were not in violation of Cayman's, or any other country's, laws. Pursuant to the ESA, the Fish and Wildlife Service (FWS) and the National Marine Fisheries Service (NMFS) issued joint regulations in July 1978 that prohibited commercial trade in listed turtles with no exemption for specimens bred in captivity. It is this ban that we are seeking relief from today. Additionally, pursuant to CITES which allows commercial trade in species bred in captivity, a Conference of Parties was held in 1979 to clarify this terminology, and thus Conf. 2.12 was born. The Cayman Islands, which are a dependency of the U.K., became a party to CITES through the U.K. in May 1979, and the Cayman Portfolio of Agriculture, Lands and Natural Resources (Mr. McLean's Portfolio) became the Management Authority at that time. The Cayman Islands and the Management Authority of the U.K. believe that the Farm meets the definition of bred in captivity as established by Conf. 2.12 and that trade in its products

should be permitted under the

The 1978 regulatory ban and the at the heart of this entire collection of either turtles or eggs from the eggs from Suriname in March of established and before Conference from the Suriname Government a collected for commercial use. eggs, they would have been sold collection of these eggs was in scheme approved by the IUCN in collection through 1980. Eggs self-sufficiency of the Farm a turtles and eggs acquired from of the facility have been legal Cayman Islands and the country taken, and in accordance with been made through the government therefore, believe our current objective evaluation. While stocks, I would like to mention were acquired for breeding purposes the wild has ever been slaughtered.

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should be permitted under the Convention.

The 1978 regulatory ban and the 1979 language of Conf. 2.12 are at the heart of this entire controversy. The last acquisition of either turtles or eggs from the wild occurred with the taking of eggs from Suriname in March of 1978, before the ban was established and before Conference 2.12. The eggs were purchased from the Suriname Government and were from a group of eggs collected for commercial use. If the Farm had not bought the eggs, they would have been sold for food. Further, the collection of these eggs was in accordance with a collection scheme approved by the IUCN in 1975 that called for wild egg collection through 1980. Eggs were not needed after 1978 for self-sufficiency of the Farm and were not taken. Therefore, all turtles and eggs acquired from the wild throughout the operation of the facility have been legally acquired under the laws of the Cayman Islands and the countries where the wild animals were taken, and in accordance with CITES. These acquisitions have all been made through the government of the supplying country and I, therefore, believe our current stocks are "legitimate" by any objective evaluation. While I am on the subject of the wild stocks, I would like to mention that all animals from the wild were acquired for breeding purposes only; no animal taken from the wild has ever been slaughtered on the Farm and its products sold.

Self-Sufficiency

One of the most important issues concerning the U.S. importation ban is the question of whether the Farm is self-sustaining at present and, if so, whether it will continue to be self-sustaining. The obvious point of this question is the concern that the Farm might need to continuously replenish its breeding and egg stock with fresh acquisitions from the wild.

There has been no acquisition from the wild since 1978, that is, before the U.S. import ban and the 1979 CITES guidelines. It seems obvious that the Farm has been self-sustaining since 1978. To demonstrate as far as possible that the Farm will remain self-sufficient, our Farm breeding data will be provided for the record. To clarify the terminology used to describe our data, I would refer you to Table I which outlines these designations. I would like you to note that we are now using designations which were recently suggested by scientists from the U.S. Fish and Wildlife Service.

Our stock acquired from the wild were taken either as turtles or as eggs. The offspring produced from these animals bear a designation dependent upon their parental source. "E" designates turtles derived from a wild egg; "T" designates animals derived from a wild turtle. Thus, "EO" turtles were taken from the wild as eggs; "E1s" are offspring derived from the mating of "EOs" in captivity; "E2s" are offspring derived from the mating of "E1s" in captivity, etc. Also, "TO" turtles are wild turtles taken into captivity; "T1s" are the offspring of captive wild turtles

which mated at the Farm; "T2" in captivity.

Before I continue, it is appropriate to provide you with information concerning the growth of the species. A relevant thing to note is that the species has a long life span. Although the species, we do know that at least 8 years, with an average life span of one fact of turtle breeding efforts to breed the species. to mating takes at least eight

There has been much discussion of a "second-generation" turtles in the Cayman Islands Government and Authority). Instead of simply detail for you with breeding time-line.

We currently have T1's which indicate from observations me to believe we will have

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which mated at the Farm; "T2s" are the offspring of "T1s" mating
 in captivity.

Before I continue, it is appropriate to relate certain
 information concerning the green turtle life history. The
 relevant thing to note is that the green sea turtle is an animal
 with a long life span. Although much is still unknown concerning
 the species, we do know that sexual maturity does not occur until
 at least 8 years, with an average age of 12-14 years. This is
 one fact of turtle breeding that we are unable to control in our
 efforts to breed the species. Therefore, each time span from egg
 to mating takes at least eight years.

There has been much discussion concerning a so-called "second-
 generation". This discussion is futile for me to pursue in this
 forum, because there are differing opinions on this topic, both
 in the regulatory and scientific arenas, as well as numerous
 interpretations by various Management and Scientific Authorities
 of the signatory nations of CITES. According to the provisions
 of CITES, the determination as to whether the Farm is producing
 "second-generation" turtles is the responsibility primarily of
 the Cayman Islands Government (that is, Mr. McLean's Portfolio
 and Authority). Instead of stating my opinion on this matter, I
 will simply detail for you where the Farms' stocks are on their
 breeding time-line.

We currently have T1's which have mated, but have not nested.
 Indications from observations of this year's farm activities lead
 me to believe we will have T2 eggs in the next season, but I

obviously cannot guarantee this. Because of the long lead time involved in a turtle reaching maturity, our El's are still growing. Our first El's were hatched in 1975 and are now seven years old and approaching reproductive age.

I have no reason to believe that our Farm stock can not continue to produce new generations in captivity. Our Farm-reared animals continue to mate, nest and produce offspring every year. It is true that our animals have not produced as prolifically as first postulated by early predictions. Tables II and III present our early optimistic predictions and compare them to our production. Table II outlines this comparison for captive wild stock and Table III for farm-reared stock. Early predictions were admittedly overly optimistic, but there are several good reasons for our miscalculations. The field in which we are involved, reptile husbandry, and specifically sea turtle farming, is a very new and developing technology. We are, in fact, the pilot project for this effort and are very proud of our success. However, as with any new technology, there are disappointments.

The predictions presented in Table II and III were based upon our first experience with the nesting of a farm-reared turtle. It was discovered later, after a much broader baseline was established, that our first turtle was very unusual. She nested unusually early in life and was much more fertile than considerably older turtles. These anomalous data skewed our predictions quite severely. This first turtle nested at 8 years; the average nesting turtle needs more like 12 years. She also produced large amounts of eggs which displayed high hatchability

rates. The fertility of turtle progressive nesting activities for nesting females, eggs produced based on our first unusual turtle wrong. In other words, our rates are, in general, too optimistic hatchability.

However, you will note our occasionally low. But your hatchability was over 25%. A distinct trend established in turtle farming is a technology farm reared animals do not die due to lack of mating. We have reason that our farm turtles several hypotheses that we have experimented with the ratio pond; we have explored hormone and farm-reared stocks; at various possibilities until

Results for the 1982 season we were collecting eggs up hearing. However, it appears we have produced more eggs the eggs we have from our farm over 1981, which was a

Because of the long lead time to maturity, our El's are still hatched in 1975 and are now seven active age.

Our Farm stock can not continue activity. Our Farm-reared animals produce offspring every year. It is produced as prolifically as first Tables II and III present our compare them to our production. for captive wild stock and Early predictions were there are several good reasons and in which we are involved, y sea turtle farming, is a very are, in fact, the pilot very proud of our success. y, there are disappointments.

Tables II and III were based upon our of a farm-reared turtle. It broader baseline was was very unusual. She nested much more fertile than anomalous data skewed our first turtle nested at 8 years; more like 12 years. She also much displayed high hatchability

rates. The fertility of turtles appears to increase with age and progressive nesting activities. Therefore, our predicted numbers for nesting females, eggs produced, and percent hatchability based on our first unusual turtle were too large and simply wrong. In other words, our predictions are off by four years and are, in general, too optimistic for egg production and hatchability.

However, you will note our overall fertility rates are still occasionally low. But you will also note that in one year hatchability was over 25%. I can only conclude that there is no distinct trend established over time. Again, I must emphasize, turtle farming is a technology and a science in its infancy. Our farm reared animals do not display hoped-for fertility, primarily due to lack of mating. We have not definitively established the reason that our farm turtles are rather shy, but we do have several hypotheses that we are currently investigating. We have experimented with the ratio of male-to-females in a breeding pair; we have explored hormonal differences between captive wild and farm-reared stocks; and we will continue to investigate various possibilities until we have reached a solution.

Results for the 1982 season are still incomplete at this time, as we were collecting eggs up to the day I left Cayman for this hearing. However, it appears that we will have a good season. We have produced more eggs than ever before and hatchability on the eggs we have from our farm-reared stock is already improved over 1981, which was admittedly a poor year. We have

scientifically based expectations for a constant improvement in our production records as our stocks mature and as we increase our knowledge of their reproductive requirements and preferences.

To sum up this self-sufficiency question, a number of points come to mind. First, self-sufficient is a subjective term. People have tried to establish a numerical designation for Cayman Turtle Farm self-sufficiency. They have suggested that we will reach self-sufficiency when we produce so many turtles of such-and-such a generation. I do not feel this kind of number can describe self-sufficiency considering all the variables that we must deal with. Further, I reject such a designation imposed by people who undoubtedly do not appreciate what self-sufficiency might be in the instance of the Farm. As I have already mentioned, the Farm is developing the technology as it goes - we are the state of the art. Therefore, numbers at this point are just that, with little substance behind them.

The second point and the important one is the question of whether the Farm would resort to huge takings from the wild if it had a bad year and most or all of its hatchlings or harvest age turtles were lost. The Farm would not resort to such measures in any event for a number of reasons. Neither the Cayman Islands Government nor the governments of the other countries whose shores still harbor enough turtles to make such a taking possible would allow us to acquire such a number from the wild. If the ban were to be lifted, I am sure NMFS and FWS would require, as they should, that no such takings were performed within the

farming operation.

you might then ask how the Farm wiped out a year's hatch or several a year class. I can comfortably experience, since we have already years when our hatch was low, or greatly increased our mortality to identify the cause of any major of our ability to do so in the future. We have been able to modify marketing plans and have been compensated for, and this is the future in the event of a bad year. We have animals over the ensuing years. A "surplus" of animals to supply a depleted year class would have turtles would be perhaps a year and would, therefore, compensate animals by providing greater am

With these points, I feel comfortable. Currently self-sufficient; I expect breeding time line already detailed. We remain self-sufficient in the future.

Enforcement

Certainly one of the most complex against the importation of farm

farming operation.

You might then ask how the Farm would handle a disaster that wiped out a year's hatch or severely cut into the survivability of a year class. I can comfortably answer that question from experience, since we have already encountered and survived, bad years when our hatch was low, or some factor, such as disease, greatly increased our mortality rate. We have always been able to identify the cause of any major mortality and we are confident of our ability to do so in the future. Additionally, we have been able to modify marketing procedures so that bad years have been compensated for, and this procedure would be followed in the future in the event of a bad year. We would simply harvest fewer animals over the ensuing years to create an "overflow" or "surplus" of animals to supply the harvest for the year when the depleted year class would have reached market size. The surplus turtles would be perhaps a year older than the usual market size and would, therefore, compensate for the smaller number of animals by providing greater amounts of meat, leather, oil, etc.

With these points, I feel comfortable in saying the farm is currently self-sufficient; I expect it to continue along the breeding time line already detailed; and I expect the farm to remain self-sufficient in the future.

Enforcement

Certainly one of the most complex and most valid arguments against the importation of farm products of an endangered species

into the U.S. is that of enforcement. How are the appropriate officials to differentiate between a turtle product originating from a government supervised operation, such as the Cayman Turtle Farm, and a turtle product taken from the wild by a poacher and smuggled into the country. The question deserves serious consideration, but we feel the answer can be arrived at without prohibitive measures.

One way of dealing with the situation, which we feel has a lot of promise, is the use of a rather complicated but effective paperwork routine. Such a paper trail has been used in documentation for farmed alligator products in the U.S. We believe the case studies for the two products to be somewhat similar; the alligator example could serve as the model for future investigation into this possibility. Such a paper trail would involve marking shipments such that U.S. officials through a simple phone call could receive confirmation from the Cayman Islands Government as to whether a suspect shipment had indeed originated at the Farm.

Another market enforcement possibility would involve putting a specific chemical signature into the turtle meat, leather, shell, and oil. This could theoretically be accomplished by the use of a chemical marker, possibly certain fatty acids, placed in the feed given to the animals shortly before slaughter. Chemical analysis would then clearly identify farm-reared turtle products from that taken in the wild. We at the Farm are willing to

undertake the necessary research and signature process.

Tests have already been devised which differentiate between the shells of those of other species, such as the test is used to examine the amino acids in the shell. Further, the Farm also produces tortoiseshell jewelry with its own CITES certificate for identification of products. Each certificate is signed by the Principal Secretary of the Ministry (deputized by him) and by the Chief Officer.

Similar markings could conceivably be used to seal stamp on skins, whole shells, taxidermied/ freeze-dried turtle products. Procedures on our skins as the authorities of Europe, Japan and Mexico do not

Because skins are often not used, therefore, a trademark could be established to have the tanners incorporate a mark in the tanning process to invisibly cover the

Whole shells and scutes could be similarly marked. Again, current markets do not

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 such as the Cayman Turtle
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 y. Such a paper trail
 U.S. officials through
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 t shipment had indeed

ould involve putting a
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 omplished by the use of
 ty acids, placed in the
 e slaughter. Chemical
 a-reared turtle products
 ne Farm are willing to

undertake the necessary research efforts to find and prove such a
 signature process.

Tests have already been devised which allow for easy
 differentiation between the shells of the green sea turtle and
 those of other species, such as the hawksbill. A simple chemical
 test is used to examine the amino acid patterns in the keratin of
 the shell. Further, the Farm already hallmarks its gold and
 tortoiseshell jewelry with its own cartouche and has adopted the
 FRES certificate for identification of its maricultured
 products. Each certificate is individually signed by the
 Principal Secretary of the Management Authority (or someone
 deputized by him) and by the Chief Agricultural and Veterinary
 Officer.

Similar markings could conceivably be initiated by means of a
 seal stamp on skins, whole shells, scutes, belly shell, and
 hide/ freeze-dried turtles. We have not begun such
 procedures on our skins as the authorities in our current markets
 of Europe, Japan and Mexico do not require any special markings.
 Because skins are often not used in their entirety anyway and,
 therefore, a trademark could be excised, it would be preferable
 have the tanners incorporate a form of watermark during the
 tanning process to invisibly cover the entire skin.

Whole shells and scutes could be similarly marked for sale in the
 Again, current markets do not require such a marking and

the Farm has not initiated such. Scutes are usually cut into small pieces for jewelry and markings are not practical. The Farm would recommend concentrating on the jewelry manufacturer for individually tagging those products.

In short, there are a myriad of methods and techniques that might be employed to solve the enforcement problems. A number of these techniques, such as chemical signatures and elaborate paper trails, offer considerable promise in meeting the challenge. The Farm stands always ready to cooperate and assist in any endeavor to ensure proper identification of its products. In this regard, we would welcome an on-site representative of the U.S. Government to monitor the Farms' activities and assure compliance with mutually agreed upon regulations. This monitoring could occur periodically or, if deemed necessary, could even be continuous with an official who would remain on the premises. However, in the latter case, we would suggest that the official be someone with a scientific research background who could be involved in research activities at the Farm, in addition to his monitoring duties.

Market Demand

The world market for turtles and turtle products has existed for centuries, and still exists today. We long ago passed the point at which the green sea turtle could satisfy the demands of this market without becoming depleted, especially as much of the turtles' breeding beach habitat became unusable to them because of man's presence. Of course, as the population of turtles fell,

the gap between demand and ability to supply has widened, and the further decline in the species on hand here today.

In order to save the turtle from extinction, we have wisely chosen to reduce the taking of wild turtles and intentions of reducing the catch levels have not been translated into efforts of many countries to halt the export of turtle eggs through strict prohibitive laws of international trade, wild sea turtles, and their products throughout the world. Even in the United States and strict conservation laws are in effect, a flourishing illegal market for turtle products exists. The seizures of large shipments of turtle products have occurred.

The problem is, of course, that a large market for turtle products in the U.S. and elsewhere has created a situation that has been found with other animals, such as ostrich, and many others. It has been found that to totally suppress the demands for these products is not a solution.

Fortunately, we do not need to suppress the demand for the conservation of turtles.

the gap between demand and ability to fill the demand without further decline in the species only widened. That is why we are here today.

In order to save the turtle from further decline and possible extinction, we have wisely chosen to protect his breeding habitat and reduce the taking of wild turtles. Unfortunately, our best intentions of reducing the catch of wild turtles to acceptable levels have not been translated into reality. Despite the best efforts of many countries to halt taking of sea turtles or turtle eggs through strict prohibitive legislation and the termination of international trade, wild sea turtles are still taken in great numbers, and they and their products reach many eager markets throughout the world. Even in the U.S., where importation bans and strict conservation laws are strongly enforced, there is a flourishing illegal market for turtle products as witnessed by the seizures of large shipments of illegal turtle meat that have occurred.

The problem is, of course, that an unsuppressed demand exists for turtle products in the U.S. and elsewhere. This is the same situation that has been found with other wildlife for which substantial traditional markets exist, such as the alligator, the ostrich, and many others. It has simply proven to be impossible to totally suppress the demands of such traditional markets.

Fortunately, we do not need to rely on the suppression of demand for the conservation of turtles. Instead, we can seek to satisfy

that demand from farmed stocks as we do in Cayman itself. Every turtle that we sell in this traditional market reduces pressure on the wild turtle. If turtle products are once again legally permitted into the U.S., it has been suggested that the market demand would be stimulated to such a degree that poaching and smuggling of wild turtles would increase. I do not believe there is any substantive evidence that this will happen. In fact, many wildlife conservationists and economists are convinced that the evidence points to just the opposite. The availability of a reliable, high quality, legal product will take pressure off wild stocks by satisfying a portion of the existing demand. It is unlikely that farmed products will quickly be able to satisfy all of the existing market for turtles and turtle products. This ultimate goal will only be reached after the Cayman Farm, and possibly ranches and farms to come, have had time to grow and create a stable balance between farm supply and market demand.

I want to make it clear that I am not advocating farming as the only means we should apply to ensuring future wild stocks of turtles. Breeding habitat protection and restoration, headstarting, ranching, and vigorous enforcement of strong national conservation and trade controls for wild stocks must continue.

Our experience in Cayman concerning the replacement of existing wild stocks in the market may be a good illustration that farmed turtles will not stimulate demand for wild stocks. From April 1979 to March of 1982, the Farm supplied the Cayman market with

31,000 pounds of turtle meat and is primarily marketed to the local market. This testimony is a copy of a letter from one of our local restaurants expressing satisfaction of this establishment's use of turtle products. This restaurant is one of many which have replaced the wild turtle on their menus with our Farm products. At our steak market, we sell turtle stew, averaging 1,500 pounds a month, to the Island market. Again, because turtle is not to be relinquished by the Caymanians, this represents a significant number of the wild turtle and one that we hope to replace by the Farm's production.

Conservation

This discussion brings me to the ground conservation of the turtle. Proponents of the Farm to that end. Proponents of the Farm makes little or no contribution to the ground conservation of the turtle. I like to present the evidence to support the Farm's extensive contributions to ground conservation of the turtle.

as we do in Cayman itself. Every additional market reduces pressure on products are once again legally been suggested that the market such a degree that poaching and increase. I do not believe there this will happen. In fact, many economists are convinced that the opposite. The availability of a product will take pressure off wild of the existing demand. It is all quickly be able to satisfy all turtles and turtle products. This started after the Cayman Farm, and come, have had time to grow and farm supply and market demand.

am not advocating farming as the ensuring future wild stocks of protection and restoration, rigorous enforcement of strong controls for wild stocks must

ening the replacement of existing a good illustration that farmed and for wild stocks. From April supplied the Cayman market with

11,000 pounds of turtle meat and edible products. This quantity is primarily marketed to the local restaurants. Attachment 1 to this testimony is a copy of a letter to the Subcommittee Chairman from one of our local restaurants, which details the thorough satisfaction of this establishment with Cayman Turtle Farm products. This restaurant is one of the many fine establishments which have replaced the wild turtle traditionally appearing on their menus with our Farm products. In addition to this turtle steak market, we sell turtle stew, at present approximately 2000 pounds a month, to the Island population for whom this is a traditional food. We average 1,500 Farm turtles per year sent to market. Again, because turtle is a traditional food that will not be relinquished by the Caymanian people or our many visitors, this represents a significant number of turtles that remain alive in the wild. This is a significant contribution to the conservation of the wild turtle and one that we can enlarge upon with scaled-up production by the Farm.

Conservation

This discussion brings me to the controversy that has centered around conservation of the turtle and the contribution of the Farm to that end. Proponents of the U.S. ban claim that the Farm makes little or no contribution to turtle conservation. I would like to present the evidence to support my view that the Farm has made extensive contributions to turtle conservation over the years:

1) We are currently rearing some forty Kemp's Ridley turtles, an endangered species. We acquired these turtles as yearlings from the Mexican government after they were raised from eggs by the Galveston, Texas, National Marine Fisheries Service Sea Turtle Headstart Program. These turtles belong to the Mexican Government who gave the eggs to NMFS and who have now entrusted us to raise them to sexual maturity. The Farm is maintaining these turtles at the request of the Mexican Government for use as a future breeding stock. Since the turtles nest on only one beach, Rancho Nuevo in Mexico, the population is very vulnerable to natural and man-induced disasters. The 1979 IXTOC oil spill in the Gulf was a case in point where the population was severely threatened; the total effect upon this population has still not been assessed.

2) The Farm has already filled some markets which were previously dependent on wild stocks. As already stated, turtle meat has always been a part of the traditional Caymanian diet. The people of Cayman favored meat from wild turtles and were reluctant to use farmed stocks. However, the Farm was successful in demonstrating to the people and to the local restaurateurs that the farmed product was superior to the wild product, both in terms of conservation of a national resource and in taste and convenience. I would again reference my previous discussion of this point and Attachment 1. In 1978 the Farm lobbied in favor of the

Cayman Islands Marine Regulations, which though traditional under Caymanian law turned to the Farm as a marketing product.

3) The Farm has been operating since 1976. Initially, the Farm was a farming endeavor bought from the Suriname programs. The Farm was inundated and, though we had not purchased from the Suriname program, we had not purchased from the Suriname program. The Farm was returned to the wild.

Currently, the Farm is operating a program which is financially and technically supported by the technology performed by the Farm. A copy of a statement from the Suriname program requested extensive information. The Farm will respond.

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Cayman Islands Marine Conservation (Turtle Protection)
Regulations, which protect wild breeding females. Even
though traditional subsistence taking of turtle is allowed
under Caymanian law, the local people and restaurants have
turned to the Farm for a consistent, convenient and good-
tasting product.

3) The Farm has supported Suriname conservation efforts
since 1976. Initially the Suriname Government supported the
farming endeavor in Cayman. In 1978, eggs and turtles were
bought from the Suriname Government for the Farm's breeding
programs. The Farm's last purchase of wild eggs was in 1978
from Suriname beaches that would probably have been
inundated and, therefore, these eggs would have been lost if
we had not purchased them. Additionally, whenever eggs were
acquired from the wild, a percentage of the hatchlings were
returned to the country of origin for release back to the
wild.

Currently, the Government of Suriname has a conservation
program which the present owners of the Farm have supported
financially and which has been greatly aided in its efforts
by the technology developed and scientific research
performed by the Farm. Attachment 2 to this statement is a
copy of a statement and paper by the Director of the
Suriname Program. The Suriname Government has recently
requested extensive assistance with their operation, and the
Farm will respond if the personnel can be spared.

4) The Cayman Farm also has a conservation program of releasing turtles to the wild. I know there are arguments made against the release of CTF turtles, but I reject that argument for reasons which I will state later. The Farm has released approximately 3,000 turtles since 1980. That number, of course, includes large scale releases made in the last two years because of excess hatchling production. However, the Farm has had a release program for a number of years both in Grand Cayman and in countries from whom we had obtained eggs.

In countries that had provided us with eggs, we released yearlings that were hatched from wild eggs taken from that country. These represented either a 100% increase from eggs that were doomed or a probable net increase over the percentage of turtles that would have survived in the wild if the eggs had been left.

In the case of releases on Grand Cayman, it is believed the indigenous population of the islands has been virtually depleted. Locally released turtles have been sited around the islands by scuba divers, and we believe the turtles will mature, breed, and aid in the restoration of the wild population. The Farm and the Cayman Government are considering a program to document the location and feeding habits of these released turtles, if research funds can be made available.

5) The Farm is working in concert to investigate the status of the Cayman Islands S of the Western Atlantic Turtle effort to establish the status am the scientific advisor for a result of this survey, a discovered on a little-utilized

6) Certainly, I believe that pressure off the wild stocks. turtle products of all sorts countries alike. Every turtle thoroughly used: the shell, etc. -- even parts of the visc contribution to scientific re situation in the wild, where meat or shell alone. Certainly animal that we slaughter for pressure on the wild stocks.

To sum up all these efforts, I believe contribution to conservation, both the assistance it lends to other committed to turtle conservation

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5) The Farm is working in concert with the Cayman Government
to investigate the status of wild populations around the
islands. The Cayman Islands Survey of Sea Turtles is a part
of the Western Atlantic Turtle Symposium, a wide-scale
effort to establish the status of sea turtle populations. I
am the scientific advisor for the Cayman Islands Survey. As
a result of this survey, a rare loggerhead nest was recently
discovered on a little-utilized beach on Grand Cayman.

6) Certainly, I believe that the sale of our products takes
pressure off the wild stocks. There does exist a market for
turtle products of all sorts in advanced and third-world
countries alike. Every turtle that we sacrifice is
thoroughly used: the shell, meat, oil, leather, calipee,
etc. -- even parts of the viscera are used for local sale or
contribution to scientific research. This is not the
situation in the wild, where an animal may be killed for the
meat or shell alone. Certainly, it is possible that every
animal that we slaughter for sale of its products relieves
pressure on the wild stocks.

To sum up all these efforts, I believe the Farm makes a strong
contribution to conservation, both through its own practices and
the assistance it lends to other countries. The Farm is
committed to turtle conservation wherever possible.

Scientific Research

Charges have been made that the Farm's research has only been of benefit to the commercial facets of our operation. Some have said the research contributes little to conservation of the species. Others have said the research contributes to the conservation of the species, but could be performed outside a commercial operation; and others have said the whole topic is irrelevant. Having headed the research program at the Farm for the last 8 years, I feel eminently qualified to speak about this issue.

The in-house staff of the Farm performs a great deal of its own research, much of which is basic research without commercial application. Certainly much of our research also generates information that has commercial applicability. However, this commercially-important research and our basic research also has applications to, and implications for, the wild population. The Farm also sponsors and funds research by scientists outside the Farm who do work we are particularly interested in: again, some is purely basic research and some has both commercial and conservation applicability. We also aid numerous scientists by affording them research facilities at the Farm and sending turtles and/or other research materials to their labs. We do not aid scientific research which only has commercial implications - we support turtle research of all kinds. I might add at this point that with the U.S. ban, scientists must obtain a permit through the Endangered Species Act to receive turtles or turtle tissues from our facility. This is a cumbersome duty and

lands uncertainty to any long-term scientists, and especially graduate students, who wish to initiate turtle research with this

the research we have performed, spanning the gamut through all facets of turtle biology. Publications have been produced in the fields of genetics, endocrinology, pathology, immunology, nutrition, histology, population biology, paleontology, physiology, anatomy, environmental

These papers have appeared in refereed journals and proceedings. Many authors have presented at international workshops and conferences, encouraged scientists to publish research, and with the Farm's assistance. The Farm has been open and stimulating

The ban will eventually cut off the economic restrictions. If the Farm of science would lose a research productive, and also lose a ready independent of wild populations.

The potential for future research to increase the production and survival of wild green turtles is high. This is directly applicable to other species

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m performs a great deal of its own sic research without commercial of our research also generates al applicability. However, this ch and our basic research also has ions for, the wild population. The research by scientists outside the cularly interested in: again, some some has both commercial and e also aid numerous scientists by ities at the Farm and sending materials to their labs. We do ich only has commercial le research of all kinds. I might e U.S. ban, scientists must obtain d Species Act to receive turtles or ty. This is a cumbersome duty and

and uncertainty to any long-term research. Therefore, scientists, and especially graduate students, hesitate to initiate turtle research with this burden imposed upon them.

the research we have performed, sponsored, and assisted has run the gamut through all facets of turtle biology. Over 60 publications have been produced through this research, spanning the fields of genetics, endocrinology, blood chemistry, pathology, immunology, nutrition, etiology, reproductive biology, histology, population biology, paleoecology, release studies, physiology, anatomy, environmental biology, and biochemistry. These papers have appeared in refereed journals, publications, and proceedings. Many authors have also made presentations at international workshops and conventions. The Farm has always encouraged scientists to publish research performed at the Farm and with the Farm's assistance. The research atmosphere at the Farm has been open and stimulating.

The ban will eventually cut off the Farm's research due to economic restrictions. If the Farm ceased operations the world of science would lose a research facility that has been highly productive, and also lose a ready source of turtles for research, independent of wild populations.

The potential for future research gains which can be applied to increase the production and survivability of both maricultured and wild green turtles is high. Further, this research could be directly applicable to other species of turtle and other

reptiles. The proven success of the Farm in the captive breeding and maintenance of threatened and endangered species is of paramount importance to turtles, some species of which could disappear from the world's oceans with a single disastrous incident, such as the large oil spill in Mexican waters in 1979 which threatened the only breeding beach of the Kemp's Ridley turtle.

All of this research could have been performed by other than a commercial operation. However, we are all aware of the scarcity of money to conduct research in areas that are not commercially applicable. This is a fact of modern society. The greatest progress in technology and scientific investigation has been in areas that have monetary rewards. I do not feel that research conducted, funded, or assisted by a commercial operation is in any way tainted. It is valid, useful information for the commercial breeder, the conservationist, researchers in many endeavors, and, lastly, the turtle. If continuance of the ban prevents the continuance of this science, the subject can hardly be irrelevant to this discussion.

Gene Pollution

As mentioned earlier in my testimony, the Farm does have a release program which I believe is a valid contribution to the effort to rebuild the Cayman Island green sea turtle population. As also alluded to earlier, there are opponents of this program. Some have suggested that turtles from different geographic areas might have substantially different genetic makeups and that

animals mating from different are since the Farm has breeding stock Caribbean and Western Atlantic, p that release of turtles of mixed might mate with wild turtles, an wild sea turtles.

There are three major population Caribbean and Western Atlantic: Rica. I know of no scientific p genetically demonstrated differe groups. In fact, I have only se address this question at all. Implications of Genetic Variabi. Turtles," by Michael Smith, et. a of Game Biologists, presents da derive from interbreeding varie From that paper:

"If part of our management plan variability in local population be carefully designed to preserve heterozygosity. Stocking with would probably result in increase heterozygosity...Heterozygosity characteristic positively correlate reproductive rate. ... High h with maximum genetic variability

bank concept."

Even if it is assumed that a genetic difference does exist between the populations, the degree of difference is important in assessing the detrimental effects of such mixing. If such differences exist, I expect they will be confined to specific bio-chemical parameters such as enzymatic alleles, and be of little practical importance.

Assuming the worst case scenario that there are genetic differences, I still feel the cause of conservation of these animals is better served by release of excess stock into the waters rather than simply destroying them. The fact remains the green sea turtle has been listed as threatened with extinction and there are few, if any, of the indigenous population remaining in the waters surrounding Grand Cayman. We have released turtles in the hope that they will remain and re-establish a local population. I do feel strongly that this question is really a non-issue in these deliberations; however, plans for any large release of turtles this year do involve the release of animals derived solely from a single geographical population. These turtles will come from the Farm's Mexican breeding stock, the population closest to the Island's own population.

Inbreeding

A final argument raised against the Farm is that of inbreeding. Again, I do not consider this a problem at the Cayman Turtle Farm. Our breeding herd originated from various geographic locations around the region so that we already have a much

broader genetic base to help in other situations. Secondly, until they are an genetic damage by inbreeding small. I would also point individuals involved in a

Although I do not feel the inbreeding, I think it is and Conf. 2.12 permitted of stock from the wild to though I am convinced this species with shorter devel sea turtle, it is a practi

In summation, I would like sufficient arguments against products into the U.S. to ban. To the contrary, I am lifting the ban. I can reasonably can to insure CITES and all applicable situation that exists at further questions.

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broader genetic base to begin with than you might encounter in
 other situations. Secondly, because turtles do not reach sexual
 maturity until they are an average of 12 years old, the risk of
 genetic damage by inbreeding with our current stock is very
 small. I would also point out that we can usually select the
 individuals involved in a mate.

Although I do not feel the Farm has to be concerned with
 inbreeding, I think it is worth noting that the framers of CITES
 and Conf. 2.12 permitted the "occasional" taking of small amounts
 of stock from the wild to prevent inbreeding problems. Even
 though I am convinced this provision was for the benefit of those
 species with shorter development life histories than the green
 sea turtle, it is a practical, well-reasoned approach.

In summation, I would like to say that I do not feel there are
 sufficient arguments against importation of maricultured turtles
 products into the U.S. to justify continuation of the present
 ban. To the contrary, I feel there is ample reason to warrant
 lifting the ban. I can assure you that we will do all that we
 reasonably can to insure that our operation complies fully with
 CITES and all applicable laws. I hope that I have explained the
 situation that exists at the Cayman Turtle Farm and invite any
 further questions.

TABLE I
TURTLE BREEDING DESIGNATIONS

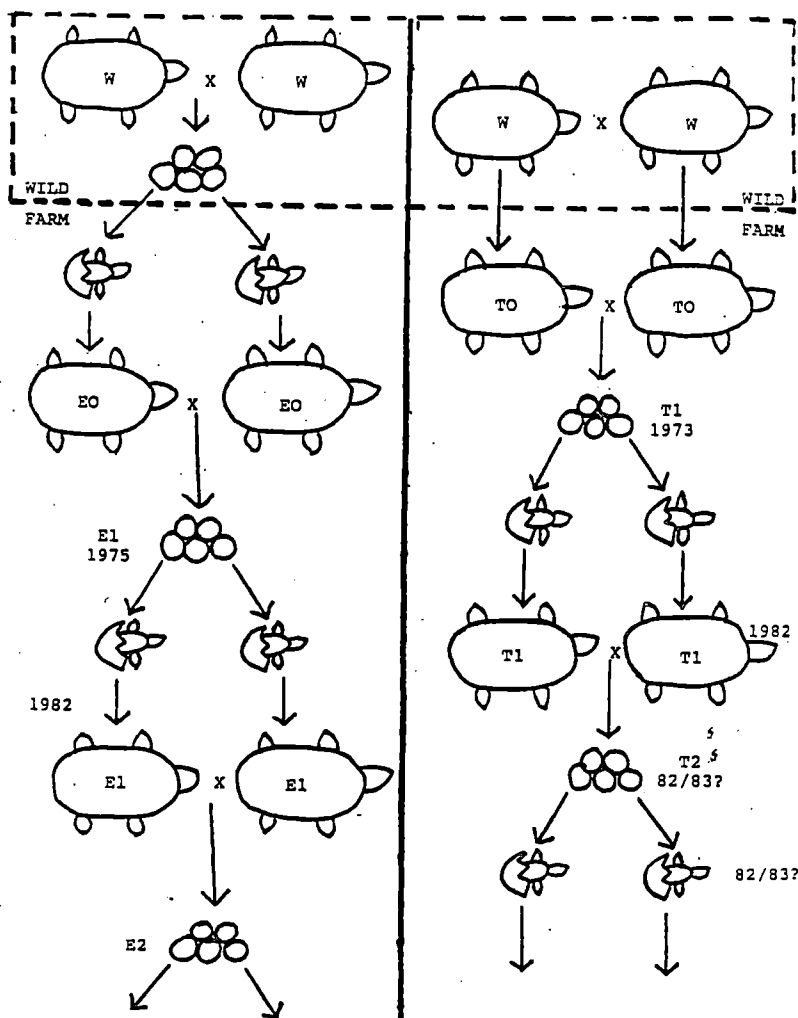


Table II. Projected vs
Captive Wi

Year	Number of Females*		Num
	Projected	Actual	
1976	18	27	12.6
1977	20	44	14.0
1978	20	43	14.0
1979	20	61	14.0
1980	20	63	14.0
1981	25	42	17.0
1982	25	59	17.0

* Number of females nesting.

Table III. Projected
Farm Rear

Year	Number of Females*		Num
	Projected	Actual	
1976	2	2	1.2
1977	5	4	3.0
1978	16	18	9.6
1979	48	27	28.8
1980	80	34	48.0
1981	110	24	66.0
1982	133	35	79.8

* Number of females nesting.

TABLE I
BREEDING DESIGNATIONS

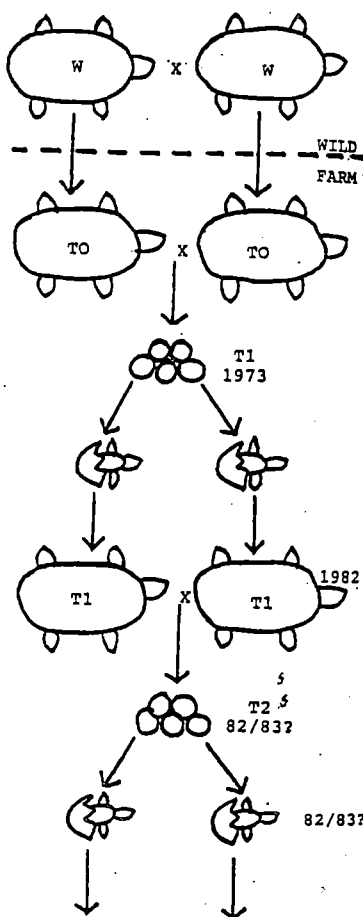


Table II. Projected vs. Actual Production
Captive Wild Stock

Year	Number of Females*		Number of Eggs		Hatchability	
	Projected	Actual	Projected	Actual	Projected	Actual
1976	18	27	12,600	14,569	50%	36%
1977	20	44	14,000	32,569	55%	60%
1978	20	43	14,000	29,671	60%	50%
1979	20	61	14,000	37,944	60%	31%
1980	20	63	14,000	34,740	60%	26%
1981	25	42	17,500	24,900	60%	20%
1982	25	59	17,500		60%	

*Number of females nesting.
OVER

Table III. Projected vs. Actual Production
Farm Reared Stock

Year	Number of Females*		Number of Eggs		Hatchability	
	Projected	Actual	Projected	Actual	Projected	Actual
1976	2	2	1,200	617	50%	8.3%
1977	5	4	3,000	739	55%	3.2%
1978	16	18	9,600	4,322	60%	25.8%
1979	48	27	28,800	8,462	60%	7.1%
1980	80	34	48,000	8,853	60%	4.2%
1981	110	24	66,015	8,725	60%	0.3%
1982	133	35	79,800		60%	

*Number of females nesting.



ATTACHMENT 1

P.O. BOX 504, PHONE: (809) 949-2593, TELEX: 4346 CARCLUB C.P.
GRAND CAYMAN, BRITISH WEST INDIES

October 1, 1982

Mr. John Breaux, Congressman
U.S. House of Representatives

Dear Mr. Breaux,

My name is Johann Guschelbauer, I am Restaurant Manager of the Caribbean Club, a restaurant of renown in Grand Cayman. I have been acquiring Turtle Steaks used in my restaurant from the Cayman Turtle Farm since 1974, prior to that time I used Turtle that was from the wild.

I have found the Turtle Steaks from the Farm to be of consistently good quality and have been very pleased with them. The steaks taste as good as the wild product and my customers have been very happy with this Farm product on my menu.

It has been a pleasure for me to deal with the Cayman Turtle Farm which has always presented me with a reliably good product which was easily obtained and which was not acquired in violation of the Caymanian Turtle Protection Laws.

Best regards,

Johann Guschelbauer
Johann Guschelbauer
Restaurant Manager

JG/cp

FOUNDATION FOR NATURE

ATTACHMENT
Para

P.O.B. 436 PARAMARIBO
Tel. 75845

Use landmark
Your reference
On landmark
Our reference

"STATEMENT OF HENRI ANJ"

BEFORE THE SUBCOMMITTEE ON FISHERY
THE ENVIRONMENT OF THE COMMITTEE
UNITED STATES HOUSE OF REPRESENT

STINASU

Mr. Chairman and Members of the Sub

author
reference

The Foundation for Nature Preservation
the captive-rearing of some endangered
of their products in international
conservation of wild populations of
The underlying philosophy of this
paper, which was delivered during
Conservation in Washington, D.C. N

author
reference

STINASU

STINASU is not a commercial enterprise
foundation in Suriname which is in
and natural resources.

It is well-known that the past dec
punitive measures have been ineffe
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It has been shown that economic in
been a stronger motivating force i

Consequently, I would like to urge
lift the import ban on captive-rear
formulate the U.S. position at the
April 1983 accordingly.

ATTACHMENT 1

CLUB C.P.

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of renown in Grand Cayman. I have
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on my menu.
to deal with the Cayman Turtle Farm
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was not acquired in violation of
on Laws.

FOUNDATION FOR NATURE PRESERVATION IN SURINAME

ATTACHMENT 2
Paramaribo, 21 September, 1982

Congressman John B. Breaux
Chairman
Subcommittee on Fisheries and Wildlife
Conservation and the Environment
Committee on Merchant Marine and Fisheries
U.S. House of Representatives
Washington, D.C. 20515

"STATEMENT OF HENRI ANTONIUS REICHART"

BEFORE THE SUBCOMMITTEE ON FISHERIES AND WILDLIFE CONSERVATION AND
THE ENVIRONMENT OF THE COMMITTEE ON MERCHANT MARINE AND FISHERIES.
UNITED STATES HOUSE OF REPRESENTATIVES.

Mr. Chairman and Members of the Subcommittees:

The Foundation for Nature Preservation in Suriname (STINASU) believes that
the captive-rearing of some endangered wildlife species, for subsequent use
of their products in international commerce, can be beneficial for the
conservation of wild populations of these species.
The underlying philosophy of this tenet is explained in the hereby enclosed
paper, which was delivered during the First World Conference on Sea Turtle
Conservation in Washington, D.C. November 1979.

STINASU is not a commercial enterprise, but rather a semi-Government
foundation in Suriname which is dedicated to the conservation of nature
and natural resources.

It is well-known that the past decades have shown that legislation and
punitive measures have been ineffective in stopping the downward trend
in population numbers of many endangered wildlife species.

It has been shown that economic incentive for the people concerned has
been a stronger motivating force in conservation.

Consequently, I would like to urge the Congress of the United States to
lift the import ban on captive-reared sea turtle products, and in addition
formulate the U.S. position at the Fourth CITES meeting in Botswana in
April 1983 accordingly.

Respectfully Yours,
Henri A. Reichart
Henri A. Reichart
Director, STINASU

FARMING AND RANCHING AS A STRATEGY FOR SEA TURTLE CONSERVATION

by
Henry A. Reichart²⁾

INTRODUCTION

There cannot be one world strategy for sea turtle conservation, but instead a mosaic of complementary courses of action which aim at the global goal of preserving marine turtle species. There should be only one unifying feature: conservation.

The strategy developed during this conference ought to provide for adaptability to local socio-economic conditions, which can vary significantly from country to country. These conditions will greatly influence any conservation attempts. For example, wildlife conservation in North America and wildlife conservation in Latin America serve the same purpose - to protect the well-being of the species. The approach to that goal, if the strategy developed here is to be effective, will have to be quite different in the two regions. Where the "halo effect" of a showbusiness celebrity, kissing a baby seal on some icefloes-- in Canada, may serve conservation efforts in North America well, it will only provoke ridicule in lesser developed countries, and may even be counter-productive. It must therefore be strongly recommended that any world strategy agreed upon include heavy reliance on cultural and economic factors of the particular region involved. Such a "strategy master plan" will be infinitely more effective than a conservation ethic originating in the affluent countries, that is meant to be applied worldwide.

It is true that these conservation principles are based on a very valid concept: respect for the rights of wildlife. At no time should this

- 1) Paper delivered during the First World Conference on Sea Turtle Conservation, Washington, D.C., USA, November, 1979.
- 2) Director of the Foundation for Nature Preservation in Suriname (STINASU); Staff member of the Surinam Forest Service.

motivation for wildlife conservation should be included as an important guiding strategy. Unfortunately, this is a very salable item in developing countries, and strategy accordingly.

Most marine turtle habitats are in countries of the world are located in not the conservation of wildlife resources they may have access to for living for their citizens. The short-term benefits are being realized, but the long-term aspects are concerning future generations. This is true in developing nations, but has been true in countries as well. There are countries that have become aware of this and is not only compatible with economic development. A case in point is the concern showing for their wildlife resources motivated from compassion for income derived from the tourism. Marine turtles do not provide a means to attract large-scale tourism, and conservation should be based on economic value.

conservation for wildlife conservation be ignored. In fact, it must be included as an important guiding principle in the formulation of a world strategy. Unfortunately, this basic tenet of good conservation is not a very salable item in developing countries, and we must adjust our strategy accordingly.

Most marine turtle habitats are located where the lesser developed countries of the world are located. The main concern of these countries is not the conservation of wildlife, but rather the exploitation of any resource they may have access to in order to improve the standard of living for their citizens. There are many examples which show that only short-term benefits are being considered in resource-use decisions, while the long-term aspects are conveniently ignored - to be dealt with by future generations. This irrationality is by no means restricted to the developing nations, but has been honed into a fine art by industrial countries as well. There are signs, though, which indicate that some countries have become aware of the fact that natural resource conservation is not only compatible with economic well-being, but is essential to it. A case in point is the concern some East African nations are suddenly showing for their wildlife resources. This concern is by no means motivated from compassion for the animals themselves, but rather by the income derived from the tourists who come to see these animals. Marine turtles do not provide the spectacle the East African wildlife does to attract large-scale tourism. Instead, the strategy for their conservation should be based on a different, but nevertheless economic value.

DISCUSSION

It is well known that sea turtles are commercially a very valuable natural resource. Therefore, management of some of their populations and controlled trade in their products should be considered as a potentially constructive mechanism in the strategy for marine turtle conservation.

To some people these activities, trade and conservation, appear conflicting but when properly applied they could very well be the key to salvation of the species. Trade and conservation have for too long been automatically regarded as a dichotomy by many conservationists, but a re-appraisal of the underlying philosophy may show that these two activities need not necessarily be mutually exclusive. International trade in sea turtle products will continue unabated, and will probably increase as human populations increase. Unless we change tactics, and use trade to our advantage, wild turtle populations will become irreversibly depleted, maybe before the end of this century.

It is highly questionable that protection measures of the past decades have made any improvement in the status of marine turtle populations; continuation of current attitudes will be fruitless. The language of the developing world is one of economics. This suggests the inclusion of the following to the preamble for a rational strategy for turtle conservation in these countries: "to conserve marine turtle populations it must be made economically attractive to do so".

The Convention for International Trade in Endangered Species (CITES) is the proper forum to deal with these aspects. CITES provides a major step in a global effort to conserve endangered wildlife, where trade is an important factor in its endangered status. The problem with CITES, though, is that no provisions exist to possibly take advantage of biological properties, such as reproductive potential, of certain animal taxa in order to boost their chances in the race against extinction.

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While that protection measures of the past decades have helped in the status of marine turtle populations, the attitudes will be fruitless. The language of the conservation of economics. This suggests the inclusion of the conservation of economics for a rational strategy for turtle conservation. conserve marine turtle populations it must be able to do so.

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recently endangered species have attained this dubious honor through activities, be it habitat destruction or excessive harvesting. In any instance, no amount of conservation efforts will bring back the spotted sea turtle to anywhere near their original numbers. They have been overhunted, and their habitat is practically gone, and they are not particularly prolific.

What we can hope for is to establish sanctuary ecosystems where these species may maintain themselves at current or slightly greater densities. On the other hand, there are species, presently endangered, which are reproductively quite prolific, but where the bulk of natural mortality occurs very early in life, thus preempting chances for rapid population recovery if only natural processes are allowed to run their course. Many species belonging to the Class Reptilia have this property. By utilizing this high reproductive potential of these animals, and by simultaneously sharply decreasing the early natural mortality through captive rearing of the hatchlings, a powerful tool is available which can help in rebuilding and conserving some of these endangered animal species. Marine turtles especially fit in this category, most of all the green sea turtle (*Chelonia mydas*), which has often been called the most valuable reptile in the world for man.

Analyzing the situation for sea turtles, it can be said that regarding habitat some nesting beaches have been destroyed but by and large the feeding grounds are still intact, and it would take two major courses of action to rebuild the wild populations.

- 1) reduce man's incidental and intentional catch of wild turtles.
- 2) restock the wild populations with captive-reared animals.

First of all, to reduce man's incidental catch will necessitate closer cooperation with fishermen, whether local operators or international fishing fleets. Experience has indicated, at least for the Guianas, that fishermen do not like to catch marine turtles in their nets. An ensnared mature turtle not only causes considerable damage to expensive nets, but it also reduces the target fish catch. To unmesh a mature turtle is such an arduous task that most fishermen don't bother. Usually the flippers are hacked off, and the carcass set adrift. Each year several such mutilated animals are stranded on Surinam beaches. When this phenomenon is extrapolated for the Western Atlantic, it suggests a senseless waste of mature turtles at a stage in their lives where we can least afford to lose them. It is not uncommon for a single fisherman in the Guianas to set one kilometre of nets at a time. Multiply this by the number of local fishermen, then add the cumulative lengths of nets set or dragged by fishing fleets of several nations operating further offshore, and it becomes obvious that a lethal barrier is stretching across turtle travel routes in the southern Caribbean. Fishermen would be quite cooperative in accepting alternate net designs which would decrease incidental turtle catch. Antagonistic interaction with the fishing industry should be avoided; it resolves nothing and the loss of their cooperation will also be a loss for marine turtle conservation.

To reduce the intentional catch of wild sea turtles, where such practice is illegal is, in general, a matter of wishful thinking. Anyone inclined to go out and catch one will do so. Legislation or international resolutions will merely be an exercise in frustration. The only way to reduce this type of exploitation is to substitute an economically attractive alternative. This leads to the second course of action in conserving sea turtles: stocking the wild populations with captive-reared animals from commercial operations.

Based on this concept, and at the request of the Convention, the Secretariat of CITES was asked to study the possibility to allow for ranching schemes. This would eliminate the necessity of a stock for the operation in countries where the population near their shores. CITES approached the countries to utilize this valuable resource and provide them with the incentive to do this, and other endangered sea turtles.

Captive-rearing of sea turtles for economic purposes implicitly aid conservation, but it can be made much more important, be accepted by the public as an additional conservation measure. As an internationally recognized turtle ranching program, an internationally recognized turtle ranching program where animals from wild at regular intervals.

Captive rearing solely for the purpose of economic gain, one which only affluent societies would be financed by them in some degree, it would escape the local people and tend to end up as a showcase for abuse and corruption.

Allowing subsistence hunting of marine turtles by local people is merely an expedient attempt to satisfy the natives demand for unlimited access to the meat is sought after by many, the desire to eat turtle meat; some favor it due to do with cultural taboos.

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based on this concept, and at the request of several member states to the
 convention, the Secretariat of CITES was instructed to investigate the
 possibility to allow for ranching schemes for some marine turtles.
 This would eliminate the necessity of establishing and maintaining breeding
 stock for the operation in countries which have a viable green turtle
 population near their shores. CITES approval would enable some developing
 countries to utilize this valuable resource with a minimal investment,
 and provide them with the incentive to contribute to the conservation of
 this, and other endangered sea turtle species.

Captive-rearing of sea turtles for economic benefit alone does not
 implicitly aid conservation, but it can open the way for supplemental
 conservation efforts which will be supported by local authorities, and
 much more importantly, be accepted by the local people.

As an additional conservation measure there should be a prerequisite for
 an internationally recognized turtle ranch to include, among other things,
 a headstart program where animals from the facilities are released to the
 wild at regular intervals.

Captive rearing solely for the purpose of release to the wild is a noble
 goal, one which only affluent societies can afford. Even if such projects
 were to be financed by them in some developing country, the rationale of
 it would escape the local people and the entire project would most likely
 end up as a showcase for abuse and corruption.

Allowing subsistence hunting of marine turtles by selected indigenous
 people is merely an expedient attempt at turtle conservation by pacifying
 the natives demand for unlimited access to the turtle resources. Even though
 the meat is sought after by many, there are also many natives who do not
 care to eat turtle meat; some favor only the eggs. Much of this has to
 do with cultural taboos.

What most of these people do have in common is the awareness of the attraction turtle products have on the international market, and they would like to capitalize on it. Given the choice, they would rather have the security of a regular income from employment at a turtle ranch than to be relegated to a steady diet of turtle meat.

International trade in turtle products will continue regardless of restrictions or resolutions. The most sensible thing to do is to acknowledge this fact of life and try to develop rational guidelines for this trade by using captive-reared green turtles so it will benefit conservation and the economies of developing nations who have this turtle resource. By using prohibition-type tactics in trade restrictions it will only encourage unscrupulous people to exploit, and thus destroy, the wild populations because the demand for sea turtle products cannot be legislated out of existence. Instead, national and international regulatory bodies should be empowered to provide controls for trade in farmed and ranched turtle products, with very stiff penalties to violators of established codes of operations. While the search for a practical labelling technique to tell captive-reared turtles from wild ones continues, there must be rigorous inspection at rearing facilities, processing sites, export and import stations. Any violation must be severely dealt with by immediate cancellation of the internationally sanctioned operating permit. The cost and responsibility of such controls to be borne proportionally by the participants in the particular phase of the trade.

For conservationists the key attraction of commercial captive rearing schemes, of course, is the headstart program. This headstarting should not merely be a secondary function of the facilities, but must be made an integral part of the overall management plan for the project.

In fact, an internationally recognized or farm must have this aspect as an obligation.

The Surinam green turtle ranching project feasibility study, may serve to illustrate of sea turtles nesting on Surinam beach about one million eggs each year. A quarter would be destroyed by spring tides, if a great loss of a valuable natural resource conservation terms. Through the efforts of organizations most of these so-called "c" sold under close supervision on local project also come from such eggs. Proceed finance conservation work in Suriname. The rationale for the controlled eggs

For commercial purposes the ranch turtle four years, at which time they will be based on the results of a high protein in Suriname with alternate, local, focus at this time to give specific growth: certain number of turtles in each year to the sea. The general program pattern:

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In fact, an internationally recognized permit to operate a turtle ranch
or farm must have this aspect as an obligatory feature.

The Surinam green turtle ranching project, which at this time is only a
feasibility study, may serve to illustrate the concept. Of the four species
of sea turtles nesting on Surinam beaches, the green turtle alone lays
about one million eggs each year. A quarter of a million of these eggs
would be destroyed by spring tides, if left unattended. This constitutes
a great loss of a valuable natural resource, both in economic and
conservation terms. Through the efforts of Surinam conservation
organizations most of these so-called "doomed eggs" are harvested and
sold under close supervision on local markets. Hatchlings for the ranching
project also come from such eggs. Proceeds of the egg sales are used to
finance conservation work in Suriname on all marine turtles nesting there.
The rationale for the controlled eggs harvest is shown in figure 1.

For commercial purposes the ranch turtles are to be raised to an age of
four years, at which time they will be harvested. This 4-year cycle is
based on the results of a high protein diet. Experiments are in progress
in Suriname with alternate, local, food sources but too little is known
at this time to give specific growth rates data. Meanwhile, each year a
certain number of turtles in each year class will be marked and released
to the sea. The general program pattern is shown in figure 2.

As was stated earlier, most natural mortality for sea turtles occurs
during the egg and hatchling stage. It is a reasonable, and possibly
optimistic estimate that under natural conditions 1 out of every 100 eggs
laid will become a turtle which reaches the age of one year. Or thinking
in terms of eggs harvested for the project: with the Surinam headstart

It was for this reason that during the second meeting of CITES in San Jose, Costa Rica, last March, some countries argued against tightening of the definition for the term "bred in captivity". In spite of this, the United States' proposed definition for the term was adopted by the Convention in virtually its original form. This definition should be considered a grave threat to conservation attempts based on captive breeding schemes.

The ramifications are that to initiate captive breeding projects for marine turtles will no longer be economically attractive. To start a farm, which would conform to the requirements of this definition, may require some 15 to 20 years before being allowed to engage in international trade of farmed turtle products. It will require several million dollars worth of investment with no return to be expected for that period. Any plans for such a project by a developing country will be abandoned. As a result of all this the hunting pressure on wild turtles will increase.

A turtle ranch would be an economic asset for a developing country. It can be the source of much needed foreign exchange and it would provide employment for some of the chronically unemployed people in those areas. These two aspects alone would make governments and local people aware that conservation of the wild turtles can be economically attractive, because these animals form the basic source of supply for their captive rearing operations. Developing countries now have the motivation to protect the wild populations living in their territorial waters.

Preservationists in the industrial nations had better clearly understand that without an economic incentive the people of lesser developed areas in the world cannot be persuaded to care much about conservation.

Instead of imposing rigorous bans on international trade in captive-reared turtle products, a certain amount of flexibility should be maintained in the decision-making procedures to allow for it.

program, when 1000 yearlings are released the potential of 100,000 eggs is put yearly for the project. The possible headstart programs are obvious. There and the questions being raised are:

- a) will they survive in the wild,
- b) will they follow species-specific
- c) will they find the feeding group
- d) will they be accepted by the wild
- e) will they find their nesting beach

As a result of tag returns and observations can already provisionally be answered in the wild. Some tag returns which indicate healthy growth.

From what is known of the behavior of animals are dispersing in anticipation released are already on the feeding Brazilian coast. They have successfully from Suriname.

Whether the released turtles will ever again after they are mature is large. The beach where they emerged as hatchlings will have shifted westward by 15 to where once the original rookery was. Beach imprinting is still a theory: significance in headstart programs. recruits for the wild breeding stock mechanism for some specific beach.

second meeting of CITES in San Jose, argued against tightening of the "CITES Convention". In spite of this, the United States was adopted by the Convention in 1973. The Convention should be considered a grave threat to captive breeding schemes. Captive breeding projects for sea turtles are economically attractive. To start a farm, even if this definition, may require a considerable investment to engage in international trade worth several million dollars worth of capital for that period. Any plans for captive breeding will be abandoned. As a result of all this, the investment will increase.

for a developing country. It can provide employment and it would provide employment for people in those areas. Captive breeding projects are economically attractive, because they provide employment for their captive rearing. The motivation to protect the turtles in the waters.

and better clearly understand the importance of lesser developed areas in the context of conservation. International trade in captive-reared turtles should be maintained in the future.

program, when 1000 yearlings are released to the sea (as was done last year) the potential of 100,000 eggs is put back for the 10,000 hatchlings taken yearly for the project. The possible benefits to conservation of such headstart programs are obvious. There are unknown aspects of headstarting, and the questions being raised are:

- a) will they survive in the wild, after having been raised in captivity?
- b) will they follow species-specific travel routes?
- c) will they find the feeding grounds of the parental stock?
- d) will they be accepted by the wild population, and be allowed to mate?
- e) will they find their nesting beach again as breeding adults?

As a result of tag returns and occasional sightings some of these questions can already provisionally be answered. Headstart turtles are surviving in the wild. Some tag returns which included weight and size information indicate healthy growth.

From what is known of the behavior of wild green turtles in this area, the animals are dispersing in anticipated directions. Some of the turtles released are already on the feeding grounds of the parental stock off the Brazilian coast. They have successfully negotiated the 2000-odd km voyage from Suriname.

Whether the released turtles will eventually find their beach of origin again after they are mature is largely academic, especially for Suriname.

The beach where they emerged as hatchlings will no longer be there - it will have shifted westward by 15 to 20 km, leaving inaccessible mudflats where once the original rookery was.

Beach imprinting is still a theory and too much emphasis is placed on its significance in headstart programs. It is more important to provide recruits for the wild breeding stock than to speculate on a homing mechanism for some specific beach.

The merits of headstarting is the subject of intense debate. It has been stated that none of the headstart projects attempted so far have helped increase the numbers of wild turtles in the sea. A negative appraisal of headstarting on these aspects often indicates pre-conceived bias and is not based on any accumulated data. Current protectionist strategy has not improved the lot of wild turtle populations and it is time that philosophical discussions on the merits of headstarting make way for the practical application of such programs - time is running out for the species. Only empirically derived data will provide the answers.

With the current Surinam project a start has been made for a long-term mark and release program of captive-reared green turtles. With subsequent releases of various age classes certain patterns could emerge which may suggest testable hypotheses.

Ranching is a very attractive turtle utilization scheme for developing countries who have the resource, and the inclusion of a compulsory headstart program will be an acceptable feature to them. Additional scientific benefits derived from such projects should not be underestimated. Farming also has already provided a wealth of data on various aspects of turtle biology. To name just one, it has pioneered the development of techniques in using artificial nest boxes for the hatching of turtle eggs. The use of this tool alone has enabled Surinam conservation organizations to put more hatchlings in the sea than all other well-oiled conservation efforts put together. Captive-rearing projects provide an opportunity to study the turtles at close range. Results of such studies can form the basis on which to continue work with wild populations. The facilities can also be used to provide breeding stock of all sea turtle species for select conservation projects.

Too much publicity has been given to the captive-rearing schemes for marine turtles of some, but by no means all turtle experts, echoed ad infinitum by laymen. As a result, it is widespread. The fact here is that there are commercial turtle farms or ranches and it is pure conjecture. One could equally say that these, however, are usually suppressed.

The data on increased trade in turtles must be kept in mind that as human consumption of natural resources will increase. The world whose trade aspects have not increased. Therefore, no amount of trade restriction will remain, unless an alternate source is found.

CONCLUSION

A captive-raised green turtle can reach the sea considerably sooner than a wild one. By the largely passive action of letting captive-raised turtles go to the sea at a time when they may be more than wild ones, we accelerate recruitment, improve natality, which is an important factor. At this critical stage of marine turtles should be on increasing the numbers. By the largely passive action of letting captive-raised turtles go to the sea at a time when they may be more than wild ones, we accelerate recruitment, improve natality, which is an important factor. At this critical stage of marine turtles should be on increasing the numbers. By the largely passive action of letting captive-raised turtles go to the sea at a time when they may be more than wild ones, we accelerate recruitment, improve natality, which is an important factor.

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 of some, but by no means all turtle experts. Their views, however, are
 echoed ad infinitum by laymen. As a result, the negative publicity is
 widespread. The fact here is that there are no hard data to show that
 commercial turtle farms or ranches are detrimental to the wild populations,
it is pure conjecture. One could equally well provide positive arguments;
 these, however, are usually suppressed in public interviews.

The data on increased trade in turtle products are undoubtedly valid, but
 it must be kept in mind that as human populations are expanding, the use
 of natural resources will increase. There is hardly a commodity in the
 world whose trade aspects have not increased.

Therefore, no amount of trade restrictions will decrease the demand for
 turtle products, and thus the pressure on the wild sea turtle populations
 will remain, unless an alternate source for the same product is provided.

CONCLUSION

A captive-raised green turtle can reach maturity in 8-12 years, which is
 considerably sooner than a wild one. By releasing captive-reared turtles
 to the sea at a time when they may reach reproductive condition sooner
 than wild ones, we accelerate recruitment to the population and thus
 improve natality, which is an important parameter for population increase.
 At this critical stage of marine turtle conservation the focus of efforts
 should be on increasing the numbers of sexually mature animals in the sea.
 By the largely passive action of letting the turtle's natural reproductive
 cycle take care of hoped-for population growth, the adherence to current
 conservation measures will invite disaster for the wild populations.

Through the millenia a balance has emerged between natality and mortality factors for sea turtles. Man, in just a short time, has been able to upset this balance. Natural reproductive processes will be unable to adjust and compensate for this disturbance, and the species will lose.

Nature needs an assist and man, in spite of his negative effects on the species so far, also has the technique to build up the populations.

Headstarting is a viable conservation tool, but it will not be feasible unless it is made economically attractive to do so, which farming or ranching does.

Paramaribo, Suriname

13 December, 1979

FIG. 1- SURINAM MARINE TURTLE C

(Chelonia)

ANNUAL CYC	
NATURAL (hands-off policy)	
START	1,000,000 eggs
doomed	250,000 eggs
	750,000 eggs
hatch failure ... (33%)	250,000 eggs
to the sea	500,000 hatchlings
mortality to age one year ... (99%)	495,000
	<u>5,000 yearlings</u>

NEGATIVE ASPECTS:

- no eggs for market will result in extensive poaching and destruction of nests of all marine turtle species nesting in Suriname.
- no eggs for market means loss of funds to hire beach personnel.
- no eggs for market will result in loss of public support on conservation measures and will almost certainly cause poaching of mature nesting females.

FIG.1- SURINAM MARINE TURTLE CONSERVATION PROGRAM
(*Chelonia mydas*)

ANNUAL CYCLE	
NATURAL (hands-off policy)	MANAGED (with operation "Headstart")
START 1,000,000 eggs	START 1,000,000 eggs
doomed 250,000 eggs	ranch project and market 300,000 eggs
750,000 eggs	700,000 eggs
hatch failure ... 250,000 eggs (33%)	hatch failure 200,000 eggs (28%)
to the sea 500,000 hatchlings	to the sea 500,000 hatchlings
mortality to age one year 495,000 (99%)	mortality to age one year 495,000 (99%)
5,000 yearlings	5,000 yearlings
	release captive- reared turtles 1,000 yearlings
	6,000 yearlings

NEGATIVE ASPECTS:

- no eggs for market will result in extensive poaching and destruction of nests of all marine turtle species nesting in Suriname.
- no eggs for market means loss of funds to hire beach personnel.
- no eggs for market will result in loss of public support on conservation measures and will almost certainly cause poaching of mature nesting females.

POSITIVE ASPECTS:

- sale of eggs provides funds to protect nests of all other marine turtle species in Suriname.
- market availability of eggs has reduced egg poaching to almost nil.
- management program enjoys full support of the Surinam people and there is no poaching of subadult or adult marine turtles.

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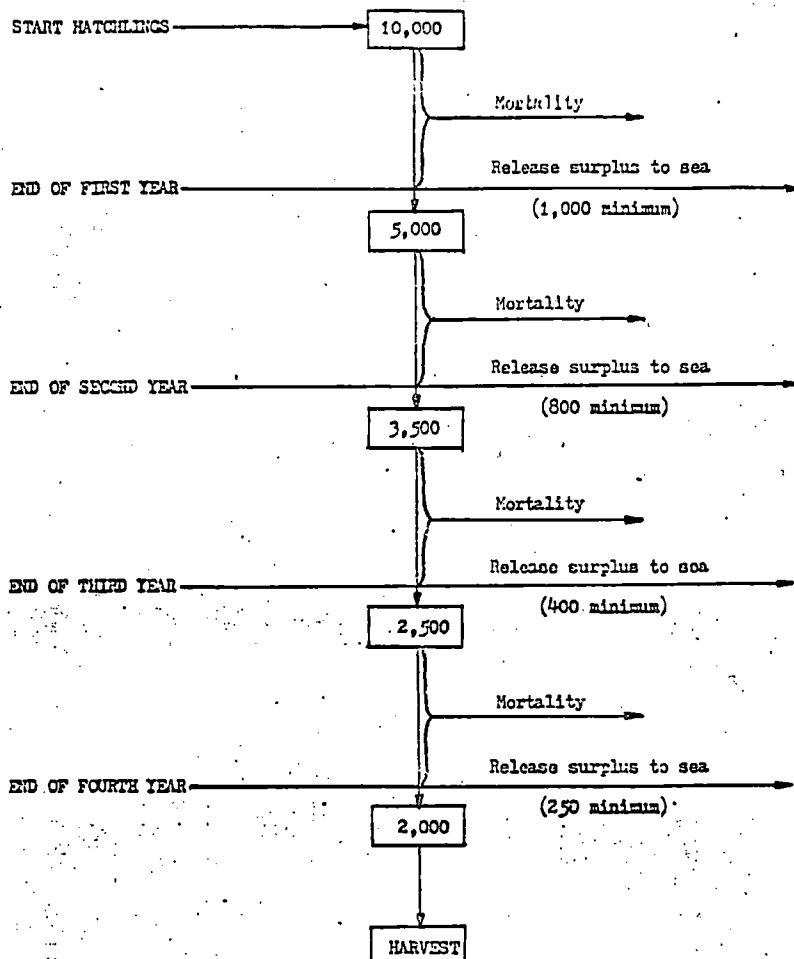
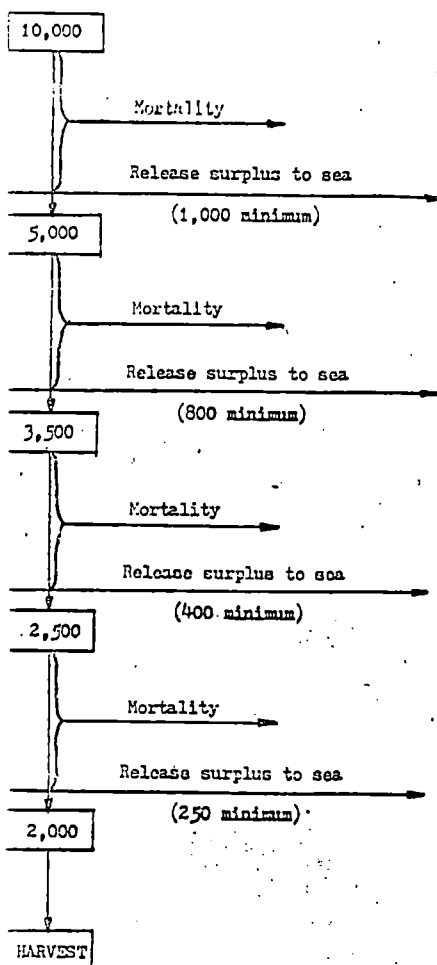


Fig. 2 - TURTLE RANCH PILOT PROJECT WITH HEADSTART PROGRAM AS DEVELOPED BY THE FOUNDATION FOR NATURE PRESERVATION IN SURINAME (STINAGU).

Regional socio-economic conditions should be taken into account in the development of a world strategy for marine turtle conservation. Principles are based on standards developed by the IUCN, which are not necessarily effective in lesser developed countries. The conservation of sea turtles in those countries is attractive to do so. This can be accomplished through the implementation of schemes of turtles, in particular the headstart program. Such projects can benefit conservation efforts by providing an economic incentive to protect the wild supply of hatchlings for the project; projects to include headstart programs where captive-reared animals are released to the wild. Marine turtles are a valuable natural resource and their conservation is a benefit. International trade in marine turtles is regulated by resolutions or punitive measures; not by optimal densities by "hands-off" policies. Reproductive potential, and by drastic measures to reduce natural mortality through captive rearing by headstarting. The Convention for International Trade in Endangered Species (CITES) should make provisions to allow the trade of captive-reared marine turtles which have this resource will be provided to conserve their wild turtle population.



THE HEADSTART PROGRAM AS DEVELOPED
PRESERVATION IN SURINAME (STINAGU).

ABSTRACT

Regional socio-economic conditions should be included in the formulation of a world strategy for marine turtle conservation. Current conservation principles are based on standards developed by affluent societies and are not necessarily effective in lesser developed countries. A rational approach to conservation of sea turtles in those areas would be to make it economically attractive to do so. This can be accomplished by allowing captive-rearing schemes of turtles, in particular the green turtle (*Chelonia mydas*). Such projects can benefit conservation in two ways: first, by providing the economic incentive to protect the wild populations, which are the source of supply of hatchlings for the project; second, by making it compulsory for the projects to include headstart programs, whereby pre-determined numbers of captive-reared animals are released to the sea at regular intervals. Marine turtles are a valuable natural resource with considerable economic benefit. International trade in marine turtle products cannot be stopped by resolutions or punitive measures; nor can the wild populations be rebuilt to optimal densities by "hands-off" policies. Taking advantage of the considerable reproductive potential, and by drastically reducing the high, early-age natural mortality through captive rearing, the wild populations may be increased by headstarting. The Convention for International Trade in Endangered Species (CITES) should make provisions to allow for ranching schemes, and subsequent trade captive-raised marine turtle products only, so developing countries, which have this resource will be provided with the economic motivation to conserve their wild turtle populations.

Mr. BREAU. I got from your testimony that currently the farm does not take any eggs or turtles from the wild?

Mr. WOOD. That is correct.

Mr. BREAU. When did you stop taking turtles from the wild?

Mr. WOOD. We have only taken turtles for reproductive purposes. The last collection was made in September 1977, from Mexico. The last collection of eggs was made from Surinam in 1978.

Mr. BREAU. So since that time, all of the increase in the population of turtles has come from within the farm system?

Mr. WOOD. That is correct.

Mr. BREAU. You make the point, with regard to determining whether these turtles are second generation under the CITES definition, that normally under CITES the management authority for the country involved makes that determination. Of course, the United States would have to look at that country's determination and determine whether it meets our own basic criteria as we have interpreted CITES.

Has the Cayman Turtle Farm submitted a request to CITES for an interpretation of the term "bred in captivity" at the next conference of CITES?

Mr. WOOD. The farm itself has not, no.

Mr. BREAU. The farm has a current petition, I guess, pending with the Department of the Interior?

Mr. WOOD. Yes.

Mr. BREAU. What does that petition request?

Mr. WOOD. The petition itself has actually been issued by the Pacific Legal Foundation. It would request that the Departments reconsider their position on the ban of our turtle products into the United States.

Mr. BREAU. The panel prior to you presented some charts that indicated that initially there were some very optimistic projections on what the farm's capacity would be and that the farm had not met those original projections. You were referred to as a person involved in helping to make the initial projections.

Could you give the committee some discussion on what happened? The projections obviously were not realized. I guess the question is what happened?

Mr. WOOD. First, I would point out that the purpose of presenting these projections to this group of scientists was to demonstrate that we had a projected program for becoming completely independent of collection of eggs in the wild, our definition of being self-sufficient.

That is, we would require no further input from the wild. In 1975, when we were asked to provide such a projection, we had at that time just had in August one of our farm-reared stock turtles reproduce on the farm, and from that, she was 8 years old, so using the only information available, we assumed that our farm-reared turtles would first reach a reproductive maturity at 8 years old and that they would lay a number of eggs and we would get a certain hatch rate.

Later on, at a further meeting in November, by this time the eggs from this particular female had hatched giving us a 33-percent hatch rate. So we had to revise our projections which makes up the changes in the November projection.

We now know that sexual maturity is early in the captive environment now it is an average of around 10 years. We also know that it is uncommon for a wild turtle to lay 600 eggs. It is a sense that they lay a smaller number of clutches per season. What malformed. We also know that the initial turtles is unusual. So we count at least somewhat for the projections then and our success in the future.

Mr. BREAU. Of the turtles taken from the wild and those eggs were then mated and hatched, the figures that I have taken approximately 460,000 eggs taken from the wild, 32 and those offspring mated and hatched. Some of those eggs have been mated, and these have produced 1,600 of those have hatched.

I take it the group prior to the offspring, they do not meet the criteria?

Mr. WOOD. From their testimony.

Mr. BREAU. Of that generation so hatched from 1975-81, how many hatched would be 7 years old?

Mr. WOOD. No. We would say none.

Mr. BREAU. The natives, the people taking turtles from the wild?

Mr. WOOD. Caymanian lay turtles within the waters of Cayman.

Mr. BREAU. What kind of turtles? Cayman Turtle Farm and turtles from the wild?

Mr. WOOD. None.

Mr. BREAU. You don't acquire turtles from the fishermen?

Mr. WOOD. No; none.

Mr. BREAU. How long is it until that generation that we are getting offspring?

Mr. WOOD. First I would like to make a distinction between calling a wild-captive which we have brought in and which is greatly different than a turtle hatched in a captive environment. Sexual maturity in a captive environment is much earlier.

Many of the concerns that we have about generation regulations are coming from the wild and hatchlings are receiving the effects of that so forth. We have had this

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We now know that sexual maturity in the sea turtles can occur as early in the captive environment as 8 years old, but certainly now it is an average of around 12 to 14 years.

We also know that it is uncommon for a beginning nesting farm-reared turtle to lay 600 eggs. They are somewhat like pullets in the sense that they lay a smaller number of eggs per clutch, a smaller number of clutches per season. Quite often, the first eggs are somewhat malformed. We also know a 33-percent hatch rate on these initial turtles is unusual. So with these differences, one can account at least somewhat for the vast discrepancy between our projections then and our success rate.

Mr. BREAUX. Of the turtles in the cycle where you took eggs from the wild and those eggs were hatched and those turtles from those eggs were then mated and produced eggs, and those eggs were hatched, the figures that I have are that under this scenario, you took approximately 460,000 eggs, in the period 1968-78. Of those eggs taken from the wild, 325,000, or about 71 percent, hatched, and those offspring mated and produced about 27,000 eggs. Some of those eggs have in turn hatched and have been raised and mated, and these have produced a number of eggs and about 1,600 of those have hatched.

I take it the group prior to you said until that group produces offspring, they do not meet the CITES requirements; is that correct?

Mr. WOOD. From their testimony, I would assume so.

Mr. BREAUX. Of that generation we are talking about, the 1,600 or so hatched from 1975-81, I guess the 1975 ones that were hatched would be 7 years old. They have not yet mated, I take it?

Mr. WOOD. No. We would say they are still too young.

Mr. BREAUX. The natives, people in the area, the nationals, are they taking turtles from the wild now?

Mr. WOOD. Caymanian law allows for the local people to take turtles within the waters of Grand Cayman.

Mr. BREAUX. What kind of dealings do you have between the Cayman Turtle Farm and the fishermen who are taking turtles from the wild?

Mr. WOOD. None.

Mr. BREAUX. You don't acquire any from them or any eggs or turtles from the fishermen?

Mr. WOOD. No; none.

Mr. BREAUX. How long in your estimation is it going to take until that generation that we were discussing is capable of producing offspring?

Mr. WOOD. First I would say in my mind there is a vast difference between calling a wild-caught turtle that was essentially adult which we have brought in and used for breeding stock, that animal is greatly different than a wild egg that has been brought in, hatched in a captive environment, and reared its entire life up to sexual maturity in a captive environment.

Many of the concerns that originally made them put in second generation regulations are covered by the fact that these eggs that are from the wild and hatch and grow up in a farm environment are receiving the effects of the nutritional regime at the farm and so forth. We have had this year three of the females that were

from the eggs laid by turtles on the farm in 1973, which we have reared out, three of these animals have mated for a fairly substantial period of time this year but did not or have not yet laid.

This is not necessarily an uncommon thing at the farm to have turtles mate and then not lay, but it usually is an indication that the animals are becoming sexually mature. Consequently, I think that next year we have a very good chance of producing everybody's definition of second generation; or if not then, the next year.

Mr. BREAU. What would be an average number of eggs that a female turtle would lay?

Mr. WOOD. In our facility, an average number of eggs would be something like 119. But it varies tremendously.

Mr. BREAU. So you have on the farm now a first generation of turtles that were the result of adult turtles taken from the wild, and they mated and hatched, and then you have that generation now on the island, and you are telling us that some of those have, in turn, mated? But you have not produced any offspring from that generation?

Mr. WOOD. Right. We have had eggs laid on the farm, conceived in captivity; the animal hatches, grows up, and they are now 9 years of age. They have mated in our captive environment but they have not laid eggs.

Mr. BREAU. Your interpretation of CITES would be that generation itself is, in fact, bred in captivity.

Mr. WOOD. That would be the more common definition. That is the definition of second generation. We rely upon the management authority in Cayman and the United Kingdom to define second generation for us.

Mr. BREAU. The panel before you said in very strong language that it was very clear that those who were working on CITES in Costa Rica clearly intended that these turtles bred-in-captivity, because it was originally produced from adults that were taken from the wild and, therefore, that is not a bred-in-captivity animal.

Mr. WOOD. I cannot speak for what the members at the conference in Costa Rica intended. I would say that as I pointed out, I think there is a vast difference between a wild turtle being brought in and a wild egg that has been hatched and grown to sexual maturity in captivity.

To me the only difference between the perhaps U.S. definition of second generation and what we have accomplished is the fact that we have an egg that was conceived in the wild but brought into a captive environment.

To me for someone to argue that we would not ultimately be able to produce anyone's definition of second generation is to assume there is some mystical process associated with this small fertilized egg obtained in the wild and a similar egg which we have done quite often in our captive environment.

Mr. BREAU. I wish somehow we could put all this information in a computer, push a button, and get an answer whether we have a bred-in-captivity turtle or not. That is what we are trying to wrestle with.

Let's talk a little bit about the enforcement problem. In your testimony, you speak of ways in which the turtle products can be marked so they can be identified down the line.

Could you elaborate on how you select that leaves the Cayman Turtle when it gets to a port in Miami, the your farm and not from somewhere else?

Mr. WOOD. Yes. The edible product, neck bone, this sort of thing, is packed in 5 five pound boxes, pound boxes and labeled with a Farm; if requested, we could have with that particular label that could records.

If anyone requested where that we would be able to say.

In addition, these—10 of these pound master carton. The carton Cayman Turtle Farm. Again, an is signed to that box. Then when shipped by the Cayman Islands Government, which boxes, what number of boxes so there would be a documentation through the market.

On products such as jewelry, like elry, these items have the Cayman shell jewelry items are individual in each of these cases, documentation company shipments.

We would be happy to undertake method we could use. We have concerning the possibility of maybe sort of chemical substance which turtle and then be utilized to identify chemical means. That is speculation.

Mr. BREAU. I know the Cayman or initiated a release program of bred on the farms. Are you still done of this type of a program in

Mr. WOOD. We have, since October such turtles into local waters. They were 10 to 12 months old, which

At the present time, we are not anticipate having quite a surplus would be released as soon as the waters.

Mr. BREAU. Is there any evidence the turtles that the farm has released?

Mr. WOOD. We have not done is that in talking to the dive boat of time in the water in Cayman, mostly see our turtles.

There is a system set up now to monitor the animals so that we can try to get these turtles are around Cayman.

During an aerial survey, I saw Sound area, and I have had reports

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Could you elaborate on how you would go about requiring a prod-
uct that leaves the Cayman Turtle Farm to be marked so that
when it gets to a port in Miami, they can recognize it as being from
your farm and not from somewhere else?

Mr. Wood. Yes. The edible products such as meat, calipee, cali-
pash, neck bone, this sort of thing, the meat, filet steak particular-
ly, is packed in 5 five pound boxes, individually wrapped filets, 5
pound boxes and labeled with a label that says Cayman Turtle
Farm; if requested, we could have a numerical system associated
with that particular label that could be coded back or kept in our
records.

If anyone requested where that 5-pound box of steak came from,
we would be able to say.

In addition, these—10 of these 5-pound boxes are put into a 50-
pound master carton. The carton itself is a printed box labeled
Cayman Turtle Farm. Again, an identification number could be as-
signed to that box. Then when shipments are made, the certificates
issued by the Cayman Islands Government could specify exactly
which boxes, what number of boxes, this sort of thing had gone out
so there would be a documentational way of following our products
through the market.

On products such as jewelry, like our gold and tortoise shell jew-
elry, these items have the Cayman Turtle Farm logo, shell items,
shell jewelry items are individually labeled with a tag; and again
in each of these cases, documentation by the government would ac-
company shipments.

We would be happy to undertake any sort of additional marking
method we could use. We have had some thought in the past con-
cerning the possibility of maybe incorporating into our diet some
sort of chemical substance which could be incorporated into the
turtle and then be utilized to identify a product as our product by a
chemical means. That is speculative at this time.

Mr. BREAU. I know the Cayman Turtle Farm has participated
or initiated a release program of some of the turtles that have been
bred on the farms. Are you still doing that? How much have you
done of this type of a program in the past?

Mr. Wood. We have, since October of 1980, released almost 3,000
such turtles into local waters. All but about 70 of these animals
were 10 to 12 months old, which I consider a nice size to release.

At the present time, we are not releasing animals; however, we
anticipate having quite a surplus of hatchlings this year, which
would be released as soon as they get a bit older into the local
waters.

Mr. BREAU. Is there any evidence as to what is happening to
the turtles that the farm has released?

Mr. Wood. We have not done a scientific study. What we do find
is that in talking to the dive boat operators who spend a great deal
of time in the water in Cayman, they report that they very com-
monly see our turtles.

There is a system set up now so that they have a reporting mech-
anism so that we can try to get some idea as to how distributed
these turtles are around Cayman and how many there are.

During an aerial survey, I saw quite a few animals in the North
Sound area, and I have had reports from local people that have

seen our turtles that they report seeing the same animal in a location over several days, indicating that the animal is basically taking up residence in a little patch of reefs.

We have even had tag numbers reported, so we can document when the animal is released.

Mr. BREAU. Approximately how many turtles have been released into the wild from the Cayman turtle farms since you have been associated with them?

Mr. WOOD. Locally, we have released about 3,000 during 1975. During 1976 and 1977, we released about another 400 animals in Surinam.

Mr. BREAU. With regard to the stability of the Cayman Turtle Farm itself, there was an indication this morning that the Cayman Government is in fact subsidizing the farm. What is the outlook?

Mr. WOOD. The outlook is essentially this: The farm cannot continue to act as a producer of turtle products on any sort of scale unless we get the U.S. market back. The United States was our major market. It is a convenient market to us. Essentially we require that market to be a turtle farm.

Our only other alternative is to exist as purely a local tourism attraction, having a few turtles out on the farm for tourists to see, run a gift and curio shop; but under such a situation, we would not, for example, support a research program.

It basically would just be a tourism attraction.

Mr. BREAU. What is the Cayman Turtle Farm? Is it a research facility or is it a commercial farm designed to primarily sell turtle products?

Mr. WOOD. Initially, and prior to the U.S. ban, the concept of the turtle farm was one of trying to develop a facility that was capable of large-scale production of sea turtle products. With the institution of the U. S. ban, the farm was forced to reduce the size of its operation, essentially over the past 4 years concentrate on being a research facility.

But, unfortunately, that requires money that is no longer available. As I say, the choice now is to either get markets back and expand somewhat or become a tourism facility.

Mr. BREAU. You said you had a number of turtles that, while they are mating, have not yet produced any eggs. Suppose they continue with that pattern. Would your recommendation be that you should be allowed to trade the products of their generation?

Mr. WOOD. Well, one, I would be somewhat surprised if the animals don't ultimately reproduce. We don't know everything about sea turtle biology. There is a lot we have to learn, a lot we have learned in the past.

I am confident that we will be able to solve the problems associated with reproduction of the sea turtle in captivity.

Essentially, the farm will either become self-sufficient in anybody's terminology, relying upon farm-reared stock animals, because we realize our captive wild animals will not last for an indefinite period of time, although we expect that they would be productively active for at least another 10 years; but, ultimately, the farm has to rely upon the farm-reared stock animals or go out of business, or become a ranch.

Mr. BREAU. In the future, would any other turtles or turtle eggs from the gene structure or maintain an that you would like to see maintained? Or would your hope be that you would for eggs or for mature adult turtles?

Mr. WOOD. I see no reason we have for eggs or for wild animals. Our relatively diverse geographical set of any particular problems with in-breeding. Our system does allow for us to who gets to get involved in this act think in-breeding will be a problem considered that the mating—reproduction roughly 12 years.

Mr. BREAU. I guess it boils down the question of enforcement. That The second question is the question produced on the Cayman Turtle Farm captivity.

The turtles have all been able to been able to produce grandchildren talking about. Some have argued that children, you do not have a bred-in-captivity. Others argue, which I take would the parents are producing children captivity successfully.

Is that basically about the summary?

Mr. WOOD. Yes, particularly, as have reared from eggs and that are

Mr. BREAU. You have done that that successfully?

Mr. WOOD. Yes, we have. We have of animal reproduce.

Mr. BREAU. How is that ratio of ratio?

Mr. WOOD. Well, in general, we have reared stock animals reproduce. Mating. Our major cause of hatch animals have not been adequately

To answer your question, as all turtles are not as fecund, reproduce wildlife turtles at this time.

Mr. BREAU. Yours are in fact in the wild? Were you saying that that ductive or less productive?

Mr. WOOD. They are less productive

Mr. BREAU. Than the wild?

Mr. WOOD. Than our captive wild

Mr. BREAU. Let me make sure clear, even if my head is not, as to you talking about your rate of survival from the wild; and those eggs come offspring producing another generation

Mr. BREAU. In the future, would you envision having to take any other turtles or turtle eggs from the wild in order to maintain the gene structure or maintain any characteristics of the turtle that you would like to see maintained?

Or would your hope be that you would not have to go back to the wild for eggs or for mature adult turtles?

Mr. WOOD. I see no reason we have to go back to the wild either for eggs or for wild animals. Our breeding herd is made up of a relatively diverse geographical set of animals. I cannot conceive of any particular problems with in-breeding developing in the future.

Our system does allow for us to control the mating pairs as to who gets to get involved in this activity; and, consequently, I don't think in-breeding will be a problem for us, particularly when it is considered that the mating—reproduction and generation time is roughly 12 years.

Mr. BREAU. I guess it boils down to two particular issues. One is the question of enforcement. That has been adequately discussed. The second question is the question of whether the turtles being produced on the Cayman Turtle Farm are in fact turtles bred in captivity.

The turtles have all been able to produce children; they haven't been able to produce grandchildren. That is basically what we are talking about. Some have argued that unless you have grandchildren, you do not have a bred-in-captivity classification.

Others argue, which I take would be your argument, as long as the parents are producing children, that shows you can breed in captivity successfully.

Is that basically about the summary of your position?

Mr. WOOD. Yes, particularly, as I say, those animals that we have reared from eggs and that are now producing offspring.

Mr. BREAU. You have done that, and you say you have done that successfully?

Mr. WOOD. Yes, we have. We have had well over 30 of this type of animal reproduce.

Mr. BREAU. How is that ratio of success comparable to the wild ratio?

Mr. WOOD. Well, in general, we have had about 70 of these farm-reared stock animals reproduce. Many have produced eggs without mating. Our major cause of hatch failure is infertility because the animals have not been adequately mated prior to nesting.

To answer your question, as all the evidence shows, the FRS turtles are not as fecund, reproductively viable as the captive stock wildlife turtles at this time.

Mr. BREAU. Yours are in fact more productive than those from the wild? Were you saying that those from the farm are more productive or less productive?

Mr. WOOD. They are less productive.

Mr. BREAU. Than the wild?

Mr. WOOD. Than our captive wild stock animals, yes.

Mr. BREAU. Let me make sure. I want to be sure the record is clear, even if my head is not, as to what we are dealing with. Are you talking about your rate of success with regard to taking eggs from the wild; and those eggs coming in and hatching and those offspring producing another generation of turtles?

I was comparing that success ratio with the ratio of just the normal survival ratio for turtles in the wild, who stay in the wild.

Mr. WOOD. The survival ratio, I feel the farm, even at its worst of times, has a better survival of animals than you get in the wild. I was speaking of in terms of hatch rate success, that farm-reared stock turtles had not been as successful in getting high hatch rates as you get either in our captive wild stock or in wild eggs obtained from—

Mr. BREAUX. What is your opinion as to why that condition exists?

Mr. WOOD. I think it may be a number of factors. I think our animals are still too young.

Mr. BREAUX. Those that we are talking about right now range in age from 8 to, say, 12 years old?

Mr. WOOD. We have animals that are getting up to 15. One of these animals that is like 15 years old, a couple of years ago, as I mentioned, did mate and produce an 85-percent hatch rate, which is a very good hatch rate for anybody, indicating that our system itself doesn't have any inherent difficulties with it.

As I stated, our difficulty is inducing our turtles to be reproductively active for mating prior to nesting. We have many things we can try such as changes in sex ratios; we are currently doing a study with Berkeley on analyzing the hormonal titers between captive wild farm-reared stock animals to see if we can pinpoint some hormonal differences in these particular two groups of animals.

Mr. BREAUX. Any possibility of artificial insemination of the turtles?

Mr. WOOD. We have done quite a bit of work on that. We have developed techniques for electro-ejaculation, collection of semen. We tried two different techniques for artificial insemination, both direct cloacal insemination and use of laproscope.

In either case, have been unsuccessful in getting a fertilized egg. We have tended to work with animals that have started out, began laying infertile eggs. We would like to see that the subsequent clutches are fertilized. It may be that that is extremely difficult to do.

We would have a better chance—to artificially inseminate a turtle before she even begins the full nesting process.

Mr. BREAUX. Dr. Wood, I think those are probably most of the areas we were trying to cover. If we have additional areas that come up, we will be back in touch with you, so we will have an adequate record.

I would say that the committee is impressed with your dedication. I think you are certainly dedicated to doing what you think is proper and appropriate with regard to helping the sea turtle move from a endangered or threatened existence to a position where it is a viable and productive animal in the wild, as well as on farms.

We appreciate your being with the committee today.

Mr. BREAUX. I would like, at this time, to welcome our last panel for this year: Robert Berg, biology professor at Southington Chalker High School, Burton, Ohio; Mr. Sam Kazman, attorney with the Association for Rational Environmental Alternatives and the Pacific Legal Foundation; Mr. Nicholas Mrosovsky, professor of

biology at the University of Toronto of the American Alligator Association.

STATEMENTS OF ROBERT BERG, SOUTHTON CHALKER HIGH SCHOOL; SAM KAZMAN, ATTORNEY, ASSOCIATION FOR RATIONAL ENVIRONMENTAL ALTERNATIVES AND NICHOLAS MROSOVSKY, PROFESSOR OF BIOLOGY, UNIVERSITY OF TORONTO; AND DON A. MROSOVSKY, ALLIGATOR ASSOCIATION

Mr. BERG. Thank you, Mr. Chairman. I would like to express my appreciation and take part in this process. I think it is one for everyone concerned.

As a bit of background, I would like to mention that I am involved with the program, and I have a Turtle Farm.

I am a high school biology teacher and have instituted in our school system a program which I teach. We raise funds which is used to take a group of students to Grand Cayman.

The main purpose of this program is to educate the public about the susceptibility of the marine ecosystem, and without a doubt, the plight of the Cayman Turtle Farm is in.

One aspect of observation I have seen in the past years is the tremendous concern and among them as to how they are solving the problem. As they have been gradually seen several students receive scholarships which hope directly relate to the program.

At the present time, I have studied the university settings in Hawaii and have grown tremendously aware of the need to approach this issue more fully. Nature can do for the species as a whole.

We have been discussing through implementing legislation, paperwork, and much attention has been paid to the species itself could tremendously help the Cayman Turtle Farm.

Mr. Wood has just said several years ago, only 3,000 yearling turtles have been born. My testimony, specifically from Dr. Weber stated and restated several years ago that the mortality of 1 in 100 adult sea turtles is expected.

In my process to prepare for testimony from the Center for Environmental Alternatives, that speaks of a surplus appears to be a bit of conflict here,