

NYZS-FFS

G.H. BALAZS FILE



University of Hawaii at Manoa

Hawaii Institute of Marine Biology
P.O.Box 1346 • Coconut Island • Kaneohe, Hawaii 96744
Cable Address: UNIHAW

February 26, 1976

Mr. Palmer C. Sekora
Fish and Wildlife Service
Hawaiian Islands and Pacific Islands
National Wildlife Refuges
337 Uluniu Street
Kailua, Hawaii 96734

Dear Palmer:

I have received your letter of February 23 concerning Regional Director Martinson's request, on behalf of the Hawaii Division of Fish and Game, for me to provide access to green sea turtle data. In your response, would you please communicate the following information and points to Mr. Martinson.

1. Financial assistance for my work at French Frigate Shoals has only encompassed a two year period (mid-1974 to mid-1976). This support has been through a contract originating from the Washington, D. C. Office of Endangered Species and administered by the New York Zoological Society.
2. The low level of funds provided by this contract are, of course, vital to the project; however, please keep in mind that they only cover a small portion of the total project costs. Two of the major items, my salary for time in the field and the time spent in data analyses, interpretation and report writing, have for the most part been donated by me. This action has been necessary because, thus far, no specific task research funds have been provided by the State of Hawaii for green sea turtle studies. I have, however, readily and willingly used my own personal time, knowledge, energies, and in some cases even money, for this work. The reason for this high level of commitment is simply that I am interested in the ecology of the Hawaiian green sea turtle, and hope to make a positive contribution to the field.
3. I want to categorically state that all of my data have always been available to any interested individual or agency who desires to discuss the subject.

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In scientific research, the accepted manner of disseminating findings and data is through written reports, some of which may be prepared for journal publication. The material is then easily transmitted to fellow researchers or interested individuals of the general public. In order to stimulate greater interest in the Hawaiian green sea turtle and, at the same time, make others aware of my findings, I have made a point of sending copies of my writings to numerous parties. This has included, and continues to include, the Hawaii Division of Fish and Game. A list of reports follows:

Balazs, G. H. 1976. Green Turtle Migrations in the Hawaiian Archipelago. *Biological Conservation (Great Britain)*, 9, In Press, 15 pp. (copy of proof pages enclosed.)

Balazs, G. H. 1976. Sea Turtle Conservation. *Elepaio, Journal of the Hawaii Audubon Society*. 36(7), 79-85.

Balazs, G. H. 1975. Green Turtle's Uncertain Future. *Defenders*. 50(6), 521-523.

Balazs, G. H. 1974. French Frigate Shoals' Progress Report. Ms Communication to Refuge Manager. Oct. 29, 5 pp.

Balazs, G. H. 1974. Survival Status of the Green Turtle (Chelonia agassizi) Nesting and Basking Colony at French Frigate Shoals, Northwestern Hawaiian Islands. Ms presentation, 104th Meeting American Fisheries Society, Sept. 9-11, Honolulu, 8 pp.

Balazs, G. H. 1973. Summary Report on the 1973 French Frigate Shoals Green Turtle (Chelonia sp.) Investigations. Ms, 33 pp.

I do not know what specific data are needed at this time by the Hawaii Division of Fish and Game, or who originated the request. However, I do know that a telephone call directly to me, rather than a formal request channeled through Mr. Martinson's office, would have yielded far faster results and eliminated the need to write a letter such as this. I have, on many past occasions, enthusiastically responded to every request for assistance made by the Division of Fish and Game and its authorized consultants. Activities have ranged from providing original data on tagged turtles reported to enforcement officers, to serving on the Division's behalf as a resource consultant at public hearings. I must therefore state in all honesty that I find this written request matter a trifle bit disturbing. This is particularly true concerning the reference made to the Freedom of Information Act, as if to somehow imply that my research information has not always been available.

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I would appreciate it if you would also pass on to Mr. Martinson my pleasure at having met him, albeit somewhat briefly, at the recent conference held here in Honolulu. I am sorry that we did not have the opportunity to discuss matters of common interest concerning the future of the Hawaiian Islands National Wildlife Refuge.

Sincerely,

George H. Balazs
Jr. Marine Biologist

mk

Enclosures

cc: J. E. Bardach
Director, HIMB

Submitted to

The United States Department of Interior
Bureau of Sport Fisheries and Wildlife
Fish and Wildlife Service

Title

An investigation of green turtle (*Chelonia* sp.) populations
of French Frigate Shoals, Northwestern Hawaiian Islands.

Principal Investigator

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

Duration

Continuing - April 1974 to April 1975. Anticipate requesting
permission to conduct similar investigations through 1978.

Objectives

1. To continue an intensive tagging study of nesting turtles at East Island, French Frigate Shoals during the 1974 nesting season. Data from the 1973 study have indicated East Island to be the site of greatest nesting activity within the atoll. Comprehensive information collected at this location will further provide a basis for defining parameters of the entire colony. Included in this phase of the work will be the accumulation of data on length-width frequencies, re-nesting intervals and locations, fecundity and emergence, site selection and nesting behavior.

2. To obtain data on the number of green turtles utilizing other nesting locations (Tern, Trig, Whale-Skate, Gin and Little Gin Island) during the 1974 season. In addition, intensive sampling of those animals nesting on Whale-Skate, the second most utilized island within the atoll,

will be made at periodic intervals in order to determine if parameter differences exist between East and Whale-Skate Island turtles.

3. To conduct further investigations on the incidence of basking and its relationship to nesting on the islands under surveillance. In depth observations will be made on this unique behavioral trait in order to accurately define and describe emergence, quiescence, retreat and other thermoregulatory patterns associated with the basking habit.

4. To obtain information on green turtle mating habits and their relationship to subsequent basking and nesting location preferences. Observations will be made to either confirm or reject the theory postulated during 1973 that at the onset of the mating season males arrive within the atoll in advance of females. Information will also be obtained on the cyclic reproductive patterns of males in order to determine if breeding by this sex takes place each year.

5. To make determinations on the degree of predation by small sharks, ghost crabs and birds on newly hatched turtles.

6. To collect additional data on egg fertility and embryo and hatchling mortality within nests at several select locations. Substrate information will also be gathered to identify those characteristics conducive to high productivity.

7. To carry out periodic land and aerial surveys several times throughout the year in order to establish the presence and size of resident green turtle populations; to determine seasonal migration patterns both in and out of the atoll, and to examine for the presence of marine turtle species other than Chelonia that may be nesting at other times of the year.

Justification

Pressures from man continue to increase on marine turtle colonies throughout the world. In order to obtain knowledge on the Hawaiian Archipelago green turtle (Chelonia sp.) colony, a preliminary intensive investigation was conducted on nesting and basking populations occurring at French Frigate Shoals, Northwestern Hawaiian Islands during 1973. A summary report on the significant results of this work accompanies this proposal.

Because French Frigate Shoals is the last remaining congregated nesting site of the green turtle in the Hawaiian Archipelago, and because Hawaiian green turtles comprise the last intact colony in the United States and possibly the only one in the world that can be completely managed under one nation's jurisdiction, it is imperative that continued studies be carried out at this location in order to gather data that will aid in the formulation of a sound long range management program. This is particularly important in view of the fact that mature animals found at French Frigate Shoals migrate to coastal waters of the major inhabited Hawaiian Islands where they are unprotected from both commercial and private exploitation.

Results obtained from the 1973 investigation have been instrumental in demonstrating the need for marine turtle protection within waters under State jurisdiction. Proposed protective measures are presently under consideration by the Hawaii State Department of Land and Natural Resources, but it is unknown at this time whether or not these restrictions, if enacted, will provide the necessary protection to ensure future viability in the Hawaiian Archipelago colony.

Because cyclic reproductive patterns are exhibited by female green turtles, intensive studies need to be conducted at the nesting site over a number of years in order to examine the entire nesting colony. Although nesting occurs most frequently in other areas of the world at three year intervals, both two and four year cycles are not uncommon. The reproductive patterns of the French Frigate Shoals colony are unknown. Due to cyclic reproduction, additional studies at the nesting site will, in essence, be examining completely different populations. Census data, as well as length-width frequencies will need to be collected on these animals in order to accurately define parameters for the total colony. This data will, in part, allow for the confirmation or adjustment of determinations previously made on the total size of the nesting colony.

During the 1973 study only eight animals were identified that had been formerly tagged, however, several hundred individuals have been marked at this location over the past six years. Subsequent investigations may well encounter greater numbers of these tagged animals and permit full utilization to be made of data previously collected by U. S. Fish and Wildlife personnel.

Procedures

Research methods utilized during the 1973 study proved highly successful and, in general, the same basic procedures will be carried out during subsequent studies. The practical experience derived from being closely associated with the French Frigate Shoals ecosystem for extended periods of time allowed for the adjustment and refinement of data collection techniques. Procedures that will be followed in order to fulfill

each of the project's objectives are outlined as follows:

1. East Island tagging study -

A small campsite will be re-established on East Island and investigators will commute between this location and the Tern Island facility as necessary for supplies, rest and rotation of duty. Seventeen previously designated areas which comprise the vegetated portion of East Island and each extend for approximately 50 meters will again be located and marked with identifying stakes. Activity during the major portion of the nesting season (June - July or as indicated through preliminary observations) will be intensively monitored by conducting surveys at two hour intervals during each night. During each survey tracks from emerged animals will be recorded and followed inland to determine incidence of unsuccessful pits and/or stage of nesting. Temporary identification will be made by numbering each animal's carapace with spray paint. When the latter cover-up stages of nesting are observed, body measurements will be taken and permanent identifying tags attached. In order to eliminate disruptions to normal behavioral patterns, animals will not be turned over for tagging purposes unless absolutely essential to the collection of critical data. Egg counts will be made on those animals found to be at a nesting stage conducive to such observations and several such nests will be permanently marked for future location.

Physical and mental stress incurred to the researchers from the rigorous data collecting schedule (in excess of 80 hours per week) will be minimized by maintaining three individuals at any one time in the

area, two of which will carry out intensive nightly duties on East Island while the third person will act in a support capacity on Tern Island. Rotation of assignments will allow for adequate rest, and give each individual the capacity to remain within the atoll for two consecutive weeks before returning to Honolulu. Tours of research duty for longer than two weeks are not deemed feasible due to University commitments and financial responsibilities on the part of research assistants that will be helping the principal investigator on this project.

2. Utilization of other islands by nesters -

Daytime surveys of the islands Trig and Whale-Skate will be made every second day in order to record the incidence of nesting pits at these locations. Similar surveys will be conducted on Gin and Little Gin at six day intervals or as weather conditions permit. Pits on Tern will be monitored periodically by that person acting in a support capacity. New pits that are recorded during each survey will be marked for future recognition. At ten day intervals one individual will carry out a night survey of Whale-Skate using the same methods as previously described for East Island.

3. Incidence and observations of baskers -

In conjunction with the regular daytime nesting pit surveys, observations on the incidents of basking animals will also be recorded. A similar survey will also be conducted regularly on East Island. Baskers which possess permanent tags and no painted numbers will be approached for identification using non-disruptive techniques developed during the previous study.

In order to make careful observations on the basking behavior of individual animals, a small tent with observation ports will be situated adjacent to a heavily used basking area at the southeast end of East Island. This facility will also be useful during night surveys for shelter from the frequent rain showers which occur at the atoll.

4. Mating habits -

Surveys will be conducted over a six day period during the first week of May to collect data and make observations on copulation and sex ratios. Samples of basking animals on each island will be marked with spray paint in order to determine inter-island movements, mating frequencies, and subsequent nesting activity. Baskers bearing tags from previous years will be approached for identification.

5. Predation on hatchlings -

Commencing the second week of July, baited hooks suspended from floats will be set at two-day intervals at select locations off East and Whale-Skate Island in order to sample the stomach contents of small sharks which are abundant in those areas. As conditions permit, observations will be made on the emergence of hatchlings from select nests to record degree of predation by ghost crabs and birds.

6. Egg fertility, embryo and hatchling mortality -

During the first week of October surveys will be made on each island to locate nests in which hatching and emergence have taken place. Excavations will be made on each nest to assess the number of undeveloped eggs, dead hatchlings, and partially developed dead embryos. Live

hatchlings found to be entrapped underground will be retrieved and released into the ocean. Terrain descriptions will be made and soil samples taken at each location.

7. Land and aerial surveys -

At three month intervals, the principal investigator and one assistant will conduct land surveys of each island over a six day period. All information pertinent to the presence and activity of turtles within the atoll will be collected. In conjunction with the weekly USCG/FAA logistics flight, and, as passenger space permits, an aerial survey of the islands will be carried out by the principal investigator once each month to further census turtle populations.

To ensure the well being of the research team while conducting studies in this remote and potentially hazardous area, all possible safety precautions will be implemented. Radio contact will be maintained at regular intervals with the Tern Island facility. The launch used for interisland travel will be equipped with flare guns, extensive mooring gear, first aid supplies, emergency food and water and reserve gasoline. In addition, an extra outboard motor and spare parts will be carried. The principal investigator will personally supervise and be responsible for all research activity within the atoll.

Close contact will be maintained at all times with U. S. Fish and Wildlife personnel in order to coordinate research activities and disseminate information relative to the progress of the project. At the completion of each major phase of the investigation, data will be compiled and a summary report prepared for the Bureau of Sport Fisheries and Wildlife.

Schedule of proposed research activities (April, 1974 to April, 1975)

<u>Month</u>	<u>Week</u>	<u>Activity</u>
April	1st and 3rd	1-day preliminary aerial survey
May	1st	6-day survey of mating activity
May	4th	Initiation of intensive tagging study and periodic island surveys
July	2nd	Initiation of shark sampling
August	1st	Completion of intensive tagging and survey studies
September	1st	1-day aerial survey
October	1st	6-day survey of egg fertility, hatchling and embryo mortality and overall turtle activity
November	1st	1-day aerial survey
December	1st	1-day aerial survey
January	1st	6-day survey of overall turtle activity
February	1st	1-day aerial survey
March	1st	1-day aerial survey
April	1st	6-day survey of overall turtle activity

Responsibilities and support

Direct financial assistance will be obtained from sources other than the Bureau of Sport Fisheries and Wildlife for all investigations scheduled to take place after April of 1975.

Based on the results and accomplishments of the 1973 investigation, a proposal is in preparation for submission to granting agencies interested in supporting green turtle research of this nature. The following support is deemed necessary in order to successfully accomplish the immediate project objectives for the period April 1974 to April 1975.

Air transportation between Honolulu and Tern Island,
French Frigate Shoals

Provision requested from the U. S.
Coast Guard and Bureau of Sport
Fisheries and Wildlife at no direct
cost to project

Use of marine laboratory's research facilities,
equipment and supplies (extra outboard motors, parts,
tools, mooring gear, safety equipment, spray paint,
calipers, and photographic materials)

Provided by the Hawaii Institute of
Marine Biology

Food costs at Tern Island (available through U. S.
Coast Guard facilities at a rate of \$4.05 per man
per day)

413.10 Provision requ
from the Burea
Sport Fisherie
Wildlife

BSFW fiscal year 1973-74 (102 man days)

BSFW fiscal year 1974-75 (129 man days ending April 1975)

Provision requested from the Bureau
of Sport Fisheries and Wildlife

Portable 2-way radios (3) \$ 480

Provision requested by the Hawaii Institute of
Marine Biology

Salary for project leader (principal investigator)

Compensation for research assistants (can be awarded for either fiscal year 1973-74 or 1974-75) Requested as a grant sum. for payment to research assistants at a rate of \$75.00 for each week (20 man weeks total) of duty at French Frigate Shoals. Recruitment of University level assistants for this type of intensive research will be facilitated considerably by offering such a cash incentive.

\$ 1,500-Provision requested from the Bureau of Sport Fisheries and Wildlife

Total direct cost to the Bureau of Sport Fisheries and Wildlife \$ 2,915.55

U. S. DEPARTMENT OF THE INTERIOR
FISH AND WILDLIFE SERVICE
Bureau of Sport Fisheries and Wildlife

GENERAL PROVISIONS - COST-REIMBURSEMENT RESEARCH
AND DEVELOPMENT CONTRACTS

ARTICLE I--REPRESENTATIONS. The Contractor represents that it is qualified, willing and able to perform the work of this contract and is performing work in a similar or related field. The Contractor shall, as an independent contractor, use its best efforts to supply the necessary personnel, facilities and do all other things which in its judgment are necessary for or incident to the performance of the work of this contract which shall be under the supervision of the Project Leader. The Contractor shall use its best efforts to complete performance of this contract, including preparation of the final technical report, within the estimated cost and period specified, but the Government and Contractor agree that performance within such cost and period of time cannot be guaranteed.

ARTICLE II--REPORTS, CONFERENCES AND PUBLICATION OF RESULTS.

(a) Reports: Periodic progress reports shall be prepared and submitted by the Contractor as specified by the Project Leader.

(b) Government-Contractor project conferences: The contracting parties recognize the advantages of project conferences and agree that conferences of this type will be held as scheduled by the Project Leader. The Project Leader shall have the opportunity to review and evaluate the program at each conference and make such recommendations as may be deemed necessary and appropriate. At the conferences, and at such other times as appropriate, the Project Leader will acquaint the Contractor with developments in other related projects.

(c) Publication of results: The contracting parties recognize the desirability of releasing as publications the technical results of this contract. The Government reserves the right to publish these results and will make its decision to publish known to the Contractor within sixty (60) days after completion of this contract. If the Government elects not to exercise this right, the Contractor will be free to publish the results by any method of its choice. Appropriate credit will be given to both contracting parties in any publication of results of this contract.

ARTICLE III--COST AND PAYMENT

(a) The total cost to the Government for the full performance of this contract will not exceed the estimated amount specified. The Contractor shall notify the Contracting Officer, through the Project Leader,

in writing whenever it appears to the Contractor that the cost of completing the performance of this contract will exceed such cost. The Government shall not be obligated to reimburse the Contractor for, and the Contractor shall not be obligated to incur, expenditures in the performance of the work contemplated by this contract in excess of the cost limitation unless, and until, it shall have been increased by amendment of this contract.

(b) The Government shall pay to the Contractor as full compensation for its undertakings hereunder the Amounts Payable as defined and determined in Article IV.

(c) Once each month (or at other intervals as may be mutually agreed upon), the Contractor shall submit to the Project Leader an invoice in triplicate copies for the Amounts Payable for the performance of work of this contract. All invoices shall summarize the items for which payment is requested. Documents supporting the invoices shall be retained by the Contractor for appropriate Government audit.

(d) Within thirty (30) days after the submission of each interim invoice, the Government shall make provisional payment, except as provided below, of the amount claimed by the Contractor. At any time or times prior to or within three years after the final payment on account of Amounts Payable, the Contracting Officer may make or have made such audit of the books and records of the Contractor bearing upon the Amounts Payable under this contract, as he shall deem proper in accordance with the provisions of this contract. Each provisional payment shall be subject to reduction to the extent of amounts included in the related invoices which are found not to constitute Amounts Payable, and shall also be subject to reduction for overpayments or to increase for underpayments on preceding invoices.

(e) The Government shall withhold payment of the invoice submitted by the Contractor for the final month (or other payment period) pending the completion of all work and the receipt of the final report or other material required by this contract.

(f) The Contractor and the Contracting Officer shall execute as soon as practicable after completion or termination of this contract a mutual release discharging both parties from any further obligations under this contract.

ARTICLE IV--AMOUNTS PAYABLE. Amounts Payable, as used herein, includes only the following:

(a) The direct costs and expenses of the work substantially of the types and amounts set forth in the cost analysis or budget of this contract except general and administrative expenses as set forth in (b) of

this Article, which are incurred and claimed by the Contractor as necessary for or incident to the performance of this contract and are accepted by the Contracting Officer. These costs and expenses shall be charged in accordance with accounting methods which are consistently followed by the Contractor and are equitable for allocating costs, provided that the amounts reimbursable for subsistence allowance and automobile mileage shall not exceed the amounts paid to the Contractor's employees or other persons.

(b) General overhead will be allowed without audit at the percentage rate specified in this contract, on the direct costs and expenses incurred under (a) of this Article.

ARTICLE V--TERMINATION

(a) It is the intent of the parties hereto that this contract will not be terminated prior to completion. In the event such termination becomes necessary in the best interests of the Government, the Contracting Officer may terminate the contract at any time by giving the Contractor notice in writing. Such termination shall be effective in the manner and on the date specified in said notice and shall be without prejudice to any claims which the Government may have against the Contractor. Upon receipt of such notice, the Contractor shall, unless the notice directs otherwise, immediately discontinue all work and the placing of all orders for materials, facilities, and supplies in connection with performance of this contract, and shall cancel promptly all outstanding commitments hereunder, including all subcontracts, insofar as such commitments or subcontracts are chargeable to this contract.

(b) Upon the termination of this contract, full and complete settlement of all claims of the Contractor shall be made as follows:

(1) The Government shall assume and become liable for all obligations, commitments and claims that the Contractor may have theretofore in good faith undertaken or incurred in connection with said work, the cost of which would be reimbursable in accordance with the provisions of this contract, and the Contractor shall, as a condition of receiving the payments mentioned in this Article, execute and deliver all such papers and take all such steps as the Contracting Officer may require for the purpose of fully vesting in the Government, the rights and benefits of the Contractor under such obligations or commitments.

(2) The Government shall reimburse the Contractor for all expenditures made in accordance with Articles III and IV and not previously reimbursed.

(3) The Government shall reimburse the Contractor for such further expenditures after the date of termination for the protection of Government property and for accounting services in connection with the settlement of this contract as are required or approved by the Contracting Officer.

ARTICLE VI--SUBCONTRACTS. No part of the work under this contract shall be subcontracted without the prior approval of the Contracting Officer.

ARTICLE VII -- PROPERTY. Title to all property acquired and used shall be in the Contractor. The Contractor will be reimbursed currently for the acquisition cost or fair rental value of such property as it may elect. All property for which the contractor has been reimbursed the acquisition cost shall be accounted for within sixty (60) calendar days following the completion of work under, or termination of, this contract by transfer of title and custody to the Government or, in the alternative, the Contractor, with the consent of the Contracting Officer, may allow credit for the current fair market value of such property in its final claim for reimbursement and if the amount due is insufficient the balance shall be paid by check made payable to the Treasurer of the United States.

ARTICLE VIII--DISPUTES. Except as otherwise provided in this contract any dispute concerning a question of fact arising under this contract which is not disposed of by agreement shall be decided by the Contracting Officer, who shall furnish to the Contractor a written copy of his decision. Such decision shall be final and conclusive unless, within thirty (30) days from the date of receipt thereof, the Contractor appeals therefrom by mailing or otherwise furnishing to the Contracting Officer a written appeal addressed to the Secretary. The decision of the Secretary or his duly authorized representatives upon such appeal shall be final and conclusive unless the decision is fraudulent or capricious or arbitrary or so grossly erroneous as necessarily to imply bad faith, or is not supported by substantial evidence. In connection with any appeal proceeding under this article, the Contractor shall be afforded an opportunity to be heard and to offer evidence in support of its appeal. Pending final decision of a dispute hereunder, the Contractor shall proceed diligently with the performance of the contract and in accordance with the Contracting Officer's decision.

ARTICLE IX--ASSIGNMENT. Neither this contract nor any claim hereunder shall be assigned without the prior written approval of the Contracting Officer.

ARTICLE X--OFFICIALS NOT TO BENEFIT. No member of or delegate to Congress or resident commissioner shall be admitted to any share or part of this contract or to any benefit that may arise therefrom, but this provision shall not be construed to extend to this contract if made with a corporation for its general benefit.

ARTICLE XI--CONVICT LABOR. The Contractor, in connection with the performance of this contract, shall not employ any persons undergoing sentences of imprisonment at hard labor which have been imposed by courts

of the several states, territories, or municipalities having criminal jurisdiction. This provision shall not be construed to preclude the employment of persons serving sentences on parole or probation, or persons who have served their terms.

ARTICLE XII--COVENANT AGAINST CONTINGENT FEES. The Contractor warrants that no person or selling agency has been employed or retained to solicit or secure this contract upon an agreement or understanding for a commission, percentage, brokerage, or contingent fee, excepting bona fide employees or bona fide established commercial or selling agencies maintained by the Contractor for the purpose of securing business. For breach of violation of this warranty the Government shall have the right to annul this contract without liability or in its discretion to deduct from the contract price or consideration the full amount of such commission, percentage, brokerage, or contingent fee.

ARTICLE XIII--EXAMINATION OF RECORDS. The Contractor agrees to preserve all of its records bearing upon the Amounts Payable under this contract until the expiration of three years after final payment under this contract, and agrees that any authorized representatives of the Government and the Comptroller General of the United States or any of his duly authorized representatives shall, during this period, have access to and the right to examine any directly pertinent books, documents, papers, and records of the Contractor involving transactions related to this contract.

ARTICLE XIV--PATENTS AND INVENTIONS. It is understood and agreed that inventions or discoveries of processes, devices and methods of application conceived and developed as a result of this contract and all rights therein shall be the property of the Government. In furtherance of this contract, the Contractor agrees to assign unto the Government any and all rights, title and interest which it may have or claim to have in any patentable invention or discoveries of processes, devices and methods of application arising out of activities under this contract. The Contractor further agrees that all its employees who shall perform work under this contract shall assign any patent rights which they may have or claim to have in discoveries or inventions resulting from work therefrom unto the Government. With respect to any subcontract hereunder, the Contractor's obligation under this section will be discharged upon its including in such subcontract a patent rights article not less favorable to the Government than as provided herein.

ARTICLE XV--BUY AMERICAN ACT. In accordance with the Buy American Act (41 U.S.C. 10a-10d) and Executive Order 10582, December 17, 1954 (3 CFR Supp.), the Contractor agrees that only domestic material will be used (by the Contractor, subcontractors, materialmen, and suppliers) in the performance of this contract.

An unmanufactured material is a "domestic material" if it has been mined or produced in the United States. A manufactured material is a "domestic material" if it has been manufactured in the United States and if the cost of its components which have been mined, produced, or manufactured in the United States exceeds 50 percent of the cost of all its components. "Component" means any article, material, or supply directly incorporated in material.

A component shall be considered to have been "mined, produced, or manufactured in the United States" (regardless of its source in fact) if the article, material, or supply in which it is incorporated was manufactured in the United States and the component is of a class or kind determined by the Government to be not mined, produced, or manufactured in the United States in sufficient and reasonably available commercial quantities and of a satisfactory quality.

ARTICLE XVI--TIME OF PERFORMANCE. The Contractor agrees to use his best efforts to complete the performance of this contract, including preparation of the final technical report, within the time stated in the contract. If, notwithstanding the exercise of good faith and diligent efforts in the performance of the work called for, the Contractor becomes unable to complete the work within the time specified, it shall give the Contracting Officer written notice of the anticipated delay with reasons therefor. Such notice and reasons shall be delivered not less than thirty (30) days before the completion date specified in the contract or within such time as the Contracting Officer deems sufficient.

UTILIZATION OF MINORITY BUSINESS
ENTERPRISES

(a) It is the policy of the Government that minority business enterprises shall have the maximum practicable opportunity to participate in the performance of Government contracts.

(b) The Contractor agrees to use his best efforts to carry out this policy in the award of his subcontracts to the fullest extent consistent with the efficient performance of this contract. As used in this contract, the term "minority business enterprise" means a business, at least 50 percent of which is owned by minority group members or, in case of publicly owned businesses, at least 51 percent of the stock of which is owned by minority group members. For the purposes of this definition, minority group members are Negroes, Spanish-speaking American persons, American-Orientals, American-Indians, American-Eskimos, and American Aleuts. Contractors may rely on written representations by subcontractors regarding their status as minority business enterprises in lieu of an independent investigation.

PRICING OF ADJUSTMENTS

When costs are a factor in any determination of a contract price adjustment pursuant to the "Changes" clause or any other provision of this contract, such costs shall be in accordance with the contract cost principles and procedures in Part 1-15 of the Federal Procurement Regulations (41 CFR 1-15) or Section XV of the Armed Services Procurement Regulation in effect on the date of this contract.

LISTING OF EMPLOYMENT OPENINGS

BIDDERS AND OFFERORS SHOULD NOTE THAT THIS SOLICITATION INCLUDES A PROVISION REQUIRING THE LISTING OF EMPLOYMENT OPENINGS WITH THE LOCAL OFFICE OF THE FEDERAL-STATE EMPLOYMENT SERVICE SYSTEM WHERE A CONTRACT AWARD IS FOR \$2,500 OR MORE.

FPR 1-2.202-1(a)(30)

U. S. DEPARTMENT OF THE INTERIOR
Fish and Wildlife Service
Bureau of Sport Fisheries and Wildlife

EQUAL EMPLOYMENT OPPORTUNITY CLAUSE

(Executive Order No. 11246, as amended October 13, 1967)

Equal Employment Opportunity. During the performance of this contract, the contractor agrees as follows:

1. The contractor will not discriminate against any employee or applicant for employment because of race, color, religion, sex or national origin. The contractor will take affirmative action to ensure that applicants are employed, and that employees are treated during employment, without regard to their race, color, religion, sex or national origin. Such action shall include, but not be limited to, the following: employment, upgrading, demotion or transfer; recruitment or recruitment advertising; layoff or termination; rates of pay or other forms of compensation; and selection for training, including apprenticeship. The contractor agrees to post in conspicuous places, available to employees and applicants for employment, notices to be provided by the contracting officer setting forth the provisions of this Equal Employment Opportunity Clause.

2. The contractor will, in all solicitations or advertisements for employees placed by or on behalf of the contractor, state that all qualified applicants will receive consideration for employment without regard to race, color, religion, sex or national origin.

3. The contractor will send to each labor union or representative of workers with which he has a collective bargaining agreement or other contract or understanding, a notice, to be provided by the agency contracting officer, advising the labor union or workers' representative of the contractor's commitments under Section 202, of Executive Order No. 11246, as amended, and shall post copies of the notice in conspicuous places available to employees and applicants for employment.

4. The contractor will comply with all provisions of Executive Order No. 11246, as amended, and the rules, regulations, and relevant orders of the Secretary of Labor.

5. The contractor will furnish all information and reports required by Executive Order No. 11246, as amended, and by the rules, regulations, and orders of the Secretary of Labor, or pursuant thereto, and will permit access to his books, records, and accounts by the contracting agency and the Secretary of Labor for purposes of investigation to ascertain compliance with such rules, regulations, and orders.

6. In the event of the contractor's noncompliance with the Equal Employment Opportunity Clause of this contract or with any of the said rules, regulations, or orders, this contract may be cancelled, terminated, or suspended in whole or in part and the contractor may be declared ineligible for further Government contracts in accordance with procedures authorized in Executive Order No. 11246, as amended, and such other sanctions may be imposed and remedies invoked as provided in the said Executive Order or by rule, regulation, or order of the Secretary of Labor, or as otherwise provided by law.

7. The contractor will include the provisions of paragraphs (1) through (7) in every subcontract or purchase order unless exempted by rules, regulations, or orders of the Secretary of Labor issued pursuant to Section 204 of Executive Order No. 11246, as amended, so that such provisions will be binding upon each subcontractor or vendor. The contractor will take such action with respect to any subcontract or purchase order as the contracting agency may direct as a means of enforcing such provisions, including the sanctions for noncompliance; Provided, however, that in the event the contractor becomes involved in, or is threatened with, litigation with a subcontractor or vendor as a result of such direction by the contracting agency, the contractor may request the United States to enter into such litigation to protect the interests of the United States,

EXAMINATION OF RECORDS BY
COMPTROLLER GENERAL

(a) This clause is applicable if the amount of this contract exceeds \$2,500 and was entered into by means of negotiation, including small business restricted advertising, but is not applicable if this contract was entered into by means of formal advertising.

(b) The Contractor agrees that the Comptroller General of the United States or any of his duly authorized representatives shall, until the expiration of 3 years after final payment under this contract or such lesser time specified in either Appendix M of the Armed Services Procurement Regulation or the Federal Procurement Regulations Part 1-20, as appropriate, have access to and the right to examine any directly pertinent books, documents, papers, and records of the Contractor involving transactions related to this contract.

(c) The Contractor further agrees to include in all his subcontracts hereunder a provision to the effect that the subcontractor agrees that the Comptroller General of the United States or any of his duly authorized representatives shall, until the expiration of 3 years after final payment under the subcontract or such lesser time specified in either Appendix M of the Armed Services Procurement Regulation or the Federal Procurement Regulations Part 1-20, as appropriate, have access to and the right to examine any directly pertinent books, documents, papers, and records of such subcontractor, involving transactions related to the subcontract. The term "subcontract" as used in this clause excludes (1) purchase orders not exceeding \$2,500 and (2) subcontracts or purchase orders for public utility services at rates established for uniform applicability to the general public.

(d) The periods of access and examination described in (b) and (c), above, for records which relate to (1) appeals under the "Disputes" clause of this contract, (2) litigation or the settlement of claims arising out of the performance of this contract, or (3) costs and expenses of this contract as to which exception has been taken by the Comptroller General or any of his duly authorized representatives, shall continue until such appeals, litigation, claims, or exceptions have been disposed of.

TERMINATION FOR CONVENIENCE OF THE GOVERNMENT

The Contracting Officer, by written notice, may terminate this contract, in whole or in part, when it is in the best interest of the Government. If this contract is for supplies and is so terminated, the Contractor shall be compensated in accordance with Part 1-8 of the Federal Procurement Regulations (41 CFR 1-8), in effect on this contract's date. To the extent that this contract is for services and is so terminated, the Government shall be liable only for payment in accordance with the payment provisions of this contract for services rendered prior to the effective date of termination.

[Applicable if not in excess of \$100,000 - CFR 1-8.700-2(a)(2)]

NEW YORK ZOOLOGICAL SOCIETY

THE ZOOLOGICAL PARK

Telephone: WELLINGTON 3-1500

Cable Address: ZOOPARK NEW YORK

Bronx Park

Bronx, N. Y. 10460

11 October 1974

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

Dear George:

Enclosed is a check in the amount of \$554.00
for supplies and assistant salaries.

Sincerely,

Wayne King

Wayne King

/db
Enc.

NEW YORK ZOOLOGICAL SOCIETY

THE ZOOLOGICAL PARK

Bronx Park

Bronx, N. Y. 10460

212
93
Telephone: WELLINGTON 3-1500

Cable Address: ZOOPARK NEW YORK

15 November 1974

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


Dear George:

Enclosed is the latest check to cover expenses of your green turtle project. Reading through your report to Mr. Sekora, it looks as though your work has gone rather well this summer. I certainly think your work should be continued during the 1975 nesting season and suggest that you once again immediately seek funding from the Office of Endangered Species. If our handling of the contract has been agreeable to you we would be delighted to handle the contract for the coming year as well. If you wish we would be happy to approach the Office of Endangered Species in your behalf -- if you provide us with a rough draft of your proposal for next year. Bureaucratic delays being what they are I think it important that you get in your proposal to the government as soon as possible. Then, in the event that they do not support your work for the coming year, we will still have time to look to other sources for funding. The amount you requested is not that great so I feel certain we can find the money somewhere.

I will be attending next week's meeting in Florida that will be considering the "worthiness" of mariculture. I don't know if you will be attending or not but if you do not show up there I will let you know how the meeting goes.

I will try and find homes for your 10 captive-reared Eretmochelys but it may take me a week or two.

Sincerely,


Wayne King

/db
Enc.

November 1, 1974

Dr. Wayne King, Director
Conservation and Environmental Education
New York Zoological Society
Bronx, N. Y. 10460

Dear Wayne:

As of October 31st, the following amounts were due to be paid for my green turtle project:

Randal Chan, Research Assistant	-	\$225.00
French Frigate Shoals Loran Station-		<u>207.70</u>
Total	-	\$432.70

The major portion of the project's work at French Frigate Shoals has now been completed for 1974, however, between now and April, 1975, several one week surveys will be made. Hopefully, studies can again be conducted during the 1975 nesting season (commencing in May) in order to gather information over three consecutive years. Approximately \$3,000.00 would be needed to cover food, research assistant and gasoline costs. I believe that the Bureau can again be depended upon to make its boat and equipment available as well as arrange for transportation between Honolulu and French Frigate Shoals. I would greatly appreciate any suggestions that you might have as to possible funding sources for this work.

Concerning another matter, I presently have ten captive reared hawksbill turtles that range in weight from 15 to 40 lbs. These animals were obtained from Western Samoa as hatchlings for use in nutrition studies. With the completion of the experiments, I now find myself trying to find suitable "homes" for these very tame reptiles. Two have already been placed in a large reef tank at Sea Life Park here on Oahu and have proven to be valuable additions to the display. Perhaps, you can suggest several potential aquariums or zoos that I might contact. Shipping crates for safe handling could be constructed at our laboratory, however the air freight costs would have to be absorbed by the recipient. The University of Hawaii seems to be in a continual state of

Dr. Wayne King
November 1, 1974
Page 2.

fiscal austerity! Incidentally, the transference of these turtles for educational or scientific purposes has been approved by the U. S. Fish and Wildlife Enforcement Agent here in Honolulu.

Many thanks in advance for any assistance that you can provide.

Sincerely,

GEORGE H. BALAZS
Jr. Marine Biologist

GHB:ec

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University of Hawaii
D. H. Balazs
Hawaii Institute of Marine Biology
Coconut Island
P.O. Box 1346
Kaneohe, Hawaii 96744

JPM 3811, Nov. 1973
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2. ARTICLE ADDRESSED TO:
Dr. Wayne King
Bronx, N.Y. 10460

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February 24, 1975

Mr. Palmer Sekora
Refuge Manager
337 Uluniu Street
Kailua, Hawaii 96734.

Dear Mr. Sekora:

My recently completed survey (February 13 - 20) of green turtle populations at French Frigate Shoals proved to be most informative. Few investigations have previously been conducted during this time of the year, when both breeding and nesting activity is absent. During the 6-day period, emphasis was placed on netting and tagging juveniles (averaging 15 - 25 lbs.) and collecting comprehensive data on adult and sub-adult basking turtles found to be present. A total of 12 juveniles were captured, 7 along the west shore of Whale-Skate Island and 5 off the northeast shore of East Island. These specific sites were identified as being favored by juveniles during the 1974 nesting season study when 14 such animals were captured and tagged. None of the previously tagged juveniles were recaptured, which may suggest an abundance in numbers and/or a frequent migratory exchange of individuals. From a taxonomic point of view, French Frigate Shoals' juveniles are of special interest. The carapace and dorsal skin surfaces are light brown to goldish in coloration, quite unlike the heavy black dorsal pigmentation found in the majority of the adult and sub-adults. The possibility of two "types" of green turtles being present has been suggested by Dr. Archie Carr, who visited the area during the early 1960's. I have recently discussed this interesting subject with Dr. Carr and, hopefully, as time progresses, sufficient information will become available to resolve the problem.

Based on the number of wild juveniles observed, I now believe that we should release 50% (approx. 25) of our captive reared juveniles at French Frigate Shoals rather than the smaller number I originally suggested. Final health clearances by Department of Microbiology personnel will be completed next week and, hopefully, the proper arrangements can be made for me to transport the turtles aboard the next Coast Guard buoy tender.

During the course of the recent survey, no basking was found to take place on East Island (the site of greatest basking activity during the nesting season), however, both Whale-Skate and Trig each has as many as 11 adult and sub-adult sized animals daily. Spray paint numbering of these turtles (interjecting as little disturbance as possible) revealed an estimated total of 26 adults and 4 sub-adults having a nearly equal sex ratio. None were found to have tags from my 1973 or 1974 nesting season studies, however, U. S. Fish and Wildlife Service tags 473 and 74 were recorded. No "T" prefix was present with these numbers. I am, of course, anxiously looking forward to learning of the previous data for these individuals and would appreciate your early assistance in this matter. As you may recall, only a few adult-sized animals were seen during my September - October three-week French Frigate Shoals' visit. The problem, therefore, exists as to what is the true status of the recently observed baskers. Logical possibilities appear to be: 1) short term visitors that are involved in more extensive migrations; 2) permanent resident animals; and 3) relatively early arrivals for the 1975 breeding and nesting season. I presently favor the first explanation, although it may well be that some turtles are present for each reason. Data from a 1975 nesting season study will help to provide answers in this matter.

In addition to the green turtle observations, data were also collected on other wildlife populations which may be of value to you.

February 13, 1100h aerial census of Hawaiian monk seals:

<u>Island</u>	
Disappearing	48
Little Gin	13
Gin	11
East	11
Mullet	4
Round	0
Whale-Skate	42
Trig	50
Tern	3
Shark	not censused
Total	182

Mr. Palmer Sekora
Refuge Manager

February 24, 1975
Page 3

Nearly all albatross eggs have now hatched with chick size ranging up to 9 inches in height. Counts were taken on the young of each species on three islands.

<u>Island</u>	<u>Black footed</u>	<u>Laysan</u>
Little Gin	180	0
East	870	370
Whale-Skate	655	70

With reference to bird populations, no aircraft hazards presently exist as sooty tern nesting has not yet commenced.

As I mentioned over the telephone, Coast Guard personnel indicated that on February 2, oil washed up on the beaches of several islands in the Shoals. Upon my arrival, quantities still remained on East, Whale-Skate, Round and Little Gin (decreasing order of abundance). At as many sites as possible, I covered this material with sand to prevent further adhesion to basking seals. Along with this letter, I am sending a sample of the oil and an illustrative photograph. I believe that it is indeed fortunate that this occurrence did not take place during the seal pupping or turtle hatching season.

Sincerely,

GEORGE H. BALAZS
Jr. Marine Biologist

GHB:ec

Encl.

cc: Dr. Wayne King
Mr. E. Kridler
Mr. M. Dillon



University of Hawaii at Manoa

Hawaii Institute of Marine Biology

P.O. Box 1348 • Coconut Island • Kaneohe, Hawaii 96744

Cable Address: UNIHAW

December 14, 1974

Mr. Palmer Sekora
Refuge Manager - U.S. Fish and Wildlife Service
337 Uluniu Street
Kailua, Hawaii 96734

Dear Mr. Sekora,

The following information summarizes the results of my one day visit and aerial survey of French Frigate Shoals on December 12th. As indicated in my project outline for 1974, periodic surveys of this nature are called for when passenger space becomes available on the U.S. Coast Guard supply flight. The willingness of the FAA pilots to circle the islands at low speeds in order to census wildlife populations is truly commendable; without their cooperation this work would not be possible.

Aerial observations (north to south):

<u>Island</u>	<u>Turtles</u>	<u>Monk Seals</u>
Disappearing	0	31
sand bars	0	2
Little Gin	1 (offshore)	5
Gin	0	11
sand bars	0	5
Round and Mullet	0	7
East	0	12
Whale-Skate	0	39
Trig	2 (basking)	24
Tern	0	0
Shark	not observable	
TOTAL	3	136

It seems apparent from the turtle counts that very few adults are now present within the atoll. Sea water temperature measured 25.5°C, about 2°C lower than during my last visit in October. If basking is in fact used as a thermoregulatory mechanism, and adults were present in the waters, one would certainly expect a number of them to be hauled out on the beaches as occurs during May and June. The absence of these animals suggests to me that only a few adult-sized turtles remain in the atoll after the mating and nesting seasons. Preliminary evidence indicates that these "resident" animals may be abnormal in some

way (i.e. tumors, missing flippers). Further information will be obtained on this aspect during the six day land survey which is tentatively scheduled for mid-January.

Colonies of Black Footed Albatross were seen on Little Gin, East and Whale-Skate Island, however, it was not possible to estimate the numbers present. Surveys of the bird populations on Tern Island were made during ground time. Censuses revealed that approximately 175 Laysan and 35 Black Footed Albatross with eggs were present. In addition, several Ruddy Turnstones and Red Footed Boobies were observed flying overhead. No Sooty or Noddy Terns were seen. At this time there appears to be no bird interference with the weekly aircraft operations.

Sincerely,

George H. Balazs
Jr. Marine Biologist

GHB:ec

cc

Office of Endangered Species

Dr. Wayne King



University of Hawaii at Manoa

Hawaii Institute of Marine Biology
P.O. Box 1346 • Coconut Island • Kaneohe, Hawaii 96744
Cable Address: UNIHAW

October 29, 1974

Mr. Palmer Sekora
Refuge Manager
U. S. Bureau of Sport Fisheries
and Wildlife
337 Uluniu Street
Kailua, Hawaii 96734

Dear Mr. Sekora:

In order to keep you informed on the progress of my green turtle research project at French Frigate Shoals, I would like to take this opportunity to outline some of the more significant results of the recently completed expedition. As you are aware, between September 19th and October 11th studies were conducted on egg fertility, nest mortality and hatchling predation. This phase of the project served as a follow-up to the intensive monitoring of nesting and basking activity carried out during June, July and August. The work primarily involved the excavation (and subsequent refilling) of nests in which natural hatching and emergence had taken place. Nearly 200 previously marked nests on East Island were uncovered and the remaining contents examined with respect to infertility, cessation of embryo development and hatched but dead turtles. The latter occurrence was found to be primarily related to the inability of individuals to reach the surface. Observations on the depth of each nest and the quality of the substrate were also taken. Nests ranged from 16 to 32 inches beneath the surface and substrate composition varied considerably between the 17 beachfront areas designated for the island. Fifty of the nests examined had been previously counted during oviposition in order to determine the exact number of eggs present. Hatchability and survival for all other nests were calculated by using the mean and standard deviation of the number of eggs in the counted nests. Preliminary analyses of these data indicate that 73% of the eggs that were laid on East Island resulted in live hatchlings emerging at the surface. Although this may appear to be low, it is in fact comparable to and in some cases higher than values reported for several other green turtle nesting areas. Fully developed hatchlings that died before reaching the surface accounted for 8% of each egg clutch while the remainder (19%) consisted of infertile and partially developed non-viable eggs. A sampling of six nests was taken on Whale-Skate Island with the results suggesting that an even greater number of hatchlings were unable to reach the surface at this location. Large pieces of coral fragments litter a significant portion of the ground on Whale-Skate thereby

Mr. Palmer Sekora
October 29, 1974
Page 2.

making emergence difficult. Although little work has been done elsewhere on the number of fully developed animals that fail to emerge from the nest, I suspect that this aspect contributes more to hatchling mortality at French Frigate Shoals than at many other green turtle nesting sites.

Predation on hatchlings between the time of emergence and the initial entrance into the sea was evaluated by making periodic night surveys over the island. Nearly all emergence occurred within several hours after sunset when the surface temperature dropped considerably. Two species of ghost crabs (Ocypode ceratophthalmus and Ocypode laevis) inhabit the Shoals and both were found to prey on hatchlings. Interestingly enough, O. laevis, the smaller of the two crabs, is not generally considered to be aggressive. O. ceratophthalmus was observed to be the principal predator, however on numerous occasions, both species were found with severely wounded or freshly killed hatchlings. Crab densities on East Island reached a maximum along the southwest beach where sand conditions were most favorable for burrowing. At this location, counts of approximately one per square yard were recorded. Based on crab observations on the surface as well as the excavation of burrows, I feel confident in stating that no greater than 3% hatchling mortality resulted on East from these crustaceans. Crab densities on Whale-Skate were from two to three times greater than on East, therefore resultant hatchling mortality could be expected to be proportionately higher. It is interesting to note that no evidence was found of crabs burrowing into nests either before or after hatchling emergence.

Predation on hatchlings after they entered the ocean was ascertained by examining the stomach contents of potential predators. Two types of ulua (Carangoides ajax and Caranx melampygus) are abundant at the atoll and both were considered to be likely candidates due to their carnivorous and opportunistic feeding habits. In addition, both the tiger shark (Galeocerdo sp.) and small gray shark (Carcharhinus sp.) were often observed close to shore with the latter being the most common. A total of 108 ulua were sampled at various locations and times of the day. No evidence of hatchlings was found in any of these specimens. After examining the stomach contents, all fish remains were either buried or used for bait on the shark hooks. The principal food of the ulua at French Frigate Shoals appears to be a small filefish, Pervagor spilisoma. Additionally, none of the 18 specimens of gray sharks captured showed evidence of feeding on turtles. Of the four tiger sharks that were taken, two contained the partial remains of adult and sub-adult turtles. Although no means existed for determining if these animals were alive at the time of ingestion, predation of this type would help to explain why some nesting turtles are seen on only a single occasion.

Mr. Palmer Sekora
October 29, 1974
Page 3.

Along the entire south side of East Island, a shallow reef flat extends offshore for approximately 50 yards. Depending on the tidal stage, the depth of the water over this area ranges from nearly bare to a maximum of three feet. Hatchlings entering the water along this side must either swim directly out over the reef flat or along the shoreline to the east or west end in order to reach deep water. Observations revealed that the route utilized was heavily dependent on existing current and wind conditions. Samplings of the fish in this area showed that most of the inhabitants were wrasses (Thalassoma sp. and Bodianus sp.). These fishes are aggressive omnivores, however, their small mouth and body size lessen if not completely eliminate any threat they might present to healthy hatchlings. Hatchlings released during the daytime were seen to swim out over the reef without molestation.

Although plovers, tattlers and turnstones were found to be plentiful at this time of the year, no evidence was obtained to suggest that these birds attack hatchlings. Both adult and juvenile frigate birds were also abundant. On a single occasion, one juvenile frigate was seen picking a hatchling up out of the water. After flying overhead for several minutes with the turtle hanging from its beak, the bird returned to roost whereupon the hatchling was dropped uninjured and apparently forgotten. Numerous other juveniles and adults were present, however only this one individual showed interest in the hatchlings that had recently entered the ocean.

Based on the facts that I have presented, one could conclude that the major causes of neonatal and early postnatal hatchling mortality at French Frigate Shoals occurs on or in the islands present. Survival of and predation on hatchlings after leaving the general waters surrounding the nesting beaches (the waters within the atoll) is completely unknown. A dearth of information which relates directly to recruitment to the breeding population exists for this portion of the life cycle. Presently, there is no means for collecting this information due to the absence of a suitable permanent tag or marker that will remain easily identifiable as the hatchling increases in size. Until such a marker has been perfected, survival rates after the early postnatal period will continue to be essentially "educated guesses."

With respect to the status of East Island, I have collected some evidence which suggests that the north shore has undergone considerable erosion over the past 25 years. I am, of course, quite concerned about this point as East is by far the most productive islet at French Frigate Shoals, not only for the green turtle but for most of the other migratory wildlife

Mr. Palmer Sekora
October 29, 1974
Page 4.

species present. With a total area of something less than 12 acres and a vegetation zone that measures approximately 1,250 feet by 300 feet, even the loss of small portions of land could have a significant effect. I have assembled several maps and aerial photographs of the island in order to evaluate any long term permanent changes, however more information is necessary. It is my understanding that a number of black and white negatives and color transparencies of East Island are presently on file at the Regional Office in Portland. If at all possible, it would be very helpful if I could study this material. Perhaps arrangements can be made to temporarily send the originals to Hawaii or to have copies made. Your assistance in this matter would be greatly appreciated.

Original data on the previously tagged turtles that I observed nesting this past summer have now been forwarded to me from the Bureau's files by Mr. Kridler. Of the 93 animals nesting on East Island this year, eight were found with tags ranging from two to ten years old. As expected, none of the turtles which I tagged during 1973 were present for the 1974 season. Original tagging locations for these eight animals included French Frigate Shoals, Lisianski Island and Pearl and Hermes Reef. Perhaps of more importance than the specific tagging locations was the proportion of animals derived from each site. Interestingly enough, three had been tagged originally at Pearl and Hermes Reef, one at Lisianski Island and four at French Frigate Shoals. I am presently not aware of the total number of turtles tagged at each of these locations over the years by Bureau personnel, therefore it is difficult to draw any firm conclusions. There is little doubt, however, that the French Frigate Shoals tag returns represent remigrations to the atoll. The other taggings from the northwest portion of the Archipelago may represent either travels from feeding to breeding grounds (with subsequent return) or simply one leg of a much larger and complex migratory pattern. It would appear to me that further studies into this aspect of the green turtle's life history in the Hawaiian Archipelago are of major importance. The 1974 nesting season at French Frigate Shoals was completed approximately two months ago, therefore, all of the turtles that were present should have arrived at their intended destinations. One of the results of my French Frigate Shoals project has been the establishment in the wild of a relatively high concentration of tagged turtles from the past two nesting seasons. Between now and approximately March, 1975, these animals should be at the site or sites utilized when not at the breeding grounds. Numerous tag returns have shown that a sizable portion of the breeding population can be found in the major inhabited Hawaiian Islands. In order to determine the proportion of tagged

Mr. Palmer Sekora
October 29, 1974
Page 5.

breeders present at the northwestern end of the Archipelago (specifically Pearl and Hermes Reef), investigations should be made within the next few months. I propose to you that we conduct just such an expedition. Ideally, the Islands of Lisianski and Laysan should also be examined, however due to transportation problems, I suspect that this would not be possible. I would anticipate that somewhere between 5 to 10 days would be needed at Pearl and Hermes Reef to complete the work. If you are in agreement that such an expedition has merit and can be arranged between now and March, please contact me at your earliest convenience.

Perhaps this would also be a good opportunity to express my appreciation to both you and the Bureau for all the fine cooperation and assistance I have received since the initiation of my project. I feel confident that the data being generated will greatly aid in our understanding and conservation of the green turtle in Hawaiian waters.

With best personal regards,

GEORGE H. BALAZS
Jr. Marine Biologist

GHB:ec

cc: Office of Endangered Species
Wayne King, New York Zoological Society
Eugene Kridler