

2 of 3 20

1981-1983 INCOMING  
LETTERS OF G.H. BALAZS

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Avenue du Mont-Blanc  
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cc - R. Scott/H. Jungius  
Dr. R. Ormond

Dr. George H. Balazs  
Assistant Marine Biologist  
University of Hawaii at Manoa  
Hawaii Institute of Marine Biology  
PO Box 1346  
Coconut Island  
Kaneohe  
Hawaii 96744  
USA

Gland, 7 December 1982

Re: W.ASIA(Gulf)/01/81 - Gulf Coordinating Council Meeting

Dear Dr. Balazs,


Bob Scott has asked me to respond to your letter of 28 October 1982 regarding turtle conservation in the Gulf region.

The IUCN Bulletin refers to our contract with the Meteorology and Environmental Protection Administration for the preparation of 9 technical papers for the Gulf Coordinating Council Expert Meeting on Environmental Issues. This meeting is expected to take place in early 1983 but the date and the place have not yet been confirmed. For your information I enclose a copy of the Marine Resources paper which devotes a small paragraph on turtle conservation.

According to Dr. Burchard's letter of 13 June 1982, he is already in close contact with the IUCN Marine conservation researchers based at the University of York (Dr. Rupert Ormond and Dr. Andrew Price). The draft project description of our Gulf project (copy enclosed) also makes mention of close collaboration with the University of Petroleum and Minerals (see pages 8 and 11). At any rate I will copy your letter and enclosures to Dr. Ormond to make sure that he is fully in the picture and that he will give due consideration to turtle conservation problems during the implementation of his project.

Best regards,

Yours sincerely,

  
Anton R.C. Fernhout  
WWF/IUCN Project Manager  
ASIA, PACIFIC and OCEANIA

COMMISSION DE LA SAUVEGARDE DES ESPÈCES - SPECIES SURVIVAL COMMISSION

Sa/3/4-3  
SSC/RFS/pc

EXPRESS

Dr. Nicholas Mrosovsky  
Department of Zoology  
University of Toronto  
Toronto  
Ontario M5S 1A1  
Canada

6 December 1982

Dear Nick,

You have asked for permission to quote from my 9 September 1980 letter to Dr. Mittag that was in response to her enquiry about releasing surplus turtles from the Cayman farm to the wild. I understand this material is to be used in a book you are preparing on marine turtles and their management.

I am pleased to give my permission, and am enclosing copies of that letter and a related one of 10 February 1981, along with a copy of the IUCN policy statement on species introductions (IUCN Bulletin, Oct/Dec 1968 Vol 2, No.7 pp 70-71). As we discussed on the telephone, my only proviso would be that the material be used fairly in the larger context of the official policy statement. I would appreciate the opportunity to review that portion of your draft manuscript when you have it completed.

As I also mentioned, IUCN is now undertaking an updating of the statement, prompted in part by the increasing incidence of proposals for releasing related but non-native taxa or stocks in habitats still occupied by the original native forms. The immediate and obvious effect of such actions is to mix up the distribution of the natural taxa, but what is of more concern to IUCN, is whether behavioural or other subtle differences accompanying the taxonomic distinctions may also turn out to have other deleterious effects as well.

You will note that the policy statement is "using the term 'species' in the sense of readily distinguishable groups of organisms (thus including taxa of subspecific rank....)", and with reference to SSC recognized "the special concern of that Commission with the influence of new introductions on the survival of endemic plants and animals." It also points out that "The control and management of introductions is... one of IUCN's major concerns...", citing the "adverse consequences of introductions, ranging from minor losses from an economic, cultural or scientific point of view up to unmitigated disaster," and stressing that "possibly the greatest danger lies in the uncertainty of prior appraisal...."

./..

Dr. N. Mrosovsky  
Canada

6.12.1982  
- 2 -

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Among the recommendations, number two suggests that "no species" (including lesser taxa) "is considered for introduction into a new area where stock of a... comparable native species occurs..."

I hope all of this will be of help to you.

Yours sincerely,



Robert F. Scott  
Executive Officer  
Species Survival Commission

Encl.



1601 CONNECTICUT AVENUE, N.W.  
WASHINGTON, D.C. 20009

TELEPHONE: (202) 387-0800  
CABLE: PANDAFUND TELEX: 64505

Nov. 19, 1982

Dear George,

Thanks very much for your comments on the three proposals for sea turtle research in Costa Rica. Archie Carr also suggested having David Ehrenfeld take a look at them and I've shipped them off to him.

Best regards,  
Nancy



copy of Balgo  
Sea Turtle  
Rescue  
Fund

11 November 1982

Dr. Archie Carr  
Department of Zoology  
University of Florida  
Gainesville, FL 32611

Dear Archie:

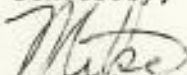
Thank you so much for your kind note of 3 November. I shall not take entire credit for the testimony since I was able to rely upon two very knowledgeable people in Roger McManus and Peter Escherich. Fortunately, we shall all benefit from their expertise over the long haul which is facing us.

I have enclosed some supplemental testimony which I prepared for the subcommittee. The only benefit from having reviewed the testimony and critiqued it is that we have perhaps created a stronger record. As it is, a letter will be sent from the subcommittee (i.e., the Chairman and the ranking minority member) to the Department of the Interior recommending that Interior change the regulations so that they comply with CITES and so that they recognize the determination by the U.K. Management Authority that the farm's products are captive-bred.

I must say that when I found out about the letter I felt such anger as I have seldom felt. The anger is passed but resolve has set in. This very disturbing development, which will affect not just sea turtles but other listed species, must not be allowed to run its disastrous course. At this time, we must sit tight, I believe.

Thank you again for your generous thoughts.

Sincerely,

  
Michael Weber

Sea Turtle Rescue Fund Director

Sawdabau.

11th Nov, 1982.

Dear George,

Many thanks for your letter of 3rd November which I received today. Glad to learn that the leather back stamps filled a gap in your collection. It's a pleasure to help anytime.

The Bali meeting was an enjoyable one - it got to be boring sometimes especially when some characters got long winded. Most of them could not stop talking. As usual the Philippines was unrepresented - no progress there. Archie's son was there & I privately suggested to him a course of action - what was suggested could be carried out very swiftly. Very simply - a delegation comprising Archie, Wayne, yourself & perhaps 2 others

From IUCN call on the President  
& explain the situation to him.  
Apparently, the task force is not  
functioning at all.

Archie did not turn up -  
his son presented a paper on  
during one of the workshop  
meetings.

From the one egg harvest  
records, the population appears to  
be constant but there is no  
room for complacency. If some  
of the activities on the other  
side of the border are carried  
we could perhaps build up  
a stable population.

The Sri Lankans I met at  
Bali have suggested that a  
further survey or study ~~on the~~  
be conducted within the Ruhuna  
National Park. I immediately  
thought of you. If you are  
willing we could do it together



The survey will take about 4 to 6 weeks. If we undertake the project we will have the assistance of Sri Kanchan kirtti workers. This will be an excellent opportunity to help others as well as undertaking a project in an alien site.

I have sent you a copy of my paper presented at Bali. As the paper is still a draft it will be appreciated if you could read please read it & send me your comments so that I could add or delete as necessary.

With all good wishes  
to you & your family.

Sincerely  
Stanley



DEPARTMENT OF THE NAVY  
ATLANTIC DIVISION  
NAVAL FACILITIES ENGINEERING COMMAND  
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FPO MIAMI 34051

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AUTOVON  
831-4204/4083

91:GDC:do  
11015  
22 November 1982

Mr. George H. Balazs  
Hawaii Institute of Marine Biology  
P.O. Box 1346  
Coconut Island  
Kanehoe, HI 96744

Dear Mr. Balazs:

I noted in the September 30, 1982 issue of the Sea Turtle Rescue Fund, East and Gulf Coast News that you have prepared a report entitled "Radio Telemetry of Hawaiian Green Turtles at their Breeding Colony" under permit number PRT 2-3593. I would appreciate it if you would send me a copy of your report.

The Navy is considering radio tracking of sea turtles as one possible method of complying with the National Marine Fisheries Service's request for more information about these animals within the Navy controlled waters of Vieques Island, Puerto Rico. Your report represents a start at gathering information on this methodology. I would also appreciate any other references you may be able to offer concerning radio tagging of sea turtles.

Thank you for your attention to this request.

Sincerely,

GEOFFREY D. CULLISON  
Commander, CEC, USN  
Director\*

UNIVERSITY OF FLORIDA  
GAINESVILLE, 32611



DEPARTMENT OF ZOOLOGY  
222 BARTRAM HALL  
904-382-1107

Mr. Arthur Sirkin, Chairman  
Environmental Advisory Committee  
Northville Industries/Petroterminal  
PO Box 937  
Melville, New York 11747

Dear Mr. Sirkin:

I would like to express my appreciation to Petroterminal and the Environmental Advisory Committee for inviting me to attend the September meeting of the committee in Panama City. The meeting gave me a much-welcomed opportunity to present information about the marine turtle fauna of the Caribbean coast of Panama, and to discuss my concern over the potential impact of the pipeline on the marine turtles and on the Chiriqui Lagoon area in general. The session also served to establish channels of communication between myself and the various parties concerned, and subsequently there has been a very constructive exchange of information.

Although I was favorably impressed at the meeting by the intentions of the parties involved and by various aspects of the physical installation itself, two facts concern me greatly. The first is that the Caribbean terminal is situated in an extremely sensitive ecosystem. I realize that some of the same conditions that contribute to the area's environmental sensitivity also contribute to favorable oil transfer operations. Nevertheless, there are considerable environmental risks to be reckoned with, and in choosing the Chiriqui Grande location, it seems to me that an obligation to insure protection of that ecosystem was also assumed. That leads to my second concern--that adequate ecological safeguards appear not to have been fully adopted. Environmental impact studies, designed to predict and offset potential damage, are scheduled to be completed long after oil pumping operations begin. It is my understanding that field work for the marine aspects of the studies only began in August 1982--the intended month of start-up. As a result, critical environmental data on the circulation pattern of water within Chiriqui Lagoon, and on the location of environmentally sensitive habitats, for example, are not available for consideration in preparing Petroterminal's oil spill contingency plan. This can only weaken the effectiveness of this important document. The fact that this plan remained unwritten as of 9 September further reinforces my concern that pipeline operations will jeopardize the environmental welfare of Chiriqui Lagoon. These problems were openly discussed at the meeting and similar concerns about the lack of a contingency plan were expressed by parties other than myself. I would like to ask what measures have been taken since the meeting to rectify the situation? What is the current status of Petroterminal's contingency plan?

I am pleased to report that several constructive developments resulted from the meeting. Mr. Geoffrey Moss, of Petroterminal, accepted the offer of assistance, in an advisory capacity, of an *ad hoc* committee of scientists and other parties concerned with the protection of the Panamanian environment. The members of the committee have volunteered their expertise in a number of pertinent disciplines. The goal members share with each other, and with your committee, is to insure the protection

George →  
F.Y.I. Were  
at a standstill  
on this right now. Sirkin  
was transferred, and the  
new man at PT P is even  
more of a Neanderthal than  
he. The contingency plan is still  
not ready. And the oil  
is flowing, a few stages  
a few stages, and  
today, and

13 October 1982

of the terrestrial and marine systems in the area of the pipeline and its terminals. Mr. Moss offered to make pertinent documents, such as Petroterminal's contingency plan, available to the committee for review and constructive input. I see the willingness of Petroterminal to work with this committee as a positive and open-minded approach to a task that is admittedly a difficult one.

Another positive step taken at the meeting was that the Environmental Advisory Committee agreed to recommend to Petroterminal that the boundaries of the environmental mapping project by *Estudios Ambientales* and Research Planning Institute be extended to include the outer lagoon area. I think this is a significant and necessary change in the design of the study, and believe it is certain to benefit marine turtles and other marine species by providing better protection for their habitats in the event of a spill. I would appreciate hearing what decision regarding this recommendation was reached by Petroterminal, and, if the recommendation was accepted, what the new boundaries of the study would be. I would like to mention that since the meeting I have been in touch with Dr. Eric Gundlach of Research Planning Institute, and that, at his request, I will be providing distributional data concerning marine turtles and their habitats for incorporation into the maps for the Chiriqui Lagoon area.

Another development of the meeting is that, through the efforts of Mr. Robert Levine and Dr. June Siva, of ARCO, an information sheet has been developed advising oil tankers against dispelling oil-contaminated ballast water in the vicinity of floating bands of *Sargassum*. These mats of algae are the habitat of hatchling marine turtles of several species during their first few years of life. They are also traps for floating oil, and hence, the need for caution on the part of oil tankers. I am looking forward to seeing the leaflet, which will be distributed by several oil companies to their tanker crews.

In summary, I recognize serious environmental risks that may be generated by the pipeline project, particularly those associated with the Chiriqui Lagoon terminal. I also, however, recognize the intention and technical capability of Petroterminal, the Environmental Advisory Committee, and the oil companies using the pipeline, to carry out the job in an environmentally conscientious manner. To that end, I hope you will take advantage of the assistance volunteered by our committee, and that, together, we can insure protection of this fragile tract of the incomparable Panamanian wilderness.

Sincerely,

Anne Meylan

Anne Meylan  
Chairperson,  
Advisory Committee, Panama Pipeline  
Caribbean Conservation Corporation

cc: Robert O. Ande  
A.W. Whitehouse  
C.C. Garvin  
R.A. Levine  
R.J. Meyers  
R.J. Harris  
G.A. Moss  
L. Ramirez

hopefully, we will get things rolling again. There's a meeting in Panama on 7 Dec. + I hope we can send a representative to attend it and to inspect the sites. A

UNIVERSITY OF FLORIDA  
GAINESVILLE, 32611



DEPARTMENT OF ZOOLOGY  
223 BARTRAM HALL  
904-392-1107

19 October 1982

904-392-1250

MEMO

TO: Advisory Committee, Panama Pipeline

FROM: Anne Meylan

RE: Status of pipeline project; establishment of advisory committee

I am enclosing copies of a number of materials that will explain the current status of efforts to persuade the builders and operators of the Panama pipeline to provide maximum protection to the environment and wildlife in the vicinity of the pipeline. On September 9, 1982, I attended a meeting of the Environmental Advisory Committee in Panama, to discuss my concerns over the potential impact of the project on marine turtles and the Chiriqui Lagoon area, and to offer the assistance and scientific expertise of our newly formed *ad hoc* committee. Lists of the members of the Environmental Advisory Committee (EAC) and of others attending the meeting are attached. The most important points of the meeting are summarized in my letter to Mr. Art Sirkin, chairman of the EAC and representative of Northville Industries (a partner in Petroterminal de Panama). I have sent copies of this letter to all EAC members and to the chairmen of the boards of Arco, Exxon and Sohio. I am expecting a letter from that committee expressing their commitment to cooperate with our advisory committee. I will then ask for a detailed description of all aspects of the project, which I will distribute to all of you.

I think that the most important document for us to obtain for review is Petroterminal's (PTP) oil spill contingency plan. This describes the course of events, and the chain of responsibilities, if a spill should occur. An important point to realize about the project's organization is that PTP is the company that is legally responsible for the pipeline and its terminals. They are responsible for writing their own spill contingency plan, with only the advice of the environmental experts of the three oil companies. The oil companies are thus one tier removed from primary responsibility for the project. This is unfortunate for two reasons. The oil companies have by far the greater expertise in preparing spill contingency documents, and, they are much more sensitive to public pressure. Nevertheless, it is in their interest to see that the operation is a clean one. Spills are extremely costly and damaging to their public image, no matter where the financial responsibility lies. The oil companies are fully liable for spills involving their ships, and would be called in to help clean up a spill if it were of giant proportions, beyond the technical capability of PTP.

As I mentioned in my letter to Mr. Sirkin, PTP's contingency plan remained unwritten as of 9 September. The only information that I have been able to obtain on spill control equipment available for the project is that listed in the enclosed invoice to Latinsell International, S.A. I received no response to my letter of 28 July asking how the various equipment would be divided between Puerto Armuelles and Chiriqui Grande.

The list leaves much to be desired. Mr. Earl Eddenfield of Jacksonville Spillage Control in Jacksonville, Florida, evaluated it at my request in early September, and found it very unsatisfactory. In his opinion, the list lacked form or direction, and did not add up to any integrated whole. He specifically cited the lack of recovery equipment and the inadequacy of the ACME 51 skimmers. (At the September meeting in Panama, I was told that another skimmer would be transferred from the Puerto Armuelles terminal to Chiriqui Grande before start-up.) Eddenfield also said the list represented inexpensive equipment, some of it out-of-date. Gilberto Cintron also reviewed the list and pointed out the inclusion of a dispersant (Corexit 9527) which, because of its toxicity when combined with oil, is rarely used in confined, low-energy environments. For your information, the use of dispersants is totally prohibited in the U.S. unless a major health hazard, exceeding the environmental hazard, exists. Even then, high-level governmental approval is required for one-time usage. As of 9 September, PTP was not prepared to say whether Corexit 9527 would be used in Chiriqui Lagoon, nor had they developed any guidelines for dispersant usage, in general.

Environmental studies for the project are being done by *Estudios Ambientales*, a Panamanian company, and by numerous subcontractors based both in Panama and abroad. Some of the most important ecological work is being done by Research Planning Institute, a company based in Columbia, South Carolina. I am hoping that our committee will be given access to the results of these environmental studies as they become available. Apparently, terrestrial faunal surveys along the pipeline's course have already been completed. I will request a timetable for the completion of the various phases of the study, so that we can anticipate the results. Mapping of the shoreline habitats (used to assign environmental sensitivity ratings) is scheduled for mid-November. These ratings figure importantly in the spill contingency plans, and are supposed to be incorporated as they become available.

I am enclosing a letter by Professors Bernard Le Mehaute and Shen Wang of the Division of Ocean Engineering, University of Miami, evaluating the placement and design of the two terminals. I have spoken to Professor Le Mehaute about the project, and I think that he will be willing to give us additional advice, if we need it. Apparently, PTP and the EAC were never advised of these findings, and I intend to send them copies for their consideration and comment. The berthing system is one aspect that our committee ought to investigate carefully, as Professor Le Mehaute feels that the SPM system chosen for the project may result in chronic, low-level spills at the terminal.

A word about our advisory committee. The following people have indicated that they are willing to serve: Chuck Carr, Gilberto Cintron, Clifton Curtis, Craig MacFarland, John Robinson, Bruce Rich, and Joe Tosi. A few others are still being contacted. I have set it up as an *ad hoc* committee of the Caribbean Conservation Corporation, under whose auspices I first approached the oil companies. The Caribbean Conservation Corporation is a non-profit organization that is concerned with the conservation of marine turtles in the Caribbean. Mr. Colin Phipps is its president, and Dr. Archie Carr, of the University of Florida, its technical director. Membership on the advisory committee does not imply membership in the organization. Please forgive my undemocratic appointment as chairperson of the committee. It was a temporary measure to get things going and to facilitate correspondence with the oil companies.

I would like to ask each committee member to provide me with his or her full name, title or affiliation, mailing address and phone. Please do this promptly, as the EAC will want to know very soon who is on the committee. If you have any reservations about being identified, or having your affiliation known, please advise me. I will distribute a complete list of members and their addresses as soon as I have it.

In closing, let me say that I have received some encouraging signs from members of the EAC concerning the potential for our committee to play a constructive role in the pipeline project. Already, their agreement to extend the area covered in the habitat mapping project is a positive step, and I think it demonstrates their willingness to consider valid, constructive criticism. One of the most important roles our committee can play is that of providing independent supervision. The companies involved are fully capable of carrying out an environmentally safe operation, but in a place as remote as Chiriqui Lagoon, the incentive to do so is not so strong. Moreover, the government of Panama is not pushing them in this direction. Our role is to give them this incentive. By requesting, for review, various documents detailing operational safeguards and spill response plans, we can insure that they do, in fact, exist. We can also provide supervision in the form of routine on-site visits. We can also provide much more detailed information on the flora and fauna of the area than they are likely to get from the cursory inventories planned. The quality of PTP's spill contingency plan depends greatly on the quality and detail of knowledge about the environment and its wildlife, and I think our committee can very definitely contribute to this end.

I think it would be helpful for one of our committee members (most likely someone from nearby Costa Rica) to visit the project around the start-up date. This would give us the opportunity to become more familiar with the operation, and would encourage PTP to fulfill some of their promises about transferring equipment. I will be working to set this up.

I look forward to hearing from each of you, and I extend my thanks for your help. I promise to make the next communication SHORTER!

Sincerely,

*Anne Meylan*  
Anne Meylan

enc.

Environmental Advisory Committee

Members:

Mr. A.L. Sirkin  
Northville Industries Corporation  
35 Pinelawn Road  
Melville, NY 11747  
(516) 293-4700

Mr. R.A. Levine  
Marine Environmental Advisor  
Health, Safety and Environment  
Arco Marine, Inc.  
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Mr. Geoffrey Moss  
Manager, Marine Services  
Petroterminal de Panama  
P.O. Box 8-179  
Panama 8, Republic of Panama

Mr. Robert J. Meyers  
Environmental Conservation Coordinator  
Exxon Shipping Company  
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Houston, TX 77001  
(713) 656-5560

Captain R.J. Harris  
Manager, Navigation and Safety  
Technical and Special Projects  
The Standard Oil Co. (OHIO)  
1052 Guildhall Building  
Cleveland, Ohio 44115  
(216) 575-5849

Ing. Luciano Ramirez A.  
Autoridad Portuaria Nacional  
Apartado 8062  
Panama 7, Panama



ENVIRONMENTAL ADVISORY COMMITTEE

Sept 9, 1982

<u>NAME</u>	<u>COMPANY / ORGANIZATION</u>
BOB MEYERS	EXXON
Marta Ramirez	Renewable Natural Resource
Anne Meylan	Dept. of Zoology, Univ. of Fla. <sup>IUCN Marine</sup> <sup>Fish Specialist</sup> 6
Argelis Ruiz	Smithsonian Tropical Research
Erick A. Castillo	Institute / Universidad de Panamá
GEOFFREY MOSS.	PETROTERMINAL de PANAMA.
DOUGLAS BUCKLEY	— do —
REINO SOISALO	SOHIO / PIO ARMUELLET
ROBERT HARELS	SOHIO MARINE
Alan E. Ramm	SOHIO / ENVIR. AFFAIRS
JAVIER E. ORTIZ	ESSO MARINE SUPPLY CO. - PANAMA
ROBERT A. LEVINE	(EXXON)
ROBERT A. LEVINE	ARCO MARINE, INC.
Pedro Galindo	EASA
JERRY SEXTON	Research Planning Institute / EASA
June Lindstedt - Soria	Atlantic Richfield, Los Angeles
BOGDAN KWIĘCINSKI	EASA PANAMA
C. B. (Bruce) KOONS	EXXON PRODUCTION RESEARCH CO, HOUSTON
Fiorella De Vincenti	EASA, Manager.
Aldelmo Ruiz -	INSPECTOR / COFINA
Victoria de Puy	Autoridad Interamericana
Luzdes J. de Mata	National Port Authority
Luciano RAMÍREZ A.	A.P.N.
DB FLANAGAN	PAN CANAL / USCS



# PETROTERMINAL DE PANAMA, S. A.

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NORTHVILL MELV

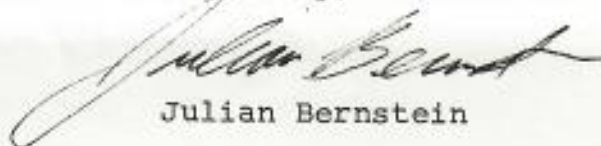
July 2, 1982

Ann Meylan  
Dept. of Zoology  
University of Florida  
Gainesville, FL 32611

Dear Ms. Meylan:

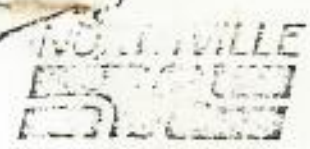
Per your request, enclosed is the list of oil spill contingency items that have been ordered to date. Please note that further equipment will be purchased after start up of operations.

Sincerely,



Julian Bernstein

JB:DDR  
Enc.



NORTHVILLE INDUSTRIES CORP.  
 ONE HUNTINGTON QUADRANGLE  
 SUITE 4001 MELVILLE, N.Y. 11747  
 (516) 263-4700 EXT. 589-1400  
 TELEX 98-1415 TWA LTD 2049443  
 CABLE NORTHVILLMELV

PURCHASE ORDER

PURCHASE ORDER NUMBER

PAGE 1 OF 1

THIS NO. MUST APPEAR ON ALL COPIES. INDELS AND FAXES SHOULD BE PREPARED.

TO: LATINSFLL INTERNATIONAL S.A.  
 EL DORADO APARTADO 662295  
 PANAMA, REPUBLICA DE PANAMA  
 ATTN: FRANK A. MATTOCKS

SHIP TO:

PETROTERMINAL DE PANAMA, S.A.  
 EDIFICIO COMARVA, P.O. BOX 8-179  
 CALLE FLORIDA MENDEZ & 52ND STREET  
 PANAMA CITY, REPUBLIC OF PANAMA  
 ATTN: CAPT. G. MOSES

DATE: FEBRUARY 11 1980  
 REQUISITION NUMBER  
 ACCOUNT NUMBER  
 PROJECT

CONFIRMING  NO  YES DATE: 2/11/80 PHONE NO. SELLERS QUOTATION REFERENCE DATE

SHIP VIA:  YOUR DELIVERY  F.O.B. POINT  DESTINATION  CIP PANAMA REQUIRED DATE: JULY 1, 1980 MAIL INVOICE TO: NORTHVILLE INDUSTRIES CORP., SUITE 4001, 1 HUNTINGTON QUADRANGLE, MELVILLE, N.Y. 11747, ATT.   
 FREIGHT:  PREPAID & ADDED TO INVOICE  COLLECT TERMS:  NET 30 DAYS  2% - 10 DAYS  SEE BELOW PROMISED DATE

TEM	QUANTITY	DESCRIPTION	PRICE	PER	TOTAL
1	35 LGMT.	ACME BOOM, 100 FT. SECTIONS, 6 INCH DIAMETER, 12 INCH SKIRT WITH 1/4 INCH CHAIN DALLAST. EACH SECTION COMPLETE WITH HAND LOOPS AND (WICH LANE) COUPLERS. WITH EYE BOLT ASSEMBLY FOR BOUY AND ANCHOR ATTACHMENT.			
2	12	ACME TOM BRIDLES			
3	15 SETS	ANCHOR AND BOUY ASSEMBLY COMPLETE WITH ATTACHING HARDWARE 20 NAVY ANCHOR.			
4	15 SPOOL	POLYPROPYLENE ROPE DIAMOND BRAND, 1/2 INCH			
5	40 GAL.	MONTGOMERY BOOM CLEANER, FIVE GALLON CONTAINERS			
6	150 BALES	38 TYPE 156			
7	50 ROLLS	38 TYPE 100			
8	100 BOX	ACME ROBERT 1			
9	100 BOX	ACME ROBERT 5			
10	50 GAL	100 SEINE DISINFECTANT, FIVE GALLON CONTAINER			
11	50 GAL	SMALL OIL CLEANER, FIVE GALLON CONTAINER			
12	4	EACH DACT SPRAYERS FOR DISINFECTANT			

NORTHVILLE INDUSTRIES CORP.

*Frank A. Mattocks*

APPROVED BY

AUTHORIZED BY

TERMINAL COPY

ORDER

# NORTHVILLE INDUSTRIES CORP.

TO: LATHBELL INTERNATIONAL S.A.

EM	QUANTITY	DESCRIPTION	PRICE	PER	TOTAL
13	10	DRUMS, COLENT 9527			
14	2	SKIMMERS, TYPE 51T, ACME, GASOLINE DRIVEN 4 HP MOTOR. INCLUDES COMPLETE SET OF SPARES FOR IN FIELD SERVICE.			
15	30	LIFE VESTS, BROWN, PLASTIC			
TOTAL INCLUDES 5% ITEM TAX					811.076
<p>PAYMENT TERMS:</p> <p>25% DOWN</p> <p>75% PAID PER ITEM IN FULL AS DELIVERIES ARE MADE.</p>					



University of Miami  
Miami, Florida 33149

DIVISION OF OCEAN ENGINEERING

Dorothy H. and Louis Rosenbrot  
School of Marine and Atmospheric Sciences  
4600 Rickenbacker Causeway (305) 556-7000

26 April 1982

Dr. Hugo Torrijos R.  
Director General  
Consular Y de Naves  
Ministerio de Hacienda Y Tosoro  
Apartado 5245  
Panama 5, Republica de Panama

Dear Dr. Torrijos:

We want to thank you very much for your hospitality during our stay in Panama. We have had the most interesting trip and we hope that the conversations that we had with you and Mr. Moncayo have also been useful.

Now we would like to summarize some of our conclusions concerning the terminals of the pipeline between Puerto Armuelles and Laguna de Chiriqui. We are offering these conclusions fully aware of their relative values - unless one can live with the project for awhile, one can only present superficial impressions, and most issues which could be raised by us have probably already been examined in depth by the contractor. In particular, we did not have the opportunity, in such a short time, to examine engineering design and we had little knowledge on the oceanographic environment. Nevertheless, our general impression is that the project is basically sound in the areas of our competence and the contractor must be congratulated for what has been achieved in a relatively short time. If more time for the design would have been available, there would be a flock of investigations which could be recommended and in the end could influence the final design.

The Laguna de Chiriqui offers ideal navigational conditions. The wind and wave climate are no major problem. Visibility is good (except under squalls, which probably occur from time to time). Considering the relative small cost of navigational buoy (in comparison to the project) and the risk involved, we recommend that you add two buoys.

Vessel traffic will be light in the initial years of operation. Consequently, no maneuvering simulation is urgently needed. This

26 April 1982  
Page two

maneuvering study may be required in the later years when the vessel traffic becomes more heavy. The prerequisites to the study, however, are an accurate description of the environmental conditions including wind current and their statistical information which are currently all lacking. Only when this information is confidently documented can the simulation study be worthwhile.

To our knowledge, extreme events are very ill-defined. Extreme events are, by definition, to be considered only for insurance. They also need to be specified by a climatological investigation and precautionary measures need to be defined as part of the operating code. (The same remark applies to Puerto Armuelles). The advice of Mr. Moss for this purpose could be invaluable.

As you well know, one of the problems with single point mooring (SPM) is the tendency for the VLCC to creep towards the mooring buoy during periods of calm. This at times, results in damage caused by the bulbous bow. Under these conditions a launch or a small tug should be able to keep the tanker at a sufficient distance from the buoy.

The main problem area remains the potential risk of pollution of the Laguna de Chiriqui. An SPM solution has been chosen. The SPM is the ideal (unique) solution offshore since a tanker can operate under higher wind and wave conditions at an SPM than along a berth. Considering the prevailing calm of the Laguna de Chiriqui, open sea berths would have been better. It is our understanding that the SPM solution was chosen to reduce construction time. The problem with SPM is that they are more prone to small operational oil spills than the flexible loading arms (such as Chicksan) which are fixed on platforms of open sea berths.

In an enclosed basin such as the Laguna de Chiriqui, subjected to very small tidal amplitude and flushing, and a prevailing wind towards the land, a small current of operational oil spill occurring at frequent intervals can create a problem to the sensitive ecological environment of the embayment. Even the ballasting water, if not properly treated, can create a problem in the long run. For this reason, the following are recommended:

1. The quality of the deballasting water should be carefully monitored as it seems to be done at Puerto Armuelles.

2. The quality of the bay water should also be monitored for at least a year after the start of the operation.
3. The meteorological conditions, particularly wind should be continuously monitored as soon as possible.
4. The results of the one-year monitoring could be used to determine the long-term potential pollution which will result from the terminal by simple analysis and extrapolation.
5. Since a third buoy is considered in the Laguna de Chiriqui, we suggest that, given time, the third SPM system be replaced by an open sea berth.
6. If necessary, even the two SPMs presently considered may have to be replaced in the future by berths.
7. In the worst possible case - not highly probable - the terminal location may have to be replaced in the future by extending the pipeline to the Isla Cayo Aqua. This solution may also be considered if the traffic increases substantially and more terminals are necessary.

The environmental study should be delineated as specified by Dr. J. van de Kreeke and Dr. J. Wang:

1. Determine the coastal circulation with emphasis on the exchange between lagoon and ocean.
2. Determine salinity, temperature and density structure of the lagoon.
3. Determine water levels, currents and residence times for various sub-regions of the lagoon.
4. Determine wind climate.
5. In the vicinity of the oil terminal determine the dispersion and mixing characteristics.
6. Adapt existing transport models to interpret the observed salinity, temperature and velocity field. The same model could possibly be used to predict the fate of an underwater oil spill (e.g., break in pipeline).

26 April 1982

Page four

7. Adapt existing numerical model for oil slick movement for use in Laguna de Chiriqui.

• Our last comment is about the selection of the SPM system. If our memory is exact, we were told that it was an EMH system. This system seems to solve the problem during calm; indeed, to our knowledge the EMH has a rotating arm which escapes laterally when the VLCC creeps toward the buoys. There is, however, less experience available on this system than on some others, and EMH has initially been designed with a base without anchors. We feel that it is an area where more information is needed.

Since you also inquired about the cost of equipment, the following figures can be presented at this time.

Drogues; to be made locally using sheet metal, U.M. marine technician will advise	\$1,500
Water level recorders (2); Leopold Stevens with paper tape output	5,000
Salinity/Temperature; Beckman direct read-out meter (1)	2,000
Recording current meters (2); Aanderaa, analog tape output	10,000
Fluorometer (1); Turner flow through	10,000
Anemometer plus Vane (1); Aanderaa	6,000

If there is anything else which we can do beyond the Tinker Foundation available support, we will be very pleased to come to an arrangement in a relatively short time.

You will find enclosed reprints relevant to the subject which could be of interest to you.

Sincerely,

*Bernard Le Mehaute*  
Bernard Le Mehaute  
Professor and Chairman

*Shen Wang*  
Shen Wang  
Professor

/m  
encls

cc: Eng. C. Moncayo  
Dr. F. Palacio







# TRAFFIC (U.S.A.)

WORLD WILDLIFE FUND-U.S.

1601 Connecticut Avenue NW  
Washington, DC 20009

(202) 797-7901

WITH OUR COMPLIMENTS

Nov 10

George,

We've been working hard at getting an agenda item discussed at the next meeting of CITES regarding trade in wild sea turtle products. You should have received a packet submitted to our Management Authority with a Resolution. Archie Carr thought it was good & covered all points. I have enclosed a letter which gives you the answer to your question you had a few months ago. CTF trade figures do not come anywhere near totals of

Cable: PANDAFUND Telex: 64505

tortoiseshell that Japan claims to import.  
Hawksbills beware! Blot, Dini



# TRAFFIC (U.S.A.)

WORLD WILDLIFE FUND-U.S.

1801 Connecticut Avenue NW  
Washington, DC 20009

(202) 797-7901

November 8, 1982

Chris Huxley  
Head, WTMU  
219c Huntingdon Road  
Cambridge CB3 0DL  
England

*CITES  
Secretariat*

Dear Chris,

I'm sorry to keep going back and forth on the sea turtle issue. I find we agree on all the points you outline, but come to separate conclusions.

The most important fact we have right now is what you set down in your first point in your letter to Eugene Lapointe: "Trade in marine turtle products in violation of CITES is known to continue." Whether we spend the next three years trying to collect information on the exact extent does not appear to be the question. We have identified an area causing serious threat to endangered species that are afforded trade protection by their listing on CITES Appendix I. We are not dealing with an absolute science, and there will always be questions on the accuracy of trade data (CITES reports included). A general resolution passed by the Parties will provide the Secretariat and/or the Technical Expert Committee with a mandate to handle the situation for anything new we find, and in the meantime, they could contact countries that we have some reliable information.

For Appendix I species the Convention has in the past addressed trade by non-party countries, so I find it irrelevant in some ways talking about "over 50% of the trade could not be in violation of CITES". A rhino horn trade resolution was passed at the third meeting of the parties (Conf. 3.11), and the Secretariat was instructed by the parties to contact non-CITES countries and ask for their assistance in the matter. The sea turtle product trade also covers many non-CITES parties and should probably be addressed in a similar manner. I believe the final say about a resolution should be given to the parties, and we should not dismiss it before it is brought to their attention. If a proposed resolution is distributed to the parties 150 days prior to the meeting, then each party can come to Botswana able to address the issue.

Now back to the battling grounds of Japan's Customs statistics. I am beginning to believe more and more that the Commodity 05.09-060 (Bekko including waste) is what Tom originally told us - shell from the hawksbill turtle. We just recently received the enclosed letter which contains official trade statistics from CTF in 1981. (I was asked by Mr. Merren not to publish the data unless I consulted Jim Wood first, so please do not use these figures freely.) About 978 lbs (445 kg) of farmed turtle shell was exported to Japan in 1981 which is within 11 kg of what Japan lists importing from the Cayman Islands under the heading 05.09-070 (Other tortoiseshell). Thus, the 3,022 kg of "Bekko" imported in 1981 from the Cayman Islands could actually be from the hawksbill turtle - a sorrowing thought.

All for now.

Best,



David Mack  
Assistant Director

cc: E. Lapointe  
T. Milliken

H. Orren Merren III  
AB, LLB, MBA, LLM, ACI Arb  
Member of the Bars of  
England & Wales,  
Cayman BWI, and  
Washington, DC

**ORREN MERREN**  
**Barrister & Attorney**  
1000 Potomac Street NW, Suite 204  
Washington, DC 20007 USA  
phone (202) 298-8686  
telex 89-2767 MULTILAW WSH  
cable "CAYLAW"  
29 October 1982

Of Counsel  
Truman Bodden & Company  
P.O. Box 866  
Grand Cayman  
Cayman Islands, BWI  
phone (809) 94-92138  
telex 4238 TRULAW CP

Mr. David S. Mack  
Assistant Director  
Traffic (U.S.A.)  
World Wild Life Fund-U.S.  
1601 Connecticut Ave., N.W.  
Washington, D.C. 20009

RECEIVED NOV 1 1982

Dear David:

Enclosed is the 1981 export data for the Cayman Turtle Farm, Ltd. which you requested at the recent CITES NGO Meeting.

If you have any questions concerning this data, I would suggest that you give Jim Wood a call at (809) 949-3893/4/5 or write to him as follows:

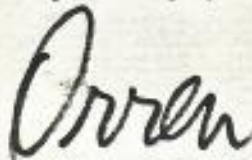
Dr. J.R. Wood  
General Manager  
Cayman Turtle Farm Ltd.  
P.O. Box 645  
Grand Cayman  
Cayman Islands  
BWI

Further, if you have any questions for the management authority of the Cayman Islands, the person to contact is as follows:

Mr. Kearney Gomez  
Principal Secretary  
Agriculture, Lands and Natural Resources  
Cayman Islands Government  
Administration Building  
Grand Caymans  
Cayman Islands  
BWI

If I can be of any further assistance, please feel free to write or give me a call.

Very truly yours,



Orren Merren  
Barrister & Attorney

OM/jq  
Enclosure.

CAYMAN TURTLE FARM LTD. - EXPORT 1981

JAPAN

Steak	25 lbs.
Turtle Hooves	20 lbs.
Belly Shell	958 lbs.
Sets of Skins	650 lbs.
Oil	1,600 lbs.

EUROPE

GREAT BRITAIN

Shells	12
Scutes	6
Oil	400 lbs.

WEST GERMANY

Shells (whole)	1,288
Scutes from	7,095 carapaces
Skinned Flipper	44,688 lbs.
Whole Flipper	79,900 lbs.
Calipee/Calipash	8,350 lbs.
Neck/Tail Bone	7,950 lbs.

ITALY

Sets of Skins	2,709
---------------	-------

SWEDEN

Shell	1
-------	---

FRANCE

Oil	800 lbs.
-----	----------

BELGIUM

Shell	1
-------	---

CANADA

Shells	6
--------	---

BAHAMAS

Shells	2
--------	---

Page 2

Cayman Turtle Farm Ltd. - Export 1981

BERMUDA

Shell	1
Freeze Dried Turtle	1

It should be noted that 229,900 lbs. of steak which had been shipped to Jamaica in 1980 for storage were transferred during 1981 to Germany.

*JRW*

J.R.W.  
29 March 1982

---

P.S. Number employed at 31/12/81 was 24 compared with 92 two years earlier, the reduction reflecting the closure of the American market.

*RSW*

Mr. Roger Webster  
Deputy Chairman

APPENDIX C

JAPAN 1981  
OF COMMODITY BY COUNTRY

BEKKO = TORTOISESHELL  
(12M Dec. 1981)



COMMODITY & COUNTRY	UNIT	CURRENT MONTH		CUMULATIVE YEAR TO DATE	
		QUANTITY	VALUE	QUANTITY	VALUE

DOMINICA	KG	-	-	44	1814
CHINA	KG	-	-	434	2737
TOTAL	KG	180	268	1560	11726

90 つめ及びくちほしるひにキョウネン及びこれら  
品(加工してないもの)並びにこれら品に付  
属する爪及び角の動物のwhalebone and  
d hair and waste of these products

TOTAL	KG	174861	11339	3143289	223365
-------	----	--------	-------	---------	--------

05.12-100 とうもろこし

TAIWAN	KG	7229	11731	1791	21942
FRANCE	KG	-	-	4	29
ITALY	KG	-	-	1	107
GREECE	KG	-	-	4	144
USA	KG	27	71	41	14
TUNISIA	KG	226	1170	1	4796
AUSTRIA	KG	-	-	-	12
TOTAL	KG	7482	9616	1479	30036

05.12-210 貝殻

CHINA	KG	286	79	-	1711
PHILIPIN	KG	1385	246	18	5431
INDONESIA	KG	1284	5482	14111	97067
AUSTRIA	KG	-	-	-	491
TOTAL	KG	15885	6015	11813	100105

05.12-220 貝殻

HONG KONG	KG	-	-	1	12
SINGAPORE	KG	-	-	19	74
PHILIPIN	KG	562	647	117	114
INDONESIA	KG	974	1721	11	199
PAPUA	KG	-	-	-	47
CHINA	KG	1577	111	1193	2102
FIJI	KG	19	18	1652	1726
SOLOMON	KG	28	139	-	52
TONGA	KG	-	-	-	124
FRENCH	KG	541	-	117	411
SAUDI	KG	-	-	-	28
TOTAL	KG	4627	2694	23792	17172

05.12-230 亀の甲殻

KOREA	KG	-	-	3749	4271
CHINA	KG	1000	371	2487	129
TAIWAN	KG	-	-	1260	1260
THAILAND	KG	-	-	1200	12
SINGAPORE	KG	-	-	1000	1000
PHILIPIN	KG	210	1201	6746	2679
INDONESIA	KG	790	2971	17127	24372
INDIA	KG	-	-	1000	3476
AUSTRIA	KG	-	-	1100	1794
PAPUA	KG	495	1739	1476	3671
YANUATE	KG	-	-	1100	124
FIJI	KG	1579	541	1842	6723
SOLOMON	KG	9370	2667	7513	11444
NEW CALD	KG	1900	737	1147	1044
NEW ZEAL	KG	1549	451	1156	7321
TOTAL	KG	195475	7093	208320	749671

05.12-240 その他の貝殻

KOREA	KG	122979	16117	146730	15131
CHINA	KG	1260	593	7180	1513
TAIWAN	KG	808	374	1040	1040
THAILAND	KG	-	-	370	186
SINGAPORE	KG	-	-	1793	1793
PHILIPIN	KG	15486	7344	374264	17571
INDONESIA	KG	9197	19857	17907	179064
INDIA	KG	-	-	3425	1226
SRI LANKA	KG	-	-	1	15
YANUATE	KG	-	-	27	821
FRANCE	KG	-	-	1279	11979
USA	KG	290336	11170	51217	175301
MEXICO	KG	18903	2431	1135	9687
HAWAII	KG	-	-	100	2633
ECUADOR	KG	-	-	187	52
CHILE	KG	-	-	61	17
KENYA	KG	-	-	96	56
TANZANIA	KG	-	-	1744	264
MADAGASCAR	KG	-	-	14	174
COMOROS	KG	-	-	500	259
AUSTRIA	KG	195	16	571	375
PAPUA	KG	-	-	247	2154
YANUATE	KG	-	-	520	674
SOLOMON	KG	143	214	1973	1279
NEW ZEAL	KG	-	-	17	8
TOTAL	KG	465547	15992	728637	7442963

TOTAL	KG	23265	394088	308231	6364367
-------	----	-------	--------	--------	---------

05.09-050 その他のアホー (動及び骨を含む)  
Other ivory, including waste and powder

TAIWAN	KG	110	18	43	42
INDONESIA	KG	-	-	12	76
USA	KG	-	-	83	1369
CANADA	KG	-	-	29	504
SAUDI	KG	-	-	912	7701
S AFRICA	KG	-	-	287	1282
TOTAL	KG	110	187	1723	12081

05.09-100 べっこう(骨を含む)  
Beak(s) including waste

COUNTRY	UNIT	QUANTITY	VALUE
HONG KONG	KG	104	151
SINGAPORE	KG	55	52
PHILIPIN	KG	439	119
INDONESIA	KG	184	104
MALDIVI	KG	-	75
HETIAND	KG	-	44
INDONESIA	KG	120	569
HONGKONG	KG	401	816
INDONESIA	KG	-	475
FRANCE	KG	80	1774
CHINA	KG	1174	36771
PANAMA	KG	-	29
BAHAMA	KG	-	419
JAMAICA	KG	-	2654
CUBA	KG	-	85
HAWAII	KG	124	546
DOMINICA	KG	36	114
P W IND	KG	181	1217
CAYMAN	KG	189	3069
GREENLAND	KG	-	7
ST LUCIA	KG	119	1972
C DOMIN	KG	-	91
C VENEZ	KG	-	91
KENYA	KG	-	1413
TANZANIA	KG	-	84
SEYCHEL	KG	-	425
FIJI	KG	36	1772
SOLOMON	KG	-	33
TOTAL	KG	3196	75618

05.09-170 その他の亀の甲殻及び爪(骨を含む)  
Other tortoise shell and claws, including waste

CHINA	KG	-	725
SINGAPORE	KG	100	16
PHILIPIN	KG	-	20
PANAMA	KG	-	37





11/5/82

To : George  
Larry

From:

Sorry I have been unable to respond in a timely manner — been traveling and in between times, some nursing a bad case of intestinal parasites (protozoan Giardia).

Thank you for making it known to STRF that headstarting is not necessarily a panacea for hawksbills. I noticed your question about Fred Berry's involvement — I question it too, but



(cont.)

don't know if there is anything more I can do about it. You see, Fred

From:

had proposed earlier that NMFS+CCG fund this same project. Carr and I objected strongly; Fred then "removed it" from the contract-proposal to survey sea turtle beaches (2 waters) in Jamaica and Marant Key.

I did not know at the time that he proceeded to "plant-the-seed" in Mike Webber's head; as

24



(cont.)

To: Anyway, I wanted  
to talk to Mike Weber

From: about it earlier this  
month. I saw him at

a TEP Tech. Transfer  
meeting in Charleston.

However, he was so tied  
up chairing the meeting  
I did not get a chance  
to talk to him about the  
Jamaica project.

I don't want to diminish  
his terrific efforts to save  
turtles by being unduly  
critical at this time. His



(cont.)

we now know. <sup>are</sup> Experimental  
Pilot study on a limited

From: (size/population of monies)  
basis is OK & guess, but  
to defend such a research  
project as a positive

management practice that  
has Caribbean-wide application  
for saving Hawksbills is  
highly speculative and  
could be counter-productive  
if beach patrols, enforcement  
activities go unsupported  
because of a funneling of  
\$\$ into tanks/plumbing/etc.



(5)

Testimony re: the Cayman

To: Turtle Farm petition

Nov 4<sup>th</sup> was one of the

From: critical overview  
best I have seen/heard

read regarding that  
nebulous issue of marketing  
effects.

(However,

I definitely intend ~~to~~ to

discuss with Mike (or

write Mr. Grooms directly)

and ask that they do not

speculate and give the

impression that headstarting

works and should be practiced

universally!



(6)

To: George — excuse this

scribble. Been real

From:

busy trying to catch up

on a myriad of paperwork

and FY 83 budgeting.

Tomorrow I leave for

Nassau to attend the

Gulf & Caribbean Fish. Inst.

annual meeting. We will

have a special session ~~to~~

to discuss WATS and try to

stimulate a sluggish group

of fishery officers to step

up their turtle surveys for

input into the Symposium.



(cont.) (7)

To Mrs. Allen Pollan (nee

Karen Björndal) said

From: she will be honey mooning  
in Hawaii in January.

I hope you can show  
her your turtles and your  
islands! I've got some  
more stuff on Inconel and TED  
(plus copies of all the CTF/NMFS/  
FWS 11/4/82 TESTIMONIES) to  
send you.

Also, apologies for my colleagues'  
burning desire to headstart turtles  
despite our somewhat pessimistic  
feelings. Aquaculture is, and was,  
a big thing with him for years — he's  
too old to change now! Best ever  
Best Larry



1601 CONNECTICUT AVENUE, N.W.  
WASHINGTON, D.C. 20009  
CABLE: PANDAFUND TELEX: 64505  
TELEPHONE: (202) 387-0800

October 25, 1982

Mr. George Balazs  
Hawaii Institute of Marine Biology  
Box 1346  
Cocunut Island  
Kaneohe, Hawaii 96744

Dear George:

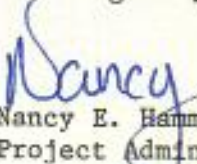
Doug Robinson and Steve Cornelius have submitted the three enclosed proposals seeking research support for the olive ridley project at Nancite and Ostional.

The current WWF-U.S. grant (\$15,000) to the study of Ecology and Distribution of Olive Ridley Turtles at Nancite and Ostional includes some funds for student stipends. If approved, grants to the enclosed proposals submitted by Doug Robinson would, in a sense, be an add on to the previous grant to increase our support of biology student participation in the overall project.

We would like to have your comments on all three proposals and ask that the two submitted by Robinson be looked at as requests to support student training.

Thank you, as always, for your assistance.

Best regards,

  
Nancy E. Hammond  
Project Administrator

NEH/fkr

**I. Project Proposal Summary**

1. **Date of Submission:** October 1, 1982

2. **Name and address of originator:**

Douglas C. Robinson, Ph.D.

Adrian Ugalde Ch. (grad. student)  
same

Escuela de Biología

Universidad de Costa Rica

Costa Rica tel: 24-36-35 (home) 255555 ext. 746 (office)

3. **Title:** Sex determination of the Olive Ridley Turtle as a function of temperature during incubation.

4. **Name and address of project leader:**

Douglas C. Robinson

same as above

5. **Project period:** March 1, 1983 - Feb. 28, 1984

6. **Funds requested:** US\$ 2450.00 Local Currency: \$122,500.00

7. **Endorsements, Institutional:** Vice-rectoría de Investigación, UCR

**Governmental:**



8. **Abstract:**

Temperature during embryonic development has been demonstrated to determine sex in some species of marine turtles (Morreale et al., 1982). At present, hatchling turtles cannot be sexed satisfactorily on the basis of external morphological criteria. Beaches where large numbers of turtles nest, such as Nancite and Ostional, at different seasons, therefore produce an unknown percentage of males versus females. An alternative to present histological (and thus lethal) techniques for sex determination could be an accurate knowledge of incubation period. In addition to obtaining natural sex ratios, the possibility of influencing sex under artificial or semi-artificial conditions exists. This may require a critical maintained temperature throughout incubation, or may depend on a critical temperature at some determined period. Management of sex proportions would be practiced in different ways depending on which of these factors is more important. It is proposed to relate incubation duration to average nest temperatures in field and lab. Then critical lethal extremes will be sought, and pivotal temperature for this species at constant temperatures. On establishing this critical temperature, the developmental period when it is effective will be looked for. Theoretically, knowing incubation duration as a factor of temperature, and therefore resulting sex, could give important clues as to the relative sexual input to the population from the arribada nesting beaches.

## II. Project Proposal Description

### 1. Justification

- 1.1 **Importance** Massive nesting (arribadas) of thousands of females on short stretches of beach on the same date could produce highly skewed sex ratios. It may be possible to predict these.
- 1.2 **Urgency** Artificial incubation and nest relocation are extensively practiced without knowledge of possible effects that minor temperature differences may produce on sex ratio of hatchlings. Although it is true that ideal proportions are unknown, obviously a balance should be sought.
- 1.3 **Feasibility** Both Robinson and Ugalde have ample experience at Ostional beach. Legal restrictions are not anticipated and followup studies as required may be carried out.
- 1.4 **Other** Previous studies on this theme have encountered serious problems due to low fertility (or developmental success) as well as legal and time limitations. We are assuming that much of the problem was due to contamination of nests by biotic factors which we will endeavour to avoid. Work will not be done in a National Park (Nancite) and will be subject to fewer (if any) restrictions. The training of a Costa Rican in this field will permit follow-up studies with the same equipment at greatly reduced cost.

### 2. Background Information

#### 2.1 Brief Description

Stephen E. Cornelius (Biological Consultant based in USA) and Douglas C. Robinson (professor, 1966-present, Univ. de Costa Rica) have been under contract (SEC:contractor) since 1980 with USFWS to investigate "Abundance, Distribution and Movements of Olive Ridley Sea Turtles". Funds have been obtained through WWF as stipends to graduate students in Costa Rica to investigate specific topics. The present proposal is for necessary equipment and services required by one of these students (Ugalde). Certain equipment and services will be shared by the other student (Mora) for whom a separate proposal has been submitted. Ugalde has ample experience at the research site and is presently taking a graduate level course on the "Biology of Sea Turtles" especially designed for these and other students who collaborate with our investigations. The University of Costa Rica will provide Laboratory space and preliminary studies on artificial incubation temperature control are underway at the present time.

## 2.2 Conservation problems

Legally controlled harvest of eggs may become a socio-political necessity at Ostional. Nancite presents no problem, as it is in a National Park. Should the government opt for this solution to an up-till-now uncontrolled situation, in spite of a legal decree regarding the beach, information on the sexes produced on different portions of the beach, or at different seasons of the year, would be of great use in selecting those eggs to be harvested. Should the present situation of no or little protection continue, such information could indicate the critical seasons for what vigilance might be available.

## 2.3 Other factors relevant to the project

- a) **historic aspect:** The confirmation of temperature determined sex in sea turtles is very recent. Work to date has been with small samples, due to the international legal status of the species. Natural, and presumably desirable sex ratios for adults are based on highly biased samples and reduced commercial capture now provides potentially less information.
  
- b) **present aspect:** At present, a permanent field assistant is on hand in Ostional. Relations with the town, which at times have been tense, are at their best level, since the government has made clear to the residents that any decision on their requests must be based on, and any permission must be subject to the available scientific data. I have made it clear to the Ministry of Agriculture, in the presence of town representatives, that until cooperation is received, such data will not be available.
  
- c) **legal status:** A decree modifying the actual decree which determines Ostional beach as a "protected area" would change this to a "National Refuge" and specifies that the Ministry of Agriculture and Livestock would administer it with the "technical collaboration of the University of Costa Rica".



**2.4 Objectives** The project is intended to provide guidelines for sea turtle management in order that sex ratios are not seriously skewed towards one or the other extreme. Eventually, it may be possible to know or estimate the desired sex ratio in nature and attempt to produce this through management.

The results of this investigation may allow estimates of sexes produced by different cohorts of nesting females on high density nesting beaches.

**2.5 Success Indicators** We expect to identify lethal low and high temperatures for incubating eggs, relate incubation period to average nest temperature, find the pivotal point(s) of temperature for sex determination, and if it exists, the vulnerable period of embryonic development when this temperature is effective.

### 3. Proposed Implementation

#### 3.1 Activities

Nests under natural, seminatural and laboratory conditions will be instrumented as described by Spotila et al. (1982). Samples of hatchling turtles will be sacrificed, and their gonads sectioned for histological examination. One gonad will be evaluated visually (stereo aided) previous to the sectioning of the other and pairs will not be compared until after these two processes are finished. Both beach and lab experiments will be repeated in light of preliminary findings.

The same hatchlings to be sacrificed in this study will be used by Mora in the companion proposal, thus reducing the number of hatchlings required.

#### 3.2 Workplan and Timetable

March 1983: Preparation of artificial incubation chambers in lab. with clean beach sand (from another source or sterilized).  
March - May 1983: Monitoring of natural and seminatural nests in Ostional throughout incubation. Beach temperature profiles.  
May - June 1983: Transfer of freshly laid eggs (terrestrial) from Ostional to San José and initiation of lab. studies under controlled conditions.  
June - August '83: Monitoring of lab. incubated eggs, Prep. of histological sections of field collected hatchlings.  
August - Sept '83: Prep. of histological sections of lab reared hatchlings.  
Sept. -Nov. 1983: Repetition of satisfactory natural & seminatural nest

(continued)

### 3.2 Schedule and Timetable (continuation)

- monitoring in Playa Ostional.
- Nov.-Jan. 84 Repetition of lab. experiments in a more confined temperature range and search for critical developmental period. Due to conditions at this season, eggs will be brought to San José by charter flight.
- Jan.-Feb. 84 Repetition of histological preparations and analysis of results.

### 3.3 Equipment Utilisation

The BAT 12 Thermocouple has been used successfully by other investigators and, together with "home made" thermocouples, is more economical than other systems. Many repetitions are desirable due to the low fertility rates of many nests. Fencing equipment, in addition to excluding non-human predators and later turtles, is intended to reach tacit agreement with townspeople as to what are experimental plots. The charter flight is the only way, in the rainy season, to bring large numbers of eggs to the lab without adverse effects.

### 3.4 Involvement of Local Resources

#### **a) government agencies:**

The aforementioned decree states that the Ministry of Agriculture and Livestock is to be advised by the University of Costa Rica as to the policies to be adopted on Ostional Beach.

#### **b) funds:**

The University of Costa Rica has given Robinson 1/4 time for dedication to this general project. It also supplies lab space, computer time, and logistic support. The Earth Preservation Fund is being consulted for possible additional financial aid although we have no definite communication as yet.

#### **c) non-governmental:**

due to economic conditions in Costa Rica at the present time, support is nominal only.

#### **d) people:**

Preparation of future researchers in the country is a primary goal. Robinson is a permanent staff member in the School of Biology of the University of Costa Rica and two MS thesis have already been completed in this field since the recent inauguration of the graduate program. This particular case is a "Licenciatura" degree, roughly equivalent to an MS degree in the United States.

### 3.5 Environmental education and training

#### a) education

It is hoped that serious experimental work at Playa Ostional, although not understood at the scientific level by the local residents, will be accepted as a necessary prelude to governmental decisions on management on this beach. The townsfolk are gradually becoming aware that their own impressions, communicated to government authorities, are not sufficient to permit decisions.

#### b) training

see 3.4 d.

### 3.6 Reports and publications

It is anticipated that the project will result in a scientific publication.

### 3.7 References

Dr. James R. Spotila  
State University College at Buffalo  
1300 Elmwood Avenue  
Buffalo, NY 14222

Stephen E. Cornelius, MS.  
RR 3, Box 216  
Mountain View, MO 65548

### 3.8 Relevant literature

- 1982 Morreale, S. J. et al.  
Temperature-Dependent Sex Determination: Current Practices Threaten Conservation of Sea Turtles.  
Science: 216: 1245-1247.
- 1982<sup>1</sup> Spotila, J. R. et al.  
Methodology for the Study of Temperature Related Phenomena Affecting Sea Turtle Eggs.  
Report to USFWS.

### III. Managerial Aspects of the Project Proposal

#### 1. Personnel

##### 1.1 Project Leader

Douglas C. Robinson, Ph.D.  
Catedratico (=full professor)  
Escuela de Biología  
Universidad de Costa Rica

##### 1.2 Project Administrator

same

#### 2. Budget

<u>2.1 Estimated Costs</u>	this proposal	Rob.-Mora	WWF '82
Personnel			
graduate student stipend			\$1,800.00
field help	\$100.00		
Travel, etc.			
Charter flight		\$300.00	
Ground transportation	50.00		
Equipment			
Bailey BAT 12 thermocouple	600.00		
150 thermocouples/\$3 each.	450.00		
Styrofoam boxes 10/\$10	100.00		
Styrofoam boxes 10/\$10		100.00	
Electric fence equip 2/\$70	140.00		
Fencing materials	860.00		
Thermostats 4/\$12.50	50.00		
Reagents for histolog. work.		200.00	
Shipping			
Equipment	100.00		
Communications			
Tel. etc. with beach crew		100.00	
Totals	\$2450.00	700.00	1,800.00

## 2.2 Payment Schedule

Single payment in January, 1983 to avoid ordering delays, etc.

## 2.3 Payment Method

Check to be deposited in dollars in Banco Nacional de Costa Rica, account 69816-7, name of Douglas C. Robinson (actual account for USFWS and WWF money on hand in Costa Rica)

## 3. Other Resources Available

### 3.1 Financial

Graduate Student Stipends from WWF.

### 3.2 Other

Logistic, etc. support and 1/4 time for Robinson and computer time as mentioned above.

## 4. Other Resources Applied for:

### 4.1 Financial

Companion proposal to WWF (Robinson-Mora)

### 4.2 Other

CURRICULUM VITAE

Adrián Ugalde Ch.  
born 15 December 1954  
Costa Rican  
Male

Single

BS degree in Wildlife Management, Univ. Costa Rica. Feb. 1982  
Presently in plan of Licenciatura (roughly = MS degree)

Douglas C. Robinson  
born 9 Jan. 1936  
U. S. Citizen

male

single

BS degree Grinnell College 1958

MS degree Univ. Michigan 1960

PhD. degree Tex. A&M Univ. 1968

Professor, Esc. de Biología, Univ. Costa Rica 1966-present

Full Professor (Catedrático) Jan. 1982 to present.

Co-Investigator with Stephen E. Cornelius under auspices of USFWS & WWF  
on "Abundance, Distribution and movements of Olive Ridley Sea  
Turtles in Costa Rica.

1 October, 1982

MS Nancy E. Hammond  
Project Administrator  
World Wildlife Fund  
1601 Connecticut Ave., N.W.  
Washington, D. C. 20009  
USA

Dear MS Hammond:

Thankyou very much for your letter of July 30 and the proposal forms. As per your suggestion, I am enclosing two proposals for our graduate students working on the Olive Ridley project. You will notice that there is considerable cost sharing between the two proposals, but since the themes are rather different, I thought it best, for reviewing purposes, to submit them separately. The more expensive proposal includes a good deal of reuseable equipment which should be of considerable help to us in years to come.

This year's project is on schedule and relations with the Ostional townsfolk are better than in the past. IOCARIBE, with whom I have a meeting at seven this morning, has agreed to the regional submeeting of pacific sea turtle investigators to be scheduled June-July 1983 at the time of the Western Atlantic Symposium to be held here in San José. We hope to develop a regional program for the pacific with centralized data banks, etc.. I suspect you will be hearing more from us on this after the Symposium.

I look forward to World Wildlife's response to the enclosed proposals which I personally feel are urgent areas of investigation.

Sincerely yours,



Douglas C. Robinson  
Escuela de Biología





## II. Project Proposal Description

### 1. Justification

**1.1 Importance** Existing and proposed "head starting" programs must at present operate in ignorance of the conditions which may be required for the return of adult nesting females. Both return of adults and initiation of new nesting beaches is dependent.

#### **1.2 Urgency**

This species is on Appendix I of CITES, and these populations are considered threatened by the USFWS. See also CONSERVATION PROBLEMS.

#### **1.3 Feasibility**

Robinson has other commitments in Ostional and a companion proposal (Robinson-Ugalde) will share resources. Legal problems not anticipated and follow-up potential exists.

#### **1.4 Other**

The possibility of establishing new nesting colonies depends in large part on a knowledge of the homing mechanism. An ongoing long-term investigation by the Univ. of Costa Rica on this species provides opportunity for further study of the phenomenon, should the present study warrant it.

### 2. Background Information

#### 2.1 Brief Description

Stephen E. Cornelius (Biological Consultant based in USA) and Douglas C. Robinson (professor, 1966-present, Univ. de Costa Rica) have been under contract (SEC:contractor) since 1980 with USFWS to investigate "Abundance, Distribution and Movements of Olive Ridley Sea Turtles". Funds have been obtained through WWF as stipends to graduate students in Costa Rica to investigate specific topics. The present proposal is for necessary equipment and services required by one of these students (Mora). Certain equipment and services will be shared by the other student (Ugalde) for whom a separate proposal has been submitted. Mora will have finished his coursework at the time of project initiation. He is presently receiving a graduate course on "Biology of Sea Turtles" especially designed for these and other students who collaborate with our investigations. Laboratory space will be provided by UCR and if needed, the Center of cell and molecular biology (UCR) will assist in the use of radioisotopes, for which they are authorized.

## 2.2 Conservation problems

Current, although inadequate legal and practical protection exists for these nesting beaches. Nancite is well protected in a National Park in so far as human exploitation is concerned. The beach itself at Ostional has been decreed a protected area but the watershed of the Ostional estuary is not included in the decree. Positive findings from this study would suggest the urgency of protecting watersheds behind arribada nesting beaches from alteration through human use. In most areas, at present, only the beaches themselves are protected.

## 2.3 Other factors relevant to the project

### a) **historic aspect:**

Owens, et al. (1982) summarize work and theories on the imprinting hypothesis and sea turtle reproduction. Our focus on this problem is novel in that we attempt to relate certain known anatomical conditions of presently undemonstrated function with physiological and behavioral aspects.

### b) **present aspect:**

The companion proposal (Robinson-Ugalde) and actual research (Cornelius-Robinson) share numerous facilities, as well as idea and information exchange, explaining why certain essential requirements are not mentioned in one or the other proposal. For Example, the charter flight herein included will be used also by Ugalde, whereas fencing on the beach (Ugalde) will also serve Mora.

### c) **legal status:**

A decree modifying the actual decree which determines Ostional beach as a "protected area" would change this to a "National Refuge" and specifies that the Ministry of Agriculture and Livestock would administer it with the "technical collaboration of the University of Costa Rica".

## 2.4 Objectives

This project is intended to supply evidence for the theory that olfactory imprinting occurs in hatchling sea turtles and to provide a justification for more sophisticated physiological experiments to further support the theory and identify the significant factors.

## 2.5 Success Indicators

Positive evidence in support of this theory could profoundly alter current practices and goals and would lead to confirmatory experiments. Waiting for the rearrival as adults of hatchlings released with or without headstarting on their original or new beaches is the ultimate proof of a homing mechanism but decisions must be made in the interim. Negative results from this study would not necessarily exclude the theory.

## 3. Proposed Implementation

### 3.1 Activities

Anatomical studies will be made of the nasal region of neonate turtles. These will include gross and histological sections and dissections. Newly hatched turtles, not yet exposed to water, will be brought to the laboratory or hatched in the laboratory, subjected to different concentrations of stain in solution at different periods after hatching, and then passed to clean water beside their controls. These are then frozen. Heads will be cut in the proper plane as determined by histological serial sections, and examined for the presence of dye. Others are sectioned to determine if the erectile tissue has sealed the pockets. If indicated, experiments will be repeated using radioactive Iodine in place of stain. Follow up investigations would include comparison of water samples from off the nesting beach, other beaches, and waters some distance off the nesting beach. We are not looking for the nature of a "remembered" substance or concentration at this time, simply a substantial difference.

### 3.2 Workplan and Timetable

Jan. - May 1983	Anatomical and Histological studies of hatchlings.
May 1983	Laboratory experiments with hatchlings.
Jun.-Aug. 1983	Sections of experimental animals
Aug.-Sept. 1983	Repetition of lab. experiments with modifications indicated by earlier experiments. If warranted, experiments with radioactive Iodine.
Oct. 1983	Analysis of preceding experiments.
Nov.-Dec. 1983	Preparation of report and publication if warranted.

(continued)

- 11 -

### 3.2 Workplan and Timetable (continuation)

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### 3.3 Equipment Utilisation

Styrofoam boxes are to assure having freshly hatched laboratory incubated turtles for experiments.

Charter flight, to be shared with Robinson-Ugalde proposal is to assure that eggs reach San José without delay which is believed to affect development.

Radioactive Iodine (125) will be used if indicated by preliminary experiments.

### 3.4 Involvement of Local Resources

#### **a) government agencies:**

This investigation relates to the decree which states that the Ministry of Agriculture and Livestock will administer the Ostional Beach in consultation with the University of Costa Rica.

#### **b) funds:**

The University of Costa Rica has given Robinson 1/4 time for dedication to this general project. It also supplies lab space, computer time, and logistic support. The Earth Preservation Fund has been approached for possible financial help but we have no definite commitment as of yet.

#### **c) non-governmental:**

due to economic conditions in Costa Rica at the present time, support is nominal only.

#### **d) people:**

Preparation of future researchers in the country is a primary goal. Robinson is a permanent staff member in the School of Biology of the University of Costa Rica and two MS thesis have already been completed under this research program. Preparation of local investigators assures the possibility of follow up studies.

### 3.5 Environmental education and training

#### a) education

It is hoped that serious experimental work at Playa Ostional, although not understood at the scientific level by the local residents, will be accepted as a necessary prelude to governmental decisions on management on this beach. The townsfolk are gradually becoming aware that their own impressions, communicated to government authorities, are not sufficient to permit decisions.

#### b) training

see 3.4 d.

### 3.6 Reports and publications

It is anticipated that the project will result in a scientific publication.

### 3.7 References

Stephen E. Cornelius, MS.  
RR. 3, Box 216  
Mountain View, MO 65548

Carlos Villalobos MS  
Scientific Authority CITES  
Escuela de Biología  
Universidad de Costa Rica  
Costa Rica

### 3.8 Relevant literature

- 1982 Owens, D. W., et al.  
The imprinting hypothesis and sea turtle reproduction.  
*Herpetologica*, 38 (1): 124-135.
- 1976 Scholz, A. T. et al.  
Imprinting to Chemical Cues: The Basis for Home Stream  
Selection in Salmon.  
*Science*, 192: 1247-1249.

III. Managerial Aspects of the Project Proposal

1. Personnel

1.1 Project Leader

Douglas C. Robinson, Ph.D.  
Escuela de Biología  
Universidad de Costa Rica  
Costa Rica

1.2 Project Administrator

same

2. Budget

<u>2.1 Estimated Costs</u>	This proposal	Rob.-Ugalde	WWF '82
Personnel			
graduate student stipend			\$1,800.00
Travel			
charter flight	\$300.00		
ground transportation		\$50.00	
Equipment			
histological reagents	200.00		
Styrofoam boxes 10/\$10.	100.00		
Styrofoam boxes 10/\$10.		100.00	
Elec. Fence Equipment		140.00	
Fencing materials		660.00	
Radioactive Iodine (125)	120.00		
Communications		100.00	
Equipment			
X-ray film	50.00		
Shipping			
Radioactive Iodine	50.00		
Totals	<u>\$820.00</u>	<u>\$1,250.00</u>	<u>\$1,800.00</u>

**2.2 Payment Schedule**

Single payment in January, 1983 to avoid ordering delays, etc.

**2.3 Payment Method**

Check to be deposited in dollars in Banco Nacional de Costa Rica, account 69816-7, name of Douglas C. Robinson (actual account for USFWS and WWF money on hand in Costa Rica)

**3. Other Resources Available**

**3.1 Financial**

Graduate Student Stipends from WWF.

**3.2 Other**

Logistic, etc. support and 1/4 time for Robinson and computer time as mentioned above.

**4. Other Resources Applied for:**

**4.1 Financial**

Companion proposal to WWF (Robinson-Ugalde)

**4.2 Other**

CURRICULUM VITAE

Jose Manuel Mora B.

born 6 april 1956

Costa Rican

Male

Single

BS degree in Wildlife Management, Univ. Costa Rica. Aug. 1981

Presently in Graduate Studies for the MS degree.

Douglas C. Robinson

born 9 Jan. 1936

U. S. Citizen

male

single

BS degree Grinnell College 1958

MS degree Univ. Michigan 1960

PhD. degree Tex. A&M Univ. 1968

Professor, Esc. de Biología, Univ. Costa Rica 1966 - present

Full Professor (Catedrático) Jan. 1982 - present.

Co-Investigator with Stephen E. Cornelius under auspices of USFWS  
& WWF on "Abundance, Distribution and movements of Olive Ridley  
Sea Turtles in Costa Rica".





MINISTERIO DE AGRICULTURA Y GANADERIA  
SERVICIO DE PARQUES NACIONALES  
SAN JOSE, COSTA RICA

20 September 1982

Ms. Nancy Hammond  
Project Administrator  
World Wildlife Fund-U.S.  
1601 Connecticut Ave., N.W.  
Washington D.C. 20009  
E.E.U.U.

Dear Nancy,

Enclosed is a proposal prepared by Dr. Gonzalo Marín and myself in which we request support from World Wildlife Fund to carry out a study of the fungus populations at Ostional and Nancite. It will be primarily to identify the organisms present but there will also be some experimental work in the lab to ascertain which are capable of retarding or halting embryological development.

Curriculum vitae for Dr. Marín and myself will follow shortly.

By now you should have received 2 proposals from Doug Robinson concerning his graduate students' projects. Because of their unrelated subject matter we would like to ask WWF to evaluate these and the one enclosed here separately.

Funds to continue the tagging work at Ostional and Nancite are being requested from U.S. Fish and Wildlife and the Earth Preservation Fund. My continued participation in the Costa Rican olive ridley work will depend on the success of these proposals. If desired I can send you a copy of the USFWS request when I return to San Jose in about 3 weeks.

Best regards,

Steve Cornelius

Encl (1)



**I. Project Proposal Summary**

1. **Date of Submission:** 20 September 1982

2. **Name and address of originator:** Dr. Gonzalo Marín Arias  
Stephen E. Cornelius  
R.R. 3, Box 216  
Mtn. View, MO 65548  
U.S.A.  
Associate Professor  
Center of Medical Mycology  
Faculty of Microbiology  
University of Costa Rica

3. **Title:** Incidence of fungus at olive ridley arribada beaches and effects on hatching success.

4. **Name and address of project leader:**  
Stephen E. Cornelius Tel. 417-469-2715  
R.R. 3, Box 216  
Mtn. View, MO 65548  
U.S.A.

5. **Project period:** January-December 1983

6. **Funds requested:** US\$ 3400 Local Currency: ₡170,000

7. **Endorsements, Institutional:** Faculty of Microbiology  
University of Costa Rica

**Governmental:** National Park Service  
Ministry of Agriculture

8. **Abstract:** For several years investigations at the large olive ridley arribada nesting beaches at Nancite and Ostional, Costa Rica have suggested that neonate production is much below the maximum possible. At Nancite hatching success from a single rainy season arribada may be as low as 3% by nest and less than 1% by total eggs deposited. Fungal and possibly bacterial invasion of the nest clutches is suspected to be the major factor causing low hatch rate. Sand samples and samples of decaying eggs will be collected systematically at both arribada beaches to identify the microorganisms present and test this hypothesis. Spatial and temporal aspects of any population fluctuations will be characterized and isolated strains suspected of retarding or halting normal embryological development will be used as inoculant on fresh uncontaminated eggs. These will be incubated and the effects, if any, will be noted. Fungal infection of eggs is a common occurrence in some conservation programs where natural nests are transplanted to high density corrals. It is hoped that this study will help identify the microorganisms associated with decaying turtle eggs and determine whether they are active agents in nest destruction or instead a secondary factor which appear only after development has been halted for unrelated and unknown reasons.

## II. Project Proposal Description

### 1. Justification

1.1 Importance Casual observation and some preliminary investigative work carried out during the past 3 years at Nancite have strongly suggested that hatching success of eggs deposited during the large olive ridley arribadas is strongly influenced by fungal growth in the nests.

1.2 Urgency The olive ridley is being subjected to heavy human exploitation within its east Pacific range, both of adults in the fisheries of Ecuador and Mexico and of eggs deposited throughout the C.A. coast.

It is urgent that production rates are known from the major beaches and that factors affecting hatching success understood.

1.3 Feasibility Laboratory techniques have been worked out and standardized during the past 2 years. No legal restrictions are placed on the collection of sand and collection of eggs is permissible under Cornelius' park service

1.4 Other permit.

Fungal infection of eggs has been noted by others and is sometimes a serious problem when eggs are transplanted from natural nests and placed in relatively high density corrals. Information from this study will aid in identification of the organisms involved and possibly offer some managerial assistance in how to avoid or reduce the problem.

### 2. Background Information

2.1 Brief Description The olive ridley is the most abundant species of sea turtle but has been remarkably neglected until very recently. The large synchronous nesting emergence (arribada), which is a unique strategy to the genus Leidochelys, is known in the east Pacific only from 2 remaining sites in Mexico and Playas Cationel and Nancite in Costa Rica. Since 1960, Cornelius and D.C. Robinson, Professor at the University of Costa Rica, have been supported by the U.S. Fish and Wildlife Service and the World Wildlife Fund in a study of the abundance, distribution and movements of the populations nesting at the 2 Costa Rican beaches. The proposed study on fungus contamination of eggs and 2 graduate student investigations (Univ. Costa Rica) scheduled for 1983 are part of the overall program titled "Biological studies directed to the conservation of olive ridleys."

2.2 Conservation problems Information gathered from marked nests and general observations have permitted a tentative assessment of the importance of various parameters affecting hatching success at Playa Nancite. (See Appendix I). It is estimated that from an average arribada of 100,000 nesting females, 45% of the clutches are completely destroyed by the effects of the nesting process itself (i.e. turtles digging into nests of others), beach erosion, and predation. The relative importance of these factors fluctuates from year to year and with each arribada. Of the remaining 55,000 clutches that survive intact to term of incubation, microorganisms such as fungus and bacteria appear to be involved in halting development at varying stages in all eggs from 93% of the nests. Approximately 3% of the original number of clutches deposited during the large arribadas of the rainy season result in at least one successful hatch from each nest. The overall production from an arribada of 10 million eggs is estimated to be as low as 94,000 hatchlings or less than 1%. Most of the factors involved are known from other beaches in other parts of the world. The conspicuous difference at Playa Nancite rests with the extraordinary number of entire clutches which show no embryological development or stop development at various stages before full-term of incubation. Preliminary examinations have shown a large array of microorganisms associated with non-developing eggs. The few which have been identified (Monosporium spp., Aspergillus spp., Penicillium spp., Fusarium spp.) are widespread in nature and often involved in spoilage of natural products. Two, Aspergillus spp. and Monosporium spp., have been associated with infections of turtle eggs by other investigators.

2.3 Other factors relevant to the project

Very little work has been done in this field.

a) historic aspect: Solomon and Baird (1980) found that both farmed and feral turtles are capable of depositing calcium carbonate as calcite instead of the normal aragonite form. When this occurs the shell appears more susceptible to fungal invasion. Spreading of fungal hyphae across the shell surface constitute at least two hazards to the embryo. The thick feltwork which forms beneath the shell must impair gas exchange. Secondly the uptake of calcium by the fungi from the eggshell may be creating a deficiency for the embryo and so impairing normal development.

b) present aspect: To the knowledge of the investigators, no current work is underway on the problem of low hatching success at arribada beaches and the possible relation to microorganism contamination.

c) legal status: There has been a scientific presence nearly continuously at the 2 study areas for the past 3 years. Nancite is within Santa Rosa Park and is totally protected. Ostional was recently declared a "protected area", a confusing designation which will probably be modified to "wildlife refuge".

4  
55  
93  
+ 1653850  
495  
515

Some arribadas or earlier ones?

?

**2.4 Objectives** This study proposes to identify microorganisms (fungi and bacteria) present in the beach sands at the 2 arribada beaches and determine whether they are a significant factor in retarding or halting normal embryological development.

**2.5 Success Indicators** Information on fungal and bacterial population fluctuations will be available upon completion of the project which will identify when during the year contamination is greatest, at which points horizontally on the beach (from low to high beach zones and lengthwise along the beach) and at what depth. It will also identify any differences in species and degree of contamination between the 2 arribada beaches which may explain differences in hatching production.

### **3. Proposed Implementation**

**3.1 Activities** Sand samples will be collected 6 times during 1 calendar year from Nancite and Ostional on alternating months. Five transects will be established relatively equidistant along each beach and samples collected from the surface and at a depth of 40 cm at 1 station in each the low, mid and high beach zones along the transects. This will result in 30 samples per collection period and 360 for the entire study. Sand samples from neighboring beaches and from decaying eggs will be collected and treated as comparative material. Eggs from turtles nesting on neighboring beaches will be inoculated in the laboratory with fungal suspensions to determine effect on development. Laboratory methods are described in Appendix II. Confirmation of species identifications will be sought from other specialists including the Center for Disease Control, Atlanta, Georgia. An attempt will be made to identify the common bacterial strains, however this is a much more difficult process. Seven species of bacteria have been identified in the preliminary work. Some are known human pathogens.

### **3.2 Workplan and Timetable**

**January 1983:** Laboratory supplies will be purchased by Cornelius and shipped to Marín. If these materials were instead ordered from Costa Rica, it could delay the project up to 6 months because of currency restrictions.

**January-June 1983:** Sand samples from Nancite will be taken in January, March, and May and at Ostional in February, April, and June by field assistants and students.

**July-December 1983:** Sand samples from Nancite will be taken in July, September, and November and at Ostional in August, October and December by Cornelius and students. Also, sands from neighboring beaches and decaying and fresh eggs will be collected at this time.

January-December 1983: Sand samples received at the microbiology lab will be treated and cultures prepared for fungal identification by Dr. Marín and assistants. Taxonomic confirmations will be sought. Egg inoculation studies will begin after June.

January-March 1984: Results analyzed and report prepared.

3.3 Equipment Utilisation No equipment other than field collection (plastic bags) and laboratory (glassware, culture medium) supplies is required.

3.4 Involvement of Local Resources

a) government agencies: Dr. Marín is formally associated with the Ministry of Public Health as well as the University of Costa Rica. Any information derived from the study concerning organisms involved in human ailments (such as the fungi *Fusarium* spp.) would naturally be of interest to the Costa Rican health services community.

b) funds: No supporting funds have been sought from local agencies.

c) non-governmental: The National Parks Service has supported the initial work in 1981 and 1982 and has an interest in further investigations of fungal contamination since the results may influence their policy on visitation of the beach by tourists.

d) people: Much of the field work and all laboratory activities will be carried out by Costa Ricans.

### 3.5 Environmental education and training

a) education Results of this study will be made available, as they have in past projects of the olive ridley program, to all interested governmental (such as the National Park Service, Department of Wildlife) and non-governmental (such as the Association for the Conservation of Nature, ASCONA; Department of Environmental Education of the Open University, UNED) entities in the country. Arribada beaches may be shown to be somewhat unhealthy for human beings which might be used to argue for habitation restrictions at nesting beaches.

b) training No formal training is involved other than the additional experience for those field assistants and students already involved in the olive ridley program.

3.6 Reports and publications A report for general distribution to interested agencies, institutions and individuals in and outside the country will be prepared. A shortened version of the report will be prepared for publication in a scientific journal. Costs for preparation of both the report and publication are included in the budget.

### 3.7 References

- José María Rodríguez, Serv. Parq. Nac., Apdo. 10094, San José  
Dr. Curt Freese, Off. Int'l Affairs, USFWS, Washington, D.C.  
Jack Woody, Off. End. Species, USFWS, Albuquerque, NM 87103  
Dr. D.C. Robinson, Fac. Biología, Univ. C.R., San José, Costa Rica  
Alvaro Ugalde, Fund. Parq. Nac., Edificio Eudocia, San José, C.R.

### 3.8 Relevant literature

- Acuña, R.A. 1980. Aspectos de la fase terrestre de la tortuga lora, *Lepidochelys olivacea*. M.S. Thesis. Univ. Costa Rica. San José.  
Soloman, S.E. and T. Baird. 1980. The effect of fungal penetration on the eggshell of the green turtle. *Electron Microscopy*, 2: 434.

### III. Managerial Aspects of the Project Proposal

#### 1. Personnel

##### 1.1 Project Leader

Stephen E. Cornelius  
R.R. 3, Box 216  
Mtn. View, MO 65548

Dr. Gonzalo Marin Armas  
Associate Professor  
Center of Medical Mycology  
Faculty of Microbiology  
University of Costa Rica 2060  
San Jose, Costa Rica

##### 1.2 Project Administrator

Stephen E. Cornelius  
(address as above)

#### 2. Budget

##### 2.1 Estimated Costs

###### Personnel

S.E. Cornelius, Co-P.I. \$1000

###### Travel and Subsistence

Student assistants, 6 trips San Jose to Ostional;  
3 trips San Jose to Nancite; 4 days/trip; at  
\$5.00/day 180

###### Equipment

Culture tubes, 150mm x 18mm, 2 cases 300  
Petri dishes, covers, 100mm x 15mm, 288 u 240  
Petri dishes, bottoms, 95mm x 22mm, 288 u 300  
Sabouraud Dextrose Agar, 3 lbs. 90  
Potato Dextrose Agar, 2 lbs. 75  
Styrofoam nest incubation boxes 100  
Plastic bags 25

###### Communication

Shipping of supplies to Costa Rica 215  
Postage for taxonomic confirmations 250

###### Data Analysis and Report Preparation

Bibliography search 75  
Office supplies and reproduction costs 50  
Publication charges 500

Total \$3400



2.2 Payment Schedule    January 15    (\$1400)  
                                 June 15        (\$1400)  
                                 December 15   (\$ 600)

2.3 Payment Method    Mercantile Bank of Willow Springs  
                                 Willow Springs, MO 65793  
                                 Tel. 417-469-3144  
                                 Acc't No. 210-684

3. Other Resources Available

3.1 Financial Partial salary and subsistence support for Cornelius is being sought in a proposal to USFWS that continues studies on abundance, distribution and movements of olive ridleys.

3.2 Other The Center of Medical Mycology and Dr. Marin's laboratory will provide microscopes, sterilization equipment and many miscellaneous supplies. Setting of cultures and much of the preliminary identification will be carried out by Dr. Marin's assistance at no cost to the project.

4. Other Resources Applied for:

4.1 Financial    None

4.2 Other        None

APPENDIX I.

~~Figure 4~~. Estimated fate of 100,000 clutches deposited in an average olive ridley arribada at Playa Nancite. Display key: A = loss to predation (16%); B = loss to beach erosion (7%); C = disrupted by same arribada (12%); D = disrupted by next arribada (10%); E = clutches surviving intact to term of incubation (55%); F = clutches with no embryonic development (83%); G = clutches with some development but no hatch (10%); H = clutches where some eggs hatch but no emergence (0.8%); I = clutches where some eggs hatch and emergence occurs (6%); J = eggs in partially successful nests which do not hatch and emerge (75%); K = hatchlings which emerge from nest (25%)

16  
7  

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23  
12  

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35  
10  

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45  
22  

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67  
23  

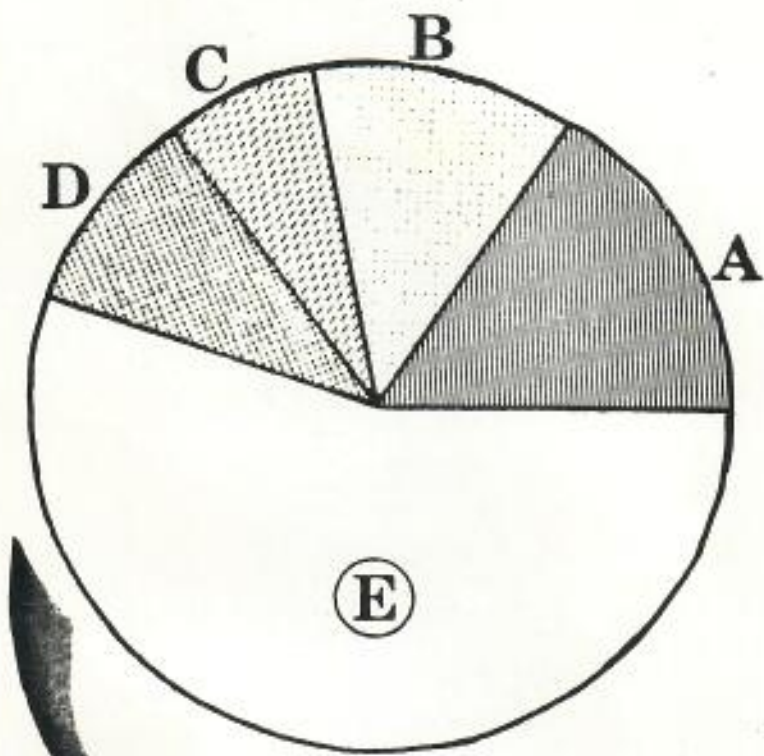
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90  
45  

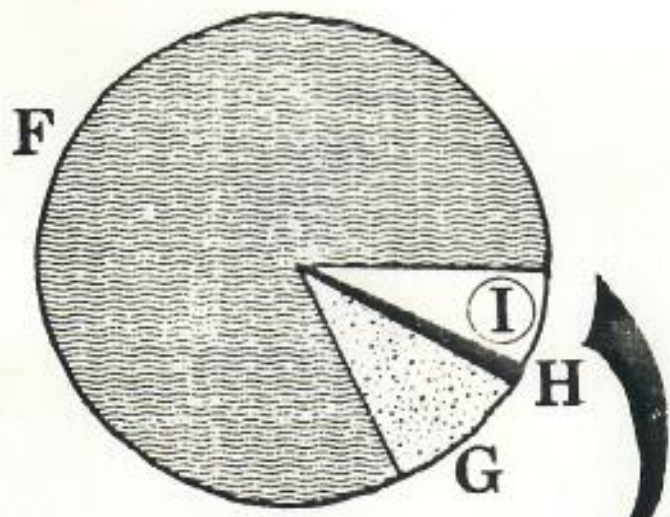
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135

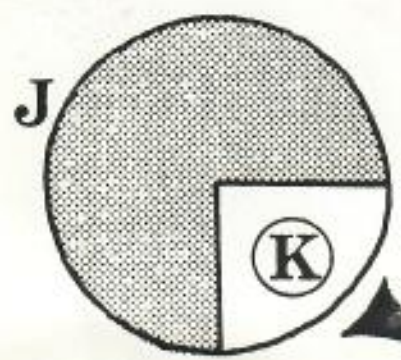
# 100,000 CLUTCHES



55,100 CLUTCHES



376,300 EGGS



94,075 HATCHLINGS

## APPENDIX II.

### Laboratory methods

Each sand sample is diluted 1:10 weight to volume in sterile distilled water. The suspension is strongly agitated for 5 minutes and then allowed to settle for 2 minutes. One milliliter is taken from the supernatant and distributed on the surface of Sabouraud and Potato Dextrose Agar culture medium contained in 2 petri dishes. The inoculated plates are incubated at room temperature and periodically observed for 15 days. Cultured fungi are microscopically examined for preliminary identification and then recultured in individual tubes of Sabouraud Dextrose Agar. Morphology of the isolated groups will be studied and specific identification attempted using laminar culture methods, growth on Czapeck Agar and assimilation and fermentation tests.

Turtle eggs will be washed in a sterile saline solution and the liquid placed on culture medium as described above. Decaying eggs will also be opened and the contents swabbed onto the culture medium. Fungal growth will be isolated, identified and compared to those observed from the sand samples.

25 October 1982.

Dear Dr. Balazs:

My name is Sally (Litwin) Krebs - you may remember meeting me at the Sea Turtle Conference in Washington several years ago. I am a graduate student of Bob Shoop at the Univ. of Rhode Island, and I did my Ph.D. research on loggerheads on the Georgia coast.

My husband and I will be visiting Oahu the week of 7 November (staying in Waikiki) and would very much like to see your laboratory and talk to you about ongoing research. Since this is purely "vacation" for us, we are free to visit any day that week. If you have a few hours time to "talk turtle" please drop me a line. Thanks.

Sincerely,  
Sally Krebs

Rt. 2, Box 157A  
Gwynn, GA. 31312.

2 November, 1982.

G. Balazs  
 U.S. Department of Commerce  
 NOAA - NMFS (F192)  
 Hawaii Area Fishery Research Center  
 2570 Dole Street - P.O. Box 8830  
 Honolulu, Hawaii 96812.

Dear Mr George Balazs.

I'am very honoured and glad to receive your letter. All the literature you send me has been a great help to me, finishing my study. I am very grateful and thank you very much for all your attention and help.

About my trip to Bali, I did not go back again. The data I got there, I analysed it and present the result on my final exam on September 22<sup>th</sup>. I thank the Lord that I pass it.

I also got a letter from your colleague, Mr A. Carr. I appreciate his attention for my research. I am very glad because my way of thinking about the matter doesn't differ much with his. The data I calculated is the relationship between the length of the carapace with the other variables. I only regret, by collecting my data I did not divide the turtles according their sex.

After I finished my study, I am doing my best to multiply my research. I'm also doing the translate of my paper in to English. So that I can send it to you and Mr. Carr as a token of gratitude for all the help your gave to me

After this I am trying to trace which kind of work I will do in the future - I am still considering whether I will work in Manado (North Celebes) or in Bogor (Western Java); Whether I will do other research work or do something else. I do hope that my work in the profession I choose will give me opportunity in the future to study more about the green turtle. It is my wish.

Yours  
 earnest



CIVITAS ACADEMICA  
INSTITUT PERTANIAN BOGOR

It will also be very important to me if we still can change information in the future. It will be a great fortune for me, if through this correspondence, I can learn more about Fishery in your country. I hope it will not be a burden to you.

I send you here a post card with a green turtle in our sea area (North Celebes) and another photograph on my inauguration day with my mother.

Can I get a picture of you and your family. Is it not too much to ask.

Hoping to meet you again in your next letter and once again thank you very much.

Your grateful,

Fransine Manginsela

ir. Fransine B. Manginsela  
@ Bogor Baru BII/3-4 Bogor  
or  
Bumi Beringin 18 Manado  
Indonesia.



Southwest Missouri State University

Springfield, Missouri 65802

11/3/82


Dr. George H. Balazs  
National Marine Fisheries Service  
P.O. Box 3830  
Honolulu, Hawaii 96812

Dear George:

Thank you very much for your letter and for sending me the requested publications. I completely understand your hesitation to endorse a proposal you have not yet seen. Also, I apologize for my mistake concerning your IUCN post. I agree that I should get Archie Carr's endorsement. It looks as though all of this may be academic for a couple of more years now however. Due to understaffing, and money shortages at my university I am now rather pessimistic that I will be allowed to spend two years away from my teaching duties at this time, and it will be another two years before the James Cook Fellowship will become available again. I do think I'll be able to get a semester off though, and will probably spend it in Belize working with hawksbill surveys during the nesting season, then shift to freshwater species during the rest of my stay.

Thanks again for your help. I'll keep you informed of my plans. I hope we will have the opportunity to meet before too long.

Sincerely,

  
Don Moll, Ph.D.  
Associate Professor  
of Biology





UNIVERSIDAD DE LEON

FACULTAD DE BIOLOGIA

DEPARTAMENTO DE ZOOLOGIA  
LEON (ESPAÑA)

León , October 22 , 1982

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

Dear Dr. Balazs ,

I am working in a revision of my 1974 field guide of the spanish amphibians and reptiles , and of course , the marine turtles species are included .

Could you provide high quality color slides of adults and hatchlings for identification ?

Your cooperation and interest is greatly appreciated .

Sincerely yours ,

Alfredo Salvador



13th June 1982

I will be delighted to be on the mailing list for the Marine Turtle Newsletter.

I believe your reprints, or at least some of them, arrived in the same package as the copies of the Sea Turtle Conservation Strategy. Many thanks. I will read and digest them in due course, and then may or may not have further comment.

The tags used by me at Jana and Karan were Hasco Style 6-56 Monel tags, of the "tamper-proof" design. One side bore the legend "RETURN TAG TO ARAMCO" and the other side bore the numbers "A 1" through "A 143". A total of 141 turtles was tagged; one was inadvertently tagged twice in the same night (mentioned in my last letter), and Tag No. A 95 was for some reason not used at all. The vast majority of the animals tagged were adult female Green Turtles. One or two males were caught and tagged when they pursued females right up to the beach at night; a few juveniles of 50-60 cm carapace length were captured and tagged around Jana Island during 1973; and if memory serves me we also tagged a small number of nesting female Hawksbills. I have complete tagging records of course, including the measurements and other details of all tagged turtles; but Aramco tried to confiscate all my scientific and personal files when I left their employ, and though I eventually recovered much of the material it is in such a shambles that it will be many months yet before I can find everything I want.

Looking at Tag No. A 95, now lying on the desk in front of me, it occurs to me to wonder whether it is in fact Monel or cadmium-plated steel: it is rusty in several places. The tags were ordered (by Aramco) as Monel, but I don't have the delivery documents (retained by Aramco purchasing department) and the box says "Hasco 56 bright cattle tags" which is not particularly illuminating. Certainly I would not knowingly put a cadmium-plated tag into a turtle!

I was aware of reports of Green Turtles basking in the Hawaiian chain and on remote islands in North Queensland, but was under the impression they did not do so elsewhere. Certainly I have not seen them basking here. There are a few large offshore sandbanks (incipient coral cays, nearly awash at high tide) on which basking might occur, but so far I have not managed to visit them at times when they were not overrun with fishermen. Actually I suspect any basking turtle would be pestered or even killed by the fishermen out of sheer boredom. Arabs are not noticeably respectful of non-human life.

Would you expect basking to occur here during summer, or during winter when water temperatures are 12°-15° C. or even lower (all-time low, 5° in 1964)? Nesting of Hawksbills seems to begin here in April and end in July; the Green turtles start in June and end in mid September. In the southern part of the Gulf (see below) the schedule seems to be different, with nesting during November and December; these animals might be on a similar schedule to those studied by Hirth on Masirah and in South Yemen.

According to the photocopy included with your letter, both male and female Green Turtles bask in Hawaii. This seems at variance with Bustard's contention that the females (only) bask to avoid the "promiscuous" attentions

13th June 1982

of the males. I have always wondered about that. Here I have seen (and photographed) mating only during the day, but the males are most certainly active during the night. At Karan in June 1975, our Zodiac was pursued across the reef flat by up to 5 enthusiastic male Green Turtles; at times we had to fend them off with the paddles to keep them from injuring themselves against the propellor. They also pursued the females, sometimes right up to the water's edge, so that as mentioned we were able to grab and tag a couple of them while so engaged. It may be significant that Karan is the most remote of our islands and has the least human interference. During daylight, however, the males were reasonably shy, and certainly didn't indulge in boat-chasing!

I imagine that a plea from Peter Scott or someone like that, on behalf of the turtles and their nesting grounds, might well help in their conservation here. I have already submitted a proposal for a Coral Reef Nature Reserve in the Gulf (copy enclosed) and perhaps the place for a plug from IUCN would be in support of that. IUCN has commissioned Rupert Ormond of York University (UK) to make a biotope survey on behalf of MEPA and recommend parks in the Red Sea and the Gulf; Rupert sent a two-man team (mentioned in my last letter) including Andrew Price, a former junior colleague of mine, to spend a couple of weeks looking around and report to MEPA on the state of the Gulf environment and on what parks should be put into effect. I gave them some proposals and a lot of photographic documentation and am waiting to see what they have done with it. I hope something good comes of the effort; but must also say I would have preferred to provide my input directly instead of at third or fourth hand via the medium of people who whatever their competence and good intentions are sitting a rather long way away from the scene of events!

At any rate I will "take some soundings" and let you know shortly where I think a plug from IUCN would do the most good.

Since last writing to you I have talked to a Kuwaiti marine biologist who has toured the Gulf (with Ron and Valerie Taylor, no less) making films of the Gulf marine environments. They found substantial nesting aggregations of Green Turtles around Halul Island and at a couple of mainland sites in Oman. I think they also found nesting Hawksbills and Loggerheads. I am proposing a scientific followup (they reported disastrous silting of reefs, due to the industrial development and dredging going on here in the Gulf, and a major plague of Acanthaster on the Oman coast), which seems to have good prospects of being funded; in that case I will have further details to report. It is beginning to look as if the Gulf were the repository of one of the biggest Green Turtle populations left.

Unfortunately, a great deal of effort is being put into intensifying the demersal trawl fishery, using Korean boats and crews. A couple of these boats are trawling around the nesting islands, as close as they can get without getting hung in the coral, making good catches of large jacks and other semi-pelagics that patrol the reef front. I'm sure they must be catching turtles though they don't report it. I am supposed to be doing some fishery resource-base research on behalf of the company concerned, but

Dr. George H. Balazs, page four

13th June, 1982

doubt whether I can persuade them to leave the islands alone. There is also intensive shrimp trawling on the grass beds. Monitoring what is happening is not easy, since for reasons of military security going to sea takes endless paperwork; you can't just get in a boat and go. Anyway I can't spend all my time on a trawler.

If you think there is any real prospect of WWF/IUCN funding a small tagging program here, I would be happy to generate a proposal. The Research Institute is a contract research organization, and funding would have to go via the Institute; I am not allowed to function as an independent contractor or to undertake research other than that funded through the Institute. I would be grateful for suggestions as to what you think WWF might support. I do not have any qualified staff at the moment so it would be necessary to recruit some from outside. Perhaps we could use Aramco student dependents, home here on summer vacation. Otherwise the visa problems, etc., become daunting. I will explore the possibilities.

There is a considerable prospect I might be in Hawaii for a short visit toward the end of July or early in August. In that case I would be trying to look up Ernie Reese (he and I were at Princeton together) and would of course be happy to meet you and talk about turtles. I'll write again when my plans are more definite.

Thanks for all the help.

Best regards,

  
Dr. John E. Burchard

Enclosure:

Arabian Gulf Coral Reef National Park

Dr. John E. Burchard  
U. P. M. Box 1903  
University of Petroleum and Minerals  
Box 144, Dhahran Airport  
Saudi Arabia

## ARABIAN GULF CORAL REEF NATIONAL PARK

We wish to propose the creation of a Marine Nature Reserve with National Park status, including the islands of Juraid, Jana, and Karan with its satellite Kurayn, and their associated coral reefs. These are natural sites of unique beauty; their fauna of birds, turtles, corals, fish and hundreds of associated animal species is the richest in the Gulf; and they provide a unique and completely irreplaceable resource for the recreation and education of the population of Saudi Arabia, for many kinds of scientific research, and for monitoring the status of the Gulf environment. This resource is extremely fragile, and we believe that to ensure its survival it is necessary to protect it from unconsidered development or exploitation while an integrated management plan for the Park is being worked out.

Basic background data on the Arabian Gulf coral islands are presented in an appendix to this memorandum. Altogether, these islands are seven in number. One (al-Farsiyah) lies in Iranian waters and is presumably occupied by Iranian military installations. Another (al-Arabiyyah) is occupied by a Saudi Arabian Frontier Forces post and by a variety of radio installations serving navigational and telecommunications purposes. Two others (Harqus and Kurayn) are so small that their importance as bird and turtle breeding sites is minor, except for some cormorants on Kurayn which in any case is really part of the Karan reef system. The large, fully developed coral reef and island ecosystem are therefore only three in number: Karan, Jana and Juraid. Each of them has certain unique features, not shared fully with the others.

For this reason we have proposed a Nature Reserve status for all three of the main islands. In view of their respective features and locations, and of the development of Jubail as a major center of population, the reasonable and necessary management objectives are clear-cut. Karan, the largest and most remote island, with the largest turtle population, should form (together with its small satellite Kurayn) a "wilderness area" off-limits for other than bona fide scientific parties and professionally guided nature-study groups. Jana, which is much more accessible from Jubail, should become a primary site for non-destructive field research and education, hopefully based on the Marine Research Center we propose to establish in Jubail. It could also be open to limited recreational use by parties of SCUBA divers, nature lovers and even for picnicking at some seasons, subject to certain restrictions outlined below. Juraid, the closest island to Jubail, would in the normal course of events be subject to the heaviest recreational use. In the interests of both recreation and public education, this use should be allowed to continue, subject to certain restrictions and to guidance from the Marine Science Center and/or Park wardens to avoid damage to the reef ecosystem. Guided trips to Juraid could become part of the program of the planned Jubail public aquarium, and suitably prepared University students might find guiding such trips an interesting and rewarding activity during weekends and University holidays.

Restrictions applicable to visitors to Juraid Island under this scheme would be common-sense restraints designed to ensure the continuation of the resource for the enjoyment and instruction of others. Deposition of any kind of rubbish on the island or the reef would be prohibited. Collecting or removal of marine life, including coral, shells, fish, turtles or turtle eggs, and birds or bird eggs, would also be prohibited. Exceptions to this rule could be granted for research or educational purposes, after review by an appropriate scientific authority. Fishing and spear fishing on the reef itself would have to be prohibited, though it might be possible to issue permits for sport fishing, including spear fishing, in the deeper waters beyond the reef edge. Inspection of the catch would ensure compliance, since the kinds of fish caught would indicate clearly where fishing took place. During the bird and turtle breeding season (mid April to mid September) overnight camping on the island would have to be restricted to certain specified locations. During this season walking on the beach at night, and among the bird colonies day or night, would have to be limited to guided parties under responsible leadership. For most groups wishing to visit the island, it will be possible to find a responsible guide within the group, or in the form of suitably prepared University students. Compliance could be checked by unscheduled visits by Coast Guard, Park staff and/or by scientists doing research in the area. Visiting the island would be made conditional on obtaining a permit and signing in at the Jubail Coast Guard station (or at Park headquarters when one is established); this would permit the Coast Guard to recognize unauthorized visitors and take appropriate action.

Similar but more stringent rules would apply to Jana Island; picnicking and overnight camping would have to be carefully regulated, at least during the bird and turtle breeding season. In the future there will probably be a scientific research team working on the island during the summer breeding season; they could be made responsible for monitoring compliance with the regulations. Scientific research conducted on the island or its reef system would be made subject to the condition that no noxious substances should be released into the reef environment, and that great restraint should be exercised in the removal of specimens for study. Proposed research projects would be submitted for prior review by a scientific advisory panel (see below).

Visits to Karan Island would normally be limited to authorized scientific research parties. Removal of specimens would be subject to the issuance of a special, additional permit limited to bona fide scientific research projects.

To develop and supervise this program, at least in the initial stages until the Marine Science Center and a Marine Park Administration is operating in Jubail, it would be desirable to establish an Advisory Panel consisting of marine biologists (not administrators) from the UPM and King Faisal University, perhaps also including representation from other organizations (such as Aramco's Environmental Unit) with genuine scientific credentials and interests, under the overall aegis of MEPA. This group could make management suggestions, review applications for permits and furnish their evaluations to the Coast Guard, and perhaps establish a list of approved guides. Such a list would make it possible for the Coast Guard to grant permits to organizations on the approved list, without being compelled to review each application in full detail. First applications, from organizations not on the approved list,

would be subject to review and to a subsequent checkup on the behavior of the group at the island. The Advisory Panel, because of their research interests and expertise in marine science, could also provide valuable assistance to the Coast Guard and/or the Park Administration in monitoring compliance and in recommending any further regulations or administrative measures that might become necessary.

We recognize that the declaration of a National Park and the establishment of the associated administrative machinery will take considerable time. We wish to urge most strongly, however, that a decision in principle be taken immediately, and that the interim administrative or regulatory responsibility be assigned to some competent Government organization able to take immediate action to protect this extremely fragile resource. The danger is otherwise acute that the resource will be lost or destroyed forever, before effective protective action has gone into effect.

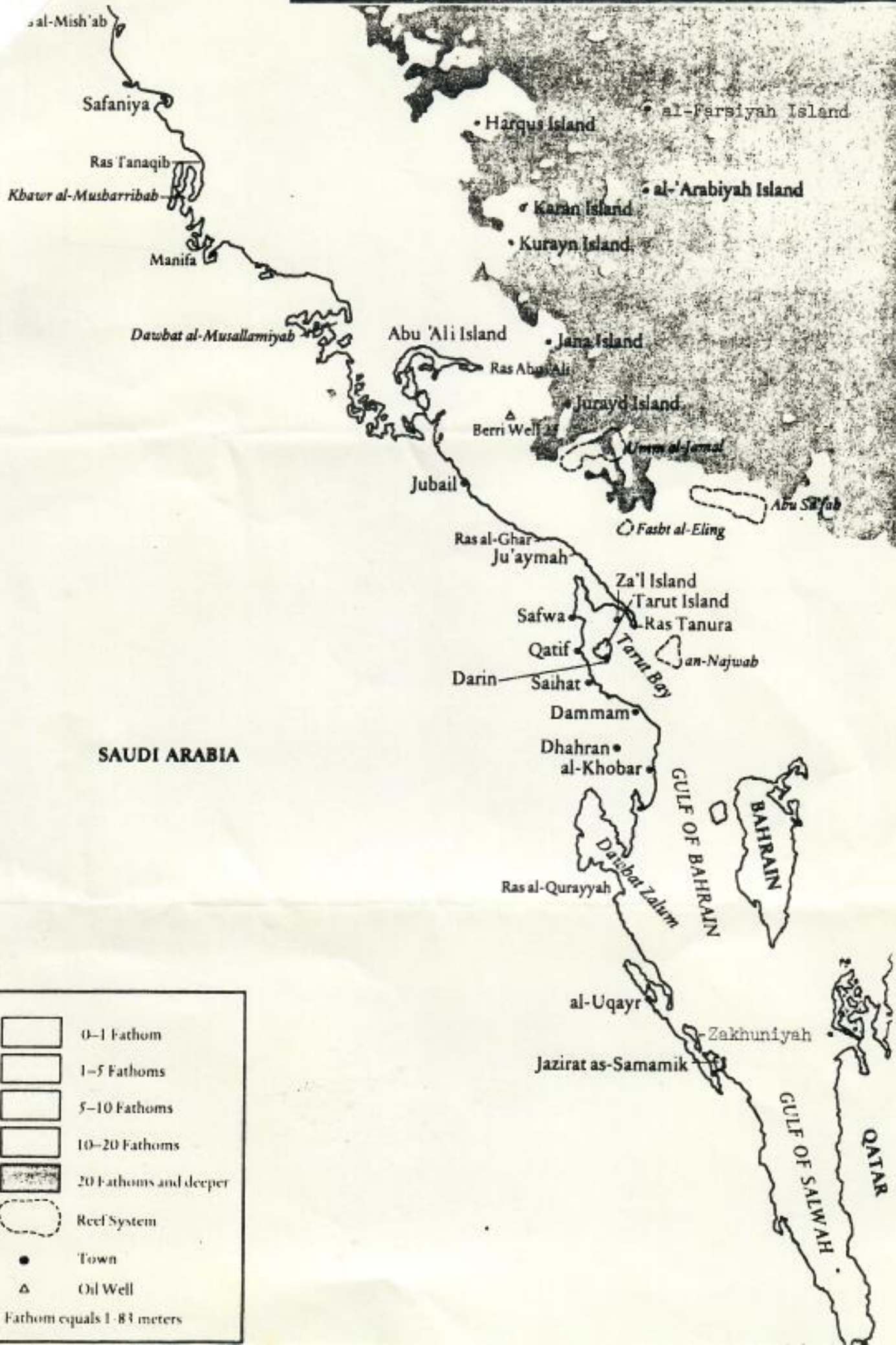
The most imminent dangers to the island and their reef ecosystems arise from three main sources: plans for the construction of installations or facilities on the islands; industrial fishing operations directed at the reef fish populations; and the heedless collecting activities of souvenir hunters, spear fishermen and (especially) Oriental contract laborers in search of sea food or of marketable souvenirs.

Construction on any of the islands would have incalculable harmful effects due to the disturbance inevitable during construction, due to the leisure-time activities of the construction personnel, and due to the permanent presence thereafter of a source of chronic pollution. Industrial fishing activities near the islands, during the summer turtle breeding season at least, have the potential to exterminate entirely the season's turtle nesting population in a period of at most a few weeks. Turtles caught in trawl nets will die, or else be so damaged by partial suffocation as to be unable to breed thereafter. Heedless recreational activities have a similar potential to devastate the living resources of the reef, and their recovery though theoretically possible is likely to be extremely slow. Turtles, in particular, are long-lived animals with a very low recruitment rate, and the destruction of nesting females cannot be justified under any circumstances.

It might be mentioned that turtles, apart from their scientific and educational interest, and apart from the fact that Saudi Arabia is the custodian of one of the very few relatively intact populations left in the world today, are under appropriate management a potential source of very high quality animal protein for human consumption (as well as a major gourmet delicacy). Such management procedures cannot, however, be implemented once the population has become severely depleted or exterminated. The turtles, for which Karan, Jana and Juraid are the primary breeding site, will not go elsewhere if these islands are alienated; they will simply disappear, as the mainland-nesting population already has done.

We hope that you will be able to do something effective about the protection of these acutely endangered reefs and islands, before it is too late.





**SAUDI ARABIA**

## PRESERVATION OF ARABIAN GULF ISLANDS AND CORAL REEFS

### BACKGROUND INFORMATION

The islands in Saudi Arabian waters of the Gulf are of two distinct types, differing in their geological history as well as in their topographical and biological features. One type, which I will call "coastal islands", has a similar topography to adjacent coastal regions; that is, they are more or less hilly and composed of rock and sand in various proportions. These islands represent hills or elevations in the former, Pleistocene landscape, which became surrounded by water during the sea-level rise following the last glacial period. Examples of this type include the large islands of Tarut, Abu Ali and Al-Batinah, now all connected to the mainland by road causeway; and the smaller islands of Zakhuniyah and Umm as-Samamik near Al-Uqayr, which are important bird breeding sites.

The other type I will call "coral islands" because of their close association with coral. They are located well offshore, each on top of a large coral reef. In fact they are an integral part of the coral reef complex, formed from sand generated by the living reef, with which they remain in dynamic equilibrium. They are flat and sandy, and except for the absence of coconut palms they resemble, in most important respects, the typical "South Sea Islands" of the travel brochures. The islands of Jurayd and Jana, near Al-Jubayl, are the most familiar examples of this type.

Both types of islands are vitally important in the ecology of the Gulf sea bird populations, since they are the only available nesting sites free from mammalian predators such as foxes, and until recently also free from significant interference by humans. In addition, the coral islands support breeding colonies of at least two endangered species of sea turtles, and their associated reefs are the richest coral communities (and probably the richest of all marine communities) occurring anywhere in the Gulf. All of these aspects are now acutely threatened by recent development trends, and are urgently in need of protection.

### Coral islands

Of the seven coral islands in the western Arabian Gulf, six are located in Saudi Arabian waters. Jurayd Island lies about 35 km. northeast of Al-Jubayl. Jana, Kurayn, Karan and Harqus islands lie approximately along a line running north-northwest from Jurayd: Jana about 20 km. distant, Kurayn and Karan about 60 km. distant, and Harqus about 90 km. distant from Jurayd. Arabiyah Island lies about 40 km. east and slightly north of Karan; and the seventh island Farsiyah lies in Iranian waters, about 25 km. north of Arabiyah. The positions of these islands can be seen on the accompanying map.

ISLANDS AND CORAL REEFS, page two

The size and vegetational features of the six Saudi Arabian coral islands are shown in the following table:

<u>Name</u>	<u>Length x width</u>	<u>Vegetation cover</u>
Harqus	259 x 76 m.	none; high seas sometimes wash over it
Arabiyah	488 x 267 m.	low bushes only; Frontier Forces base
Karan	2024 x 632 m.	dense cover of bushes up to 1 m. high
Kurayn	312 x 251 m.	scattered bushes only
Jana	1105 x 300 m.	dense cover of bushes up to 1 m. high.
Jurayd	732 x 282 m.	dense cover on about two thirds of the island

All of these islands are used as breeding sites by sea birds, mainly several species of terns. Only rough estimates are available for the total number, which might amount to about 50,000 breeding pairs altogether. Karan, the largest island, is also the most important bird breeding site, with some 20,000 pairs of Lesser Crested Terns Sterna bengalensis and smaller numbers of at least three other species, including the Swift Tern Sterna bergii, a species only very recently discovered to breed in the Gulf. The next most important islands are Jana, Jurayd and Kurayn, probably in that order. Breeding attempts on Harqus frequently fail when storm seas wash over the island, destroying the eggs or young birds; and bird breeding on Arabiyah is affected by the military and other technical installations and by the continuous presence of people on the island.

The same coral islands are also used as breeding sites by the Arabian Gulf populations of two endangered marine turtle species, the Green Turtle Chelonia mydas and the Hawksbill Turtle Eretmochelys imbricata. The total population of Green Turtles using these islands can be estimated at about 12,000 - 15,000 adults, of which only about one third visit the islands to breed in any given year, plus an unknown but certainly large number of juvenile and immature animals. The population of Hawksbill Turtles is less well known, but is probably smaller than that of the Green Turtles. For both species, Karan Island is again the most important breeding site, followed by Jana Island. Together these two islands probably account for about 80% of the turtle breeding in the Gulf. Jurayd was formerly also an important site, but turtle breeding there may have declined recently as a result of human interference. Being close to Jubayl, this island is frequently visited by local fishermen who sometimes slaughter the nesting females or dig up their eggs. The recent influx of large numbers of Oriental laborers, who forage ruthlessly for anything

edible from the sea and who cannot be expected to take any interest in preserving the Saudi Arabian environment, has undoubtedly increased the pressure on the turtles, especially on Jurayd.

During the warmer months, from late March to mid September, female turtles come ashore on the island beaches at night, to bury their eggs in the sand above high tide mark. At this time they are extremely sensitive to disturbance - a flashlight on the beach is sufficient to deter them from coming ashore - and once ashore they are slow-moving and easily caught and killed by anyone wishing to do so. Many turtle populations have been wiped out in this way, since killing off the breeding females effectively stops reproduction, and the recruitment of new individuals into the breeding population is apparently very slow. The eggs take about 50 days to hatch and during this time will die if dug up or otherwise disturbed. The newly hatched young turtles return to the sea, and during this migration are extremely vulnerable to predation both on the beach and in the shallow water near shore. House mice, apparently brought by fishing boats, are now established on all the islands and kill a large number of baby turtles on the beach. Even a very small camp fire will attract all the hatching turtles from a large area of beach. They run toward the brightest point on the horizon, which is normally the direction of open water, but in this case their behavior leads them to the fire, where they perish in the flames. Thus a relatively low level of disturbance to the island environment can cause massive disruption of turtle reproduction. On the other hand it is possible to observe and study this fascinating spectacle at close range, and even to photograph or film it, by taking the correct precautions to avoid disturbing the animals. Various scientific manipulations necessary for a turtle population study, such as tagging and measuring the adult animals, can also be carried out without disturbing reproduction, by exercise of the appropriate precautions.

The coral reef complexes surrounding these islands are probably the most diverse and concentrated assemblages of marine life occurring in the Gulf. Besides some 55 species of stony corals, whose growth has produced the reef itself, these assemblages include hundreds of species of fish and an even larger variety of invertebrate animals. The reefs are local centers of extremely high productivity and are consequently frequented by important commercial and game fish species, who find there a rich source of food. Among such regular visitors at the Jana Island reef, for example, we have observed pompano Trachinotus blochi, Kanaad or king mackerel Scomberomorus commersoni, several species of large jacks and of tuna, sailfish Istiophorus gladius, black marlin Makaira indica and a variety of large sharks. The reef also plays an important or crucial role as a nursery for the young of many fish species, both reef residents and those which as adults occupy other habitats.

## SYNOPSIS OF BIRD AND TURTLE BREEDING

### TURTLES

Green turtle Chelonia mydas: depleted or extinct in most of its range, mainly due to the uncontrolled slaughter of nesting females for the manufacture of turtle soup. Breeding population in Saudi Gulf waters estimated at 12,000 - 15,000 adults plus an unknown number of juveniles. Breeding occurs mainly on Karan, Jana, Jurayd and Kurayn islands (in that order of importance) and to a lesser extent on certain mainland beaches where it is subject to severe human disturbance and to predation by foxes etc.

Hawksbill turtle Eretmochelys imbricata: severely depleted or extinct in most of its range, considered an acutely endangered species world-wide. The main cause of its decline has been slaughter of nesting females to obtain the horny shell covering or "tortoise shell" of commerce. The Gulf population is not well known but might consist of several thousand adults. Breeding occurs mainly on Karan and Jana so far as is known, but more data are needed.

### BIRDS

Swift tern Sterna bergii: one colony of 1,000 + pairs breeding sometimes on Karan, sometimes on Kurayn; the species attempted to breed on Harqus in 1979 and 1980, but were flooded out by high seas on both occasions

Lesser crested tern Sterna bengalensis: colonies on several islands; about 20,000 pairs on Karan, perhaps 10,000 on Jana, 1,000 on Kurayn, 1,000 on Zakhuniyah, 500 on Umm as-Samamik; uncertain whether it breeds on Jurayd but if so probably at least 1,000 pairs

Bridled tern Sterna anaethetus: 1,000 pairs on Karan, many more than this on Jana; no estimate for Jurayd but probably around 1,000 pairs, 1,000 on Umm es-Samamik. These estimates might be too low, especially for Karan; the Jana population might be 5,000 or even 10,000 pairs

White cheeked tern Sterna repressa: the largest colony is on Jana, but no concrete estimates for its size; 1,000 pairs on Karan, a "big colony" (perhaps also 1,000 pairs?) on Zaal, a little less than 500 pairs on Umm es-Samamik, a few on Kurayn

Socotra cormorant Phalacrocorax nigrogularis: 25,000 pairs on Zakhuniyah, 1,000 pairs on a small rocky islet off Salwah, 500 pairs on Umm es-Samamik, 100 pairs on Kurayn. Has probably been driven from several other major breeding sites by human interference

Reef heron Egretta gularis: about 40 pairs on Umm es-Samamik, the only known breeding of this species in Saudi waters of the Gulf

Osprey Pandion haliaetus: one pair on Umm es-Samamik; several other breeding pairs are suspected, but not definitely confirmed at other locations along the coast

Several other sea bird species (notably the Least Tern!) have very recently been discovered to be breeding in our area, some of them in very unlikely places. This list is therefore by no means complete, and further additions can be expected.

## SYNOPSIS OF CRITICAL ISLAND BIOTOPES

### Coral islands

Harqus	259 x 76 m.	no vegetation; high seas occasionally wash over it
Arabiyah	488 x 267 m.	low bushes only; Frontier Forces base, etc.
Karan	2024 x 632 m.	dense cover of bushes up to 1 m. high
Kurayn	312 x 251 m.	scattered bushes only
Jana	1105 x 300 m.	dense cover of bushes up to 1 m. high
Jurayd	732 x 282 m.	dense cover on about two thirds of the island

There are no other islands of this type in Saudi Arabian waters (and only one other, small one in the western Gulf). The most important bird and turtle breeding sites are Karan, Jana, Jurayd and Kurayn, in descending order of importance. Karan and Jana together probably account for 80% of turtle breeding in the Gulf at present.

### Coastal islands

Zaal (near Ras Tanura) has a large breeding colony of White cheeked tern Sterna repressa, and in winter Peregrine falcons Falco peregrinus

Zakhuniyah (in the entrance to the bay of Al-Uqayr) has about 25,000 breeding pairs of Socotra Cormorant (by far the largest breeding colony in the western Gulf) and about 1,000 pairs of Lesser crested terns Sterna bengalensis

Umm as-Samamik (just outside the entrance to the same bay) has roughly 1,000 pairs of Bridled tern Sterna anaethetus, 500 pairs each of Lesser crested and White cheeked terns and of the Socotra Cormorant Phalacrocorax nigrogularis, 40 pairs of the Reef Heron Egretta gularis, and one pair of Osprey Pandion haliaetus

These islands have been singled out for mention because they are known to support large bird colonies and/or breeding of rare or endangered species. There are numerous other islands of similar type, especially in the area North and West of Abu Ali adjacent to the Jubail Community Harbor. At least some of these are probably important bird breeding sites, but for most of them data, even in the form of estimates, are not available at present.



COMMISSION DE LA SAUVEGARDE DES ESPÈCES - SPECIES SURVIVAL COMMISSION

Prof. Archie Carr  
Graduate Research Professor  
Dept of Zoology  
University of Florida  
Gainesville, Florida 32601  
USA

20 October 1982

Dear Archie,

I took the enclosed request from Nick Mrosovsky with me to Bali, hoping to discuss it with you there. It refers to your advice I forwarded to Dr. Mittag after her inquiry about releasing surplus turtles to the wild (copies of letters also enclosed).

Nick called me yesterday to follow up, and I told him I wanted to consult you first, since they were your ideas he wished to quote. I also asked about the context in which the quote was to be used, since such material can easily be misused. Apparently he wants to discuss the whole exchange to illustrate something.

He finally said he would call you direct, and that either he or you would get back to me. What do you advise?

I mentioned to him that the issue was much broader than just the turtles, and that it had caused a lot of discussion within SSC and had led to work underway now by SSC and COE to revise the original IUCN policy statement on Introductions and Reintroductions. He did not seem interested in those aspects.

Sorry you did not get to Bali. Wayne King chaired the turtle meeting, at which we had a good cross section of about 25 people. I will be sending a report.

Yours sincerely,

Robert F. Scott  
Executive Officer  
Species Survival Commission

cc: GLucas  
WKing  
GBalazs

Sa/3/2-20  
RFS/pc

Dr. med. Judith Mittag  
Dr. Mittag Verwaltungsgesellschaft mbH  
Am Bonnehof 30  
D-4000 Düsseldorf 30  
Federal Republic of Germany

9 September 1980

Dear Dr. Mittag,

This is in reponse to your inquiry of 5 August 1980 on release of surplus hatchling turtles. This exemplifies one kind of problem that farming wild species generates. The present one may appear trivial, but to those who are concerned over the elementary state of sea turtle taxonomy it does not seem so. If the Cayman release were successful, it would add to the difficulty of determining affinities and differences among the green turtle populations of the western Atlantic. If the hatchlings to be released are from captive-reared females, they could be hybrids of the three Atlantic breeding colonies: those of Ascension Island, Suriname, and Costa Rica, all of which, at one time or another, have been present in the Cayman breeding crawl. The release might thus involve turtles that would either fail to breed, or would modify the natural West Atlantic strains, and thus exacerbate the troubles facing any effort to use modern, fine-scale taxonomic procedures in the systematic study of the group. Nevertheless, if the release were certain to be a single isolated exercise one might say go ahead with it — believing that so few of the hatchlings would grow to maturity that even the most discriminating biochemical tests would not be biased by their presence in the population. But there is also the precedent to consider. There are aspirant turtle farmers all over the world, and the kind of zoogeographic disarray that they could produce by indiscriminately releasing farm-bred hatchlings could completely block any effort to sort out the green turtle stocks of the world.

Perhaps the first questions to be asked are whether the genetic background of the stock to be released is known, how many turtles are involved, and what their age is? A few hundred very young hatchlings

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Dr. mad. Judith Mittag  
Düsseldorf, Fed. Republic of Germany

9.9.1980

- 2 -

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might not be worth worrying about. A few hundred yearlings of mixed origin probably would be. Situations in between those extremes would require more pondering.

Clearly the answer to your question is not simple!

Sincerely yours,

Robert F. Scott  
Executive Officer  
Survival Service Commission

September 28, 1981

Mr. George Balazs  
Hawaii Institute of Marine Biology  
P.O. Box 1346  
Coconut Island  
Kaneohe, Hawaii 96744

Dear George:

Although you are probably aware of the information I am about to give you, I thought it would not hurt to make sure. Your contacts are such that you can distribute it where it may do some good.

The sex determination project that I coordinated for Jack Woody is pretty much finished, and Jim Spotila's group, with Georgita's help, has nearly finished working up the data. They will publish a paper in Science shortly. For conservation purposes, the essential conclusions are these:

1) eggs incubated in styrofoam boxes in shaded hatcheries are very likely to produce all or nearly all males. The only way to avoid this is to find some way of regulating the temperature inside the boxes, which is - for most purposes - expensive and impractical.

2) eggs reburied in enclosed, in-ground hatcheries (eg. fenced areas on the nesting beach) will probably produce all or nearly all males if a) the eggs are buried at a depth that insures a cooler than average temperature, b) the hatchery is on a slope that reduces the total sunlight incident on the nests, c) the hatchery is shaded by vegetation or by artificial structures, or d) other conditions, known or unknown, reduce the temperatures inside the nests.

3) on a nesting beach which can only be partly protected (from wave erosion, predators, other turtles, etc.), protection primarily of the more upland, vegetated parts of the beach is likely to increase, perhaps markedly, the male/female ratio of the naturally emerging hatchlings.

The above statements apply to Chelonia mydas and Lepidochelys olivacea. I think that it is reasonable to assume that all sea turtles are subject to the same kind of sex determination, until proven otherwise.

Although I have mentioned only factors that will increase the number of male hatchlings, it is also true that factors that increase average egg incubation temperatures are likely to produce a higher percentage of females among the hatchlings. This is less of a worry because most artificial incubation regimes are likely to lower nest temperatures, and also because a higher percentage of females is less damaging (or possibly desirable) from a conservation standpoint.

Of course all this brings us back to what Archie and you and I have been saying for a number of years: the fewer the manipulations of species with complex and poorly known biologies, the greater the chance of success of any conservation protocol. In the case of sea turtles, we can only wait and see what the next surprise will be.

Best regards,

*David*

David Ehrenfeld  
Professor of Biology

cc: Jack Woody  
Jim Spotila  
Archie Carr

HOTEL **Bali** BEACH  
INTER-CONTINENTAL

21<sup>st</sup> October, 1982.

Dear George,

Sometime ago you wanted a set of Indonesian turtle stamps, but due to my contacts in Indonesia they were unobtainable. While at Bali I came across a neat set which I hope you will fill the gap in your collection.

I was looking forward to seeing you here & it was a great disappointment to have missed you & Archie Carr. The latter's paper was presented by his son.

The Philippine question again fell through as there was no one heard up for his side. Since they has to be done during the next turtle meeting I have suggested a new line of action to ~~Chas~~ Archie's son - please give it a thought. If the mountain will not go to Mohammed, perhaps we should go to the mountain.



HOTEL  
**Bali**  
BEACH  
INTER-CONTINENTAL

Bali is a wonderful place - a land  
of smiling people, rich in tradition &  
culture. I seem to get on with them  
as I come from the ancient land  
of Lanka pura so vividly mentioned in  
the Ramayana.

I hope you, Linda, George and  
yourself are all keeping well.

With all good wishes.

Yours sincerely  
Stanley.



Mrs. A.T. Gouw,  
49 Oei Tiong Ham Park,  
Singapore 1026.  
October 26th '82.

Dr. George H Balazs,  
Hawaii Institute of Marine Biology,  
P.O.Box 1346,  
Coconut Island,  
Kaneohe, HAWAII 96744.

Dear Dr Balazs,

I trust this will find you still greatly involved in research work on TURTLES, about which mysterious creatures I enclose herewith a few xeroxed sheets of articles published recently in our local newspapers. I hope you will find these interesting reading and the information of use in your research work.

With Best Regards,

Sincerely,

Mrs. A.T. Gouw  
Mrs. A.T. Gouw.

cc Lisa Gouw



Southwest Missouri State University

Springfield, Missouri 65802

9/15/82

Dr. George H. Balazs  
Hawaii Institute of Marine Biology  
P. O. Box 1346  
Kaneohe, Hawaii 96744

Dear George:

I am writing for several reasons. First I want to thank you for sending me so many of your reprints that I have requested over the years. I find your work continually interesting and thorough, as well as significant. The last I received, Sea Turtles and Their Traditional Useage in Tokelau, has been particularly useful to me as it closely relates to a proposed research program of my own, the outline of which I must submit to my university's sabbatical leave committee by November 1 of this year. Briefly, I plan a (2-3) year study of marine turtle distribution, migration patterns, feeding and reproductive ecology, and human exploitation in the southwestern Pacific (centering in the islands of New Caledonia, Tonga, Fiji, and Vanuatu). I also hope to investigate the possibility and extent of loggerhead nesting on extreme northern New Zealand, as suggested to me by Peter Pritchard. Major support for the intended research would be provided by a Captain James Cook Fellowship for research in New Zealand and the southwest Pacific offered by the New Zealand government. I also am considering seeking support from other agencies as well (mainly for interisland travel).

Due to your position as Co-Chairman of the Marine Turtle Specialists Group of the IUCN/SSC, and your extensive experience with Pacific marine turtles I'd like to ask if you could write a letter supporting the goals of the intended research and its importance in conservation of marine turtles in this area? Certainly your support would be of great assistance in obtaining leave, and later in composing the official application for the Fellowship. Since we have not met, and much of my work has dealt with freshwater turtles I have included a copy of my professional vita, and selected publications of my own to indicate, perhaps, that I can conduct research and write, and therefore may have the capacity to conduct the proposed project in the Pacific. Although my work has, due to my geographic location and logistics, been freshwater oriented, I have participated in loggerhead study and tagging programs, and have a paper concerning Brazilian green turtle distribution and paleoecology in press and scheduled for COPEIA, 1983, #1 (see enclosed copy). This summer I will survey hawksbill status and ecology on the barrier reef atolls of Belize. Archie Carr and Petr Pritchard know me and have written favorable letters in my behalf for past projects, tenure & promotion etc., and I have discussed this proposed project with Peter also. I mention these matters only to indicate that your support would not be misplaced.

- sawyer  
- send to who?

I have not worked out the specifics of the study proposal as yet. I will send you a copy when I do. With a few variations what I have in mind is quite similar to your Tokelau study. Certainly the major objectives will be to identify the species utilizing feeding areas, and nesting sites in the study areas previously mentioned; to evaluate population densities, and seasonality in useage of these sites; to identify hitherto unknown feeding and nesting sites; to tag nesters for the usual reasons concerning return nesting patterns and travel routes, to gather data concerning reproductive potentials, hatching success, predation, and other natural threats; and to monitor human exploitation (traditional and modern) with the goals of conserving the turtles and the cultures which depend upon them. I also plan to investigate the possible origins of the remarkably long migrations of some populations in the area, as in the Scilly atoll to Tonga, Fiji, Wallis Island, Vanuatu, New Caledonia route. Certainly I would also appreciate any suggestions from you concerning approach or objectives.

Finally, in case I am not successful in gaining the Cook Fellowship, I wonder if you could suggest any other research projects concerning marine turtles that could be tackled during an approximately 6-9 mo. span in the Hawaiian Islands (and presumably on a more modest budget)? I, of course, do not wish to infringe upon any of your own work in the islands, either planned or contemplated or in progress, but I would be pleased to work cooperatively if you should so desire. I could work such a plan into my leave proposal as a hedge against failure of my primary objective to at least assure that I should be doing something more useful than teaching general ecology during my proposed sabbatical period.

I regret imposing myself upon you in this way (and the self-aggrandizement necessary in presenting my qualifications), but hopefully it may eventually result in some good for the turtles, and your help would be greatly appreciated. I'll be attending the IUCN/SSC meetings in Kuala Lumpur this October (I'm on the freshwater chelonian spec. group). If you are planning to attend perhaps we could discuss this then. If not then I hope you will be able to find time to write concerning these matters. Anyway, thanks for considering my requests.

Sincerely,

Don

Don Moll, Ph.D.  
Associate Professor  
of Biology

P.S. If available I would appreciate copies of :

Balazs. 1977. South Pacific Commission Turtle Project: a constructive review and evaluation with recommendations for future action. Report for SPC, Noumea, New Caledonia

Balazs. in press. Status of sea turtles in the Central Pacific, Smithsonian Press

Balazs. in press. Sea turtles: a shared resource of the Pacific Islands. The South Pacific Commission Fisheries Newsletter.



Telephone : 022/64 71 81  
Telegrams : Panda, Gland  
Telex : 28 183 wwf ch

Avenue du Mont-Blanc  
1196 Gland, Switzerland

Telephone : 022/64 71 81  
Telegrams : iucnature, Gland  
Telex : 22 618 iucn ch

cc - R. Scott

Dr. G.H. Balazs  
Deputy Chairman of IUCN/SSC  
Turtle Specialist Group  
Institute of Marine Biology  
Box 1346 Coconut Island  
Kaneone  
Hawaii 96744  
USA

Gland, 13 October 1982

Re: Project 1451 - Pakistan, Sind Wildlife Turtle Conservation  
Programme


Dear Dr. Balazs,

Please find attached a copy of a letter from Mrs. Aban Marker Kabraji responding to your various scientific queries.

We will certainly follow-up on your suggestion to write an official letter to the Governor of Sind regarding the proposed housing scheme and will send you a copy in due course.

Many thanks for your valuable guidance.

Yours sincerely,

  
Anton K.C. Bernhout  
WWF/IUCN Project Manager  
ASIA, PACIFIC and OCEANIA



17 SEP, 1982

# SIND WILDLIFE MANAGEMENT BOARD

P.O. Box No. 2722  
Sind Centre Building  
(Opp: P.I.A. Booking office)  
Stratchen Road, Karachi-1  
(Pakistan).

Mr. Anton Fernhout,  
WWF/IUCN Project Manager,  
Asia, Pacific & Oceania,  
Avenue du Mont Blanc,  
1196 Gland,  
Switzerland.

7th, September 1982.

Dear Mr. Fernhout,

Thank you very much for your letters of June 8 and August 13. I am sorry about the delay in replying to your request for a financial report on project funds, but the bank here finally traced the January 1982 draft in August 1982.

The total amount of funds received in 1982 is therefore \$ 6280 with the following break-up:

Consultancy fees	1982
Principal Investigator.	4,300 \$
Co-Investigator.	1,980 \$

We have not received any funding for Equipment and Miscellaneous as per our request made to you in July, 1981. In addition, 500 of the salary budget for the Principal Investigator in January 1982 have been deducted by IUCN/WWF to make up the extra amount required for the better quality tags, and the deficit will be met out of Miscellaneous funds received by us, for 1981.

Although your request for a report is only for 1982, I give below a list of all equipment received from you to date:

<u>Year.</u>	<u>Particulars.</u>	<u>Approx value U \$</u>	
1981-82	Rocca Sportman with 15 Evinrude Out board engine.	4,434.00	1,103.00
"	Toyota Land Cruiser.	8,778.00	
"	Electronic Thermometer + sensors and extension cables.	509.45	
"	5000 Monel Metal Tags with 5 applicators.	1,739.78	
"	Binoculars.	50.00	
"	Weighing scales.	100.00	
"	Miscellaneous (stop watch, tally counter & one Max. min. thermometer).	210.00	
"	Research papers & books.	500.00	
		<u>Total \$ 17,424.23</u>	

note!

ok.

✓

Everything arrived during 1981. Some items (eg. tags) which arrived late in 1981 were not cleared from customs until early 1982. At present however everything is with us and in working order. We even managed to get an exact replacement for the temperature recorder through friends in an American Oil Company prospect here.

We would appreciate receiving a copy of the CITES text as we do not have one.

With regard to the comments on the project, there are a few points I should also like to make:

1. We are aware of the present debate in scientific journals concerning the adverse impact that can result on sex ratios, in conservation projects. Unfortunately the dilemma is quite simple, either a conservation project which removes eggs to enclosures and thereby runs the risk of affecting sex ratios or an attempt to protect eggs in natural nests where one runs the considerable risk of close to 100% destruction of all nests by dogs and people. We have in fact tried the second alternative (and when enclosures are full in peak seasons, have no option but to resort to it) - but when the beaches stretch for miles, it is difficult to keep the dogs away from even our research area, even though we have had the municipal corporation launch quite a few campaign to shoot stray (Pye) dogs. While poaching has been largely controlled, the predation is a process that continues in differing degrees but watching response from us is by no means lacking.

2. The sites selected for the hatcheries are the highest points on the beach, in the same zone where maximal natural laying takes place. However, a look at the map accompanying the first project report will show that the nesting beaches are mostly on a spit of sand with marsh behind. Therefore even the highest points of the beach are swamped during the monsoon when the high tides go right over the spit and drain into the marsh behind it.

3. We are investigating the comparison between natural and hatchery survival rates and will comment further in our next report.

4. The delay of 12 hours between egg laying and reburial is not a regular feature but does occur in some circumstances. Reports in the literature have indicated that this is a safe period. In view of the comment from the IUCN reviewers we will now reduce the period as much as possible.

5. Despite our sustained efforts to keep pye dogs away, killing them occasionally by launching campaign to shoot them, there is a population of tame dogs in fishing villages which steal their way particularly near enclosure 1. We are taking more measures to control the situation. The data has been collected to statistically analyse what the percentage of destruction actually takes place.

The administration is taking appropriate steps to safeguard turtle population from the adverse effects of the proposed housing colony. In this regard a letter from IUCN Chief to Governor Sini/Chairman Sini Wildlife Management Board should prove most helpful as it will project the international concern.

If reports suggest that the weighing of adult turtles is stressful, we will drop the request for the scales.

We have in fact received enquiries and letters from sea turtle researchers about our project, and have sent them information and repeated our invitation. Unfortunately no body has actually arrived. Interested persons include Dr. Jeane Mortimer from the Seychelles, Dr. J.G. Frazier from the National Zoological Park in Washington, D.C., Dr. H.R. Bustard who was in India and is now at the University of Glasgow, and Mr. G. Balazs from Hawaii who corresponds regularly with us and has been great help ever since the project began.


We have also started "Turtle Tours" as part of a fund raising cum educational programme. The enclosed letter went out to all the embassies the response has been encouraging.

If you require any more information, do please let us know.

Thank you for all the help, kind regards.

Enc. One Turtle Tour letter.

Yours sincerely,



( MS. ABAN MARKER KABRAJI )  
Principal Investigator,  
Marine Turtle Conservation Project  
Sind Wildlife Management Board,  
Karachi-1(Pakistan).

....



The world's most endangered animal

## THE HEARTBREAK TURTLE

A documentary from Houston Public Television KUHT-TV

September 12, 1982

Mr. George H. Balazs  
Fishery Biologist  
National Marine Fisheries Service  
Honolulu Laboratory  
P. O Bx 3830  
Honolulu, Hawaii 96812

Dear Mr. Balazs:

As you asked in your letter of September 3, here is a dub of the program.

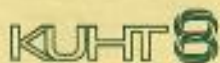
I'm glad to hear it finally aired in Hawaii. PBS fed it to the system on July 16, but many stations chose to tape it and hold it for later air.

I'm happy to be able to share the program with you, since NMFS is such a significant part of the story. We could not have done it without NMFS Galveston's cooperation.

WE'd be interested in learning your reaction to the program.

Sincerely,

Miriam Korshak  
Producer



4513 Cullen Blvd.,

Houston, Texas 77004

(713-749-2304)



MANZANILLO, COL., A 30 DE SEPT. DE 1982

DEAR GEORGE H. BALAZ

R. Márquez  
Apartado Postal # 695  
Manzanillo, Col. 28200  
México

MY NEW MAIL ADDRESS:  
MANZANILLO, COL. 28200  
VALUABLE ASSISTANCE WITH

REPRINTS ON: SEA TURTLES

P.D. Here in is included the only one stamp.

that I was able to get.  
I am living here, and I do  
not know on the stamps

CORDIALLY

→

just when they were not  
available any more.

Please make a good xerox  
copy for the others of the  
sea turtle group.

I am sending one to Dr.  
Mrosowsky (and I do not  
have any one for me!!)

Some time ago appeared  
one 'logo' of turtles in the  
National Cotery, please make  
diffusion if you are agree.

Best wishes from Manza-  
nillo, I am working yet on  
sea turtles as the principal  
here in Mexico

Cordially

A handwritten signature in blue ink, appearing to be 'Manzanillo', written in a cursive style with a large flourish at the end.

REGIONAL OFFICE, EAST COAST NATIONAL PARKS

**TURTLE ISLANDS NATIONAL PARK**

BOX 708, SANDAKAN, SABAH, MALAYSIA.

CABLES "NATAPARK", SANDAKAN. TEL. ~~xxxx~~ 42188

10/11/82  
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Your Ref:-

Our Ref:- ECNPRO/52/1/140

Date 24th September, 1982

Mr. George Balazs,  
University of Hawaii at Manoa,  
Hawaii Institute of Marine Biology,  
P. O. Box 1346,  
Coconut Island,  
Kaneohe,  
Hawaii 96744.



Dear George,

Many, many thanks for your letter of 17th September, 1982 and the enclosure which is highly appreciated. The posters are excellent education material and I have had them framed and placed in all the buildings on the islands and the museum. I am most grateful to you for the help and assistance.

I do hope that I will be able to see you at Bali.

With kind regards to you and your family.

Sincerely yours,

*Stanley*  
G. S. de Silva





Mr. George Balazs,  
 University of Hawaii at Manoa,  
 Hawaii Institute of Marine Biology,  
 P. O. Box 1346,  
 Coconut Island,  
 Kaneohe,  
 Hawaii 96744,  
 U. S. A.

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Sender's name and address: Turtle Islands National Parks  
P. O. Box No. 768, Sandakan,  
Sabah, East Malaysia



AN AIR LETTER SHOULD NOT CONTAIN ANY  
 ENCLOSURE: IF IT DOES IT WILL BE SURCHARGED  
 OR SENT BY ORDINARY MAIL.

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Dear George,

It took me some time to track down the final fate of 'Chelonologica' - It is now extinct but maintains a reference library - I enclose a copy of my most recent correspondence with them.

I have been involved in some discussion with Wayne and Anne Meylan concerning the proposals for discussions at Kuala Lumpur. Unfortunately I can't get there myself (Too expensive, too busy). I concur that it does not seem right that non experts from Glard will fly to K.L. at IUCN expense to make determinations of status while you & I stay home. However I do trust Owen Lucas and believe that a reasonable compromise will emerge.

I have got tied up in the Cayman turtle farm issue again. Those ~~two~~ ~~islands~~!! have got a hearing before Sohn Breaux Committee probably on Oct 1 to argue that USFW can.

and Interior treated them unfairly and without authority. They will probably get a sympathetic hearing although Mike Bean and the EDF people are presenting the ~~new~~ good guys side and I may be called to testify on the Australian turtle farms.

Does your change of address indicate a new source of employment/funding?

Have you seen the new manual for sea turtle research put out by Fred Berry's people and IOCARIBE? ITS ok.

also NMFS- /USFW Turtle anatomy and necropsy manuals. all available from S.E. Fisheries Centre Panama City FLA. 32407.

Thanks for the plug with Bob Scott.

Regards Person.