TT G.H. BALAZS

U.S. DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
Southwest Fisheries Center Honolulu Laboratory
2570 Dole St. • Honolulu, Hawaii 96822-2396

May 19, 1987 F/SWF2

Mr. Flinn Curren
Pohnpei State Government
Marine Resources Division
P. O. Box B
Kolonia, Pohnpei
Federated States of Micronesia 96941

Dear Flinn,

Many thanks for your recent letter, the tagging data, and draft note for the Marine Turtle Newsletter authored by Clay Edson. I am delighted to receive this important information and certainly commend your people for doing such a fine job. I hope that more turtles can be tagged and protected at Oroluk this year. It will be very exciting when we receive our first long-distance tag recovery from one of these animals. Are there any traditional stories among the people of Pohnpei as to where the turtles go when they are not nesting at Oroluk? I will notify you immediately when a tag recovery is reported to us.

In the tagging list you provided, there were four tags that were not entered among the consecutive numbers. They were 4322, 4328, 4330 and 4334. I assume that these tags were lost or for some reason not applied. Please confirm this point for me so that no confusion develops in coming years. If the tags became bent and unusable, ideally they should be returned to me, thereby eliminating any future problems. Also, I note that you should now have 12 tags (4339 - 4350) on hand. If work at Oroluk will take place again this season, let me know and I'll send you more right away.

I hope that the note for Marine Turtle Newsletter will be submitted for publication in the very near future. Your findings are important and need to be made known to the scientific and conservation community at large. To date, the only information about nesting turtles at Oroluk appears in Peter Pritchard's 1977 booklet "Marine Turtles of Micronesia". A copy of this section has been enclosed in case its not easily available to you. I recommend that Clay Edson reference and discuss parts of this earlier report, especially;

1). The numbers of turtles previously nesting per night as stated by Pritchard;
2). The recommendation that Oroluk be designated a Turtle Sanctuary, and that the few people in residence be relocated in order to properly protect the turtles from being eaten;
3). The statement by Pritchard about a "split" nesting season at Oroluk, and whether or not any evidence was found for such a pattern occurring at the present time.

At this point there is no question in my mind that the Oroluk nesting colony is on the verge of becoming extinct.

As requested, I have enclosed several items that might be useful as educational material about sea turtles for school age children In addition, I have asked Jack Woody to send you a free copy of the slide show "America's Sea Turtles" recently produced by the U.S. Fish and Wildlife Service. I will also be trying to identify funds that can be used to support the Pohnpei/Oroluk turtle project.

Best Regards,

George H. Balazs
Zoologist

GHB:jn
cc : Mike Gawel, FSM Chief of Marine Resources
Jack Woody, FWS Sea Turtle Coordinator

1983 or 1984 ?

Mayor Jacklick's statement

From page 1

vide assistance. Less than half of our students who complete elementary school go on to any form of secondary education.

Because of the removal of our population from our home islands to make possible missile test activities of the Kwajalein Missile Range, our lifestyle is entirely urban. This makes even more critical the need for basic secondary and technical education.

Marshallese employment opportunity at the missile base is limited. The Army imposes specific policy directives of about 550 jobs, although we are certain, that with adequate education and technical training programs, Marshallese persons could fill all of the logistic support employment opportunities at Kwajalein. These number about 1,500.

Our situation with re-

Turtle hunters defy code

Reprinted from the New Zealand Herald

PALAU — A Japanese company is tempting the residents of the Republic of Palau to grant it unlimited rights to catch the green sea turtles. It is offering the residents of Maril Island $1000 and 15 percent of the sales of turtle meat and shells. This flouts the ruling of the Convention on International Trade in Endangered Species. Trading in turtles is banned by the organization, unless they are farm-grown, but apparently neither the company nor the Japanese Government accepts the code.

The green turtles problem is that it is too valuable for its own good. From its flesh come such delicacies as turtle chowder, popular in Japanese restaurants. Its shell produces tortoise-shell jewelry; the skin provides attractively grained leather and its oil is used in the pharmaceutical and cosmetic industries.

Japanese traders are free to buy as many of the green turtles as they want provided they have the consent of the Government of the exporting country.

But fewer countries are willing to sell Japan the turtles since the protection convention came into force in 1980.

Total turtle imports have fallen from 127 tonnes in 1979 to 44 tonnes last year.

COMING SOON...A ground-breaking ceremony for a very large economic enterprise..ceremony probably to be held this month on a very prominent piece of real estate. This facility-activity has been long expected, and when it arrives it should arrive quickly and be in operation by next October. What is it?

Copy

Dear Suzanne — 5-18-82
Hope you received this letter (and lots of enclosures) that I sent you a couple months ago.
Best regards —
George Balazs

NATIONAL MARINE FISHERIES SERVICE
HONOLULU LABORATORY
P. O. BOX 3830
HONOLULU, HAWAII 96812

February 24, 1982 F/SWC2:GHB

Mrs. Suzanne Ellard Acker
P. O. Box 177
Kolonia, Yap
Western Caroline Islands 96943

Dear Suzanne,

I'm sorry that I missed seeing you on your recent visit to Honolulu, but nevertheless I want to take this opportunity to send the enclosed materials on sea turtles. Any information that you can gather on the current conservation status, ecology, and human usage of turtles during your forthcoming visits to the Outer Islands of Yap (and elsewhere) will be most appreciated. The enclosed background articles authored by Mike McCoy and Peter Pritchard should give you a good idea of what is generally known about turtles in Yap as of a few years ago.

The following list will give you some idea of what questions should be asked when talking to local people on each of the islands. Try to search out elder fishermen and others who command a high reputation among their people.

1. What species are present in their relative abundance?

2. Does nesting occur and at what locations?

3. How many turtles nest each night during the peak month or months of the breeding season?

4. Have tags ever been found on turtles? If so, what are the details of recovery?

5. How many turtles by species are taken each month or year?

6. Does poisoning from eating turtles ever occur?

7. Are eggs gathered and eaten, and in what quantities?

8. Are their more, fewer, or the same number of turtles now than when the informant was young?

Again, your offer to help out is really welcome. I send you and your husband best regards, and look forward to hearing from you when your time permits.

Sincerely,

George H. Balazs
Fishery Biologist

GHB:ey
Enclosure
cc: Balazs; HL

rec'd 11/21/85

Teresa L. Herring
P.O. Box 9
Kolonia, Pohnpei 96941
Federated States of Micronesia

November 19, 1985

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

Dear Dr. Balazs:

I received your letter of October 31. I'm glad to know you were pleased with the report on the Oroluk turtle project. Presently, I am in the process of attaining the necessary support and funds to repeat the project next year.

I am interested in establishing a resource conservation education program for the public of Pohnpei. The main emphasis will be on sea turtles. In the past, I have seen sea turtle posters titled " Sea Turtles of the World" sponsored by NMFS. The poster has colorful pictures and information on habitat, food & biological data of the world's sea turtles. Could you please help me to locate the source of attaining a couple of these posters?

I appreciate your assistance.

Sincerely,

Teresa L. Herring

Teresa L. Herring
Peace Corps Volunteer

MARINE RESOURCES DIVISION, YAP STATE
FEDERATED STATES OF MICRONESIA

PHONE: 2185, 2294
CABLE: GOV YAP

POSTAL ADDRESS:
P.O. BOX 251
COLONIA, YAP
W. CAROLINE ISLANDS
96943

- Fighting cards
- poster

April 22, 1985

Mr. George Balaz
South W. Fisheries Center
NMFS
P.O. Box 3830
Honolulu, Hawaii 96812

Dear Mr. Balaz:

First time I am writing you. I hope you still remember me when I met with you and Mr. Roger Pflum. I just want to report a Turtle catch made here in Yap State.

On march 29, 1985, Sam Falanruw, Director of Resources and Development, at about 8:00 a.m. brought in a Ridley Turtle (lepidochelys Olivaces) which was caught about a week ago. He kept it in a bath tub for that duration. It seemed to be in good condition physically except for some scratches on the shell.

It was about 15 inches long and about 14 inches wide on the back and about 30-40 lbs. It was caught at the Northern tim of the island around FAD #5 on March 23, 1985.

At about 10:00 a.m. on March 29, 1985, David Hamm and I released it off shore. We didn't have a boat to take it outside the reef. It surfaced about two minutes afterward and we lost track of it after then.

I heard and read about this species that they are going to get extinct eventually. That is what I read in the Five-Year Status Reviews of Sea Turtles Listed Under the Endangered Species Act of 1973 by the U.S. Department of Commerce, NOAA January 1985.

Please, give us more information and advice on the Turtle Phenomenon.

Hope to hear from you.

Sincerely,

John B. Iou
Acting Chief,
Marine Resources

JBI/mi

cc: FSM, Chief of Marine Resources

DEPARTMENT OF RESOURCES & DEVELOPMENT
YAP STATE GOVERNMENT
P. O. Box 336
Colonia, Yap
Federated States of Micronesia 96943

Cable: GOV YAP

Office of the Director

October 17, 1983

George Belaz
NMFS Lab
Box 3830
Honolulu, Hawaii 96812

Dear George;

When I arrived here and looked in the freezer I found the usual collection of dehydrated fish frozen into a large pile and lo and behold, a large Leathery back turtle (42 inches shell length). Apparently the turtle was taken nearly a year ago and died before the authorities could release it. Since then its been in our freezer. Margie Falanruw made a plaster of paris caste (mold?) of it and wants to make a replica for the local museum. She said she would like to disect it and attempt to describe its basic anatomy for a short publication. I told her I would contact you to see if you wanted it whole for any reason first. Has the anatomy of sexual maturity of this size of leathery been described by anyone? Is this a worth while endeavour?

Have you any recommendations or use for the animal? She said Hendrickson (?) at Bishop Museum was interested but had no $ to do anything with it, but would like the bones. What do you think we should do with it? Any chance of it being poisonous to eat? The turtle farm in Palau was apparently turned down as a project proposal for use of Japanese foreign aid funds, Tosh tells me. He is sending a copy of the proposal. I will forward if you like.

Is it worth our time and energy to do anything with turtles here? Does a short term nursery like McCoy had make sense? What about the aspect of fouling up their nesting instincts? Talk to me turtle man! I'm awaiting enlightenment.

Is there anything meaningful we can do out here statistically on turtles, i.e. catch, effort, seasonality, etc. that would be of value to you. Any funds for turtle research? How would you like to come out and what would you envision as a worth-while project? What about turtle farming? Is it totally out of the question or is there hope? Answer these and other question that come to mind and you to can win a trip to exciting, exotic, neurotic Yap!

Roger Pflum

Aloha and mahalo.
Roger Pflum

P.O. Box 251

March 19, 1984

Dear George,

Things all seem to be falling in place after a busy 6 weeks of work. I've had time to reflect back upon my journey through Micronesia and am beginning to realize just how much I really did learn.

I've been recieving packets of useful information from Emily Roet at the Sea Turtle Rescue Fund. I've also recieved an application for an internships with the STRF. I'm in the process of making final changes on my research paper and will send a copy to Emily along with my application and resume. I'll be sure to send you a copy of my paper also.

Did you ever recieve a response from the MMDC lab in Palau regarding the tags for their project? Emily has sent me a manual on the turtles and I've forwarded it onto MMDC for use in their operation. Has there been any news about recent Japanese efforts to farm the Hawksbills in Palau? I have not heard anything lately.

This summer is definitely going to be a grand learning experience for me! I've been accepted into the volunteer program at the John G. Shedd aquarium in Chicago. I've been told that I will be working with the sea turtles and salt water fishes. I can only afford one day a week due to two other jobs, but it's a start. I'm excited!

Enclosed are the pictures I took the day we searched for turtle eggs in Palau. You're welcome to keep them.

I'm sending you a drawing I recently completed of a young hawksbill.

I hope you're got somewhere to hang it in your office!

I received the Hawksbill endangered species poster and have already had it framed. It's a beautiful print.

Thanks again for your help George.

Sincerely,

Claudia Johnson
316 Peyton St.
Geneva, IL - 60134

DEPARTMENT OF RESOURCES AND DEVELOPMENT
YAP STATE GOVERNMENT
P.O. BOX 336
COLONIA, YAP
FEDERATED STATES OF MICRONESIA 96943

Office of the Director

Cable Address
Gov Yap

October 28, 1983

George Belaz
NMFS
Box 3830
Honolulu, Hawaii 96812

George,

I watched a green turtle being cooked alive this weekend and I must admit it was saddening but it tasted great! Seriously there were Senators and Chiefs, Government people including the Chief of Tourism and members of the Police Department in attendance. No one was sure if it was against the law but they all thought it was probably illegal.

I've asked the A.G. to do a legal search of all existing FSM, former TTPI, State of Yap, and municipal laws on all forms of marine resources, fishing and conservation laws. Even Margie wasn't sure which laws are in affect. What we have here is a problem of apathy, communication and basic education! Can you help? We need literature, pamplets (the one you sent is great - we need more like it. Also what are U.S. Federal and International laws that affect us here? Once I get all this info in hand I'll be ready to go to battle to help stamp out ignorance.

Now, I will show your letter to Margie and we will see about get your gut samples, tags, head, etc. Send your Franking label.

You did not answer all my questions fully. Please reread my letter and send me some advise. No advice - no guts for you!

Hope your wife is o.k. Sorry to hear your life is abnormal. I'll see you in Dec. I'm coming up for the PFDF meetings.

Roger Pflum

Roger Pflum
Chief of Marine Resources
P.O. Box: 251

DEPARTMENT OF RESOURCES & DEVELOPMENT
YAP STATE GOVERNMENT
P. O. Box 336
Colonia, Yap
Federated States of Micronesia 96943

Cable: GOV YAP

Office of the Director

October 11, 1983

Dear Dick;

Since I've been here it has been brought to my attention several times that the commonly found reef and lagoon species have decreased over the years. People here feel this is largely due to the fact that modern monofilament gill nets, night diving with flash lights, and other introduced techniques are more efficient than traditional traps etc., this is probably a correct assumption.

As you know Yap has a traditional reef ownership and conservation system which is apparently not as affective as in years past. What I'd like to do is to work a modern data collection system with analysis, then turn the results along with suggested management alternative over to the traditional leaders for action. This would fulfill our resource management responsibilities and leave basic enforcement at the village level where I feel it belongs. Coupled with this would be an ongoing education of the villagers and students of the basic concepts of reef ecology, conservation and management. My first problem is how to get all this in motion.

What I'd like to do is enlist the aid of NMFS and possibly others (UOG, etc.) in establishing a baseline of the existing reef and lagoon species commonly taken for sale and subsistence consumption.

I'm basically a one man show here at the moment. I have only one UN Volunteer biologist from Ireland who I've assigned to Trochus seeding in the outer island and giant clam reintroduction to Yap Proper. Since I'm short handed I have to rely on outside help to get it going. Here's what I'd like to do:

1) establish standing stock levels of consumable species in the reef and lagoon of Yap Proper.
2) establish a relevant data collection system based on catch of these species by village fishermen and local commercial fisheries.

3) record the data in a manner consistant with modern analysis procedures i.e. - put it on a computer disc as Ponape and Palau are doing. One copy to be kept locally, one to go to NMFS and/or UOG for safe keeping. (as you know things have a tendency to get lost here).

4) analysis of baseline data, current and past catch data (limited) and traditional knowledge. Formulate a management strategy with alternatives for implementation.

What I need to know from you is where you feel you might be able to help in this scheme of things. Obviously we would need your assistance in determining what the basic data collection system should include as to desired information to be generated; a system to record the information, i.e. a computer system similar to Ponape and Palau, training, initial setup and follow-up on a continual basis.

I've already written Doyle as to how we officially make the request for funds and assistance. If you see anyway you can be of help in a more immediate sense please drop me a line with your thinking. I also asked Doyle to see what can be done about clearing the way for the T. Cromwell to be used here for bathymetric and charting work as well as resource survey particularly in the outer islands.

Of course I'd like to get the ball rolling on these things as soon as possible because of my limited contract time here, but also because nothing has happened here since McCoy left. I feel there may already be problems with certain of the reef species, due to over-fisihing, undersize mesh, etc.

Is it possible to link a computer system out here with yours via satellite? What would be the cost? I'm sure McCoy has some of the answers but I haven't talked to him yet.

Do you see any possibility of us getting George Belaz out here to work on evaluating the present turtle populations, possible enhancement measures and doing a feasibility of turtle farming potential? I talked with George briefly and am trying to put together some current catch information for him.

If you could have your computer and statistical staff send down a basic format of the type of information we should be gathering I can get something started in the near future. I'm going to try to work it out that the village magistrate or chiefs be the arm of initial data collection but I need an idea of what types of information would be most relevant to gather. Thanks for all you kokuan. Say hello to everyone for me.

Mahalo and aloha nui,

Roger Pflum

Roger Pflum
Chief
Marine Resources Division
P.O. Box: 251

SundayTravel
The Sunday Star-Bulletin & Advertiser

Micronesia: an island

Supplies are unloaded during a stop in the Caroline Islands.

Photos by Capt. Kalindoy

By Thomas H. Booth
Special to the Advertiser

From the district centers of Micronesia a fleet of austere little ships sporadically sail off to a myriad of seldom seen outer islands. Passage on these vessels is possible, and we highly recommend it to hardy travelers who lust for the sea and a measure of true island life—warts and all.

Three cents a mile for deck passage, or seven cents a mile plus seven dollars a day provides a cabin, meals, and a voyage of one to five weeks to such islands as Kapingamarangi, Nukuoro, Sonsorol, Ifalik, Woleai, Kosrae, Helen Reef, Ulithi, Tobi—ad infinitum.

There are however, a few essentials to observe. First, these ships—mostly government field service vessels, and a few privately owned traders sail without benefit of schedule, and to become a passenger may involve sustained waiting at the appropriate district center.

Where you'll go varies from district to district and may be changed or augmented at any time—but when the vessel calls at an island expect to be greeted with song, flowers, food and palm liquor.

Getting to Micronesia

Micronesia is easily available since Continental's Air Micronesia flies out of Honolulu at least four times weekly on a "stepping stone" flight to Johnston, Majuro, Kwajelein, Ponape, Truk, Guam, Yap and Palau (Belau.) Round trip air fare Honolulu-Palau with unlimited stopovers is $1,292.

Some of the above islands won't fill your soul with hossanah—certainly not Johnston and Kwajelein, but they're off limits anyway. Majuro might not either, and while it has all the requirements of a tropical atoll, the Majurans reflect little island culture, and the beaches near the main town of Rita are the repositories of debris that moulders back to World War II. Hotels there are good—three of them, The Ajidrik—$36 a double, Eastern Gateway—$30, and the Majuro—$20.

Keep moving West, the best is yet to come. But remember that if sailing away on small spartan ships isn't quite your style, or if the strictures of time prevent it, just stick to the islands Air Micronesia serves and do them on schedule and in reasonable comfort.

Ponape

Ponape, the fourth stop the 727 makes is the district center of the Carolines. Some authorities call this high green volcanic island with lacy waterfalls tumbling from the mountains the most beautiful island in the world. Kolonia, the main town reflects little of this beauty, but fortunately no one has yet false-fronted any of its weathered wood and tin buildings with Hollywood's South Sea gimmickry. Happily too, at night all eight of Kolonia's bars are noisily filled with congenial Ponapeans.

Hotels there, about nine of them, are from good to excellent, for example doubles at the Village will run about $50, the South Park about $45, and the Blue Rose Inn is $15.

Spend several days there, walk the jungly mountain trails to remote villages and pause for periodic dips in mountain streams. Don't miss the 25-mile within-the-reef boat trip to the eerie basalt ruins of Nan Madol.

Ponape is one of the better places for ships, and if a vessel is poised to sail to Nukuoro and Kapingamarangi, 300 and 500 miles South, go with alacrity. They are completely unspoiled enclaves of Polynesia where people live the old way, wear lava lavas, live in thatch huts, and the men go off fishing in fast sailing canoes.

Kosrae, 300 miles Southeast of Ponape is another high island filled with beauty and friendly people. If you can't mesh with a ship, use the weekly seven-seat plane. No hotels there, but it's easy to find a family who'll take you in.

Truk

Truk in the Eastern Carolines is next. 33,000 people live among this collection of semi-high islands set in a great lagoon. Moen, the main town was once Japan's Gibralter, and as a result of a bombing in 1944 more than sixty ships rest on the bottom of the la-

section D

Prepared by the staff of the Honolulu Advertiser August 7, 1983

for every Pacific taste

Girls wait their turn to dance for visitors.

goon. Now they're historic sights, and the Truk Legislature has designated its crystal-clear lagoon a district monument where visiting divers can explore this military hardware, but are not allowed to disturb it.

Hotels are all good there—the Truk Continental has doubles for $65, the Christopher Inn for $28, and the Maramar at the other end of the spectrum at $20.

Field service vessels from Truk, and an occasional tramping freighter sail about once a month to a number of sparsely settle low islands—Losap, Lukunor, Satawan, Etal, Namolu, and at least five others. Don't fret if a ship isn't available, wait for Yap and Palau—they have more to offer in terms of outer islands.

Guam

Guam, according to its Chamber of Commerce is where "America's Day Begins," and is a return to the bright lights, McDonalds, massage parlors, used car lots, stateside television, and heavy commute traffic of sea-rusted cars referred to as Guam Bombs. Guam has beauty too, fine beaches, friendly people, good food, and Waikiki-class tourist hotels which range from the Hilton at $113 down to several at $25. But because of a peculiar law—the Jones Act—no ships can carry passengers to the exotic nearby islands. Round trip air fare to these islands—Saipan, Rota, and Tinian from Guam is $78.

Yap

Yap, the next stop after Guam is more genuinely primitive than the other islands, and away from the main town of Colonia life is based on fishing, and the raising of taro, coconuts, yams, and betel nut. They're warm and gentle folks these Yapese, but proud too, and place high values on their culture and privacy. Visitors, therefore, are advised to always ask permission to enter a village, to use a beach, and to enthusiastically avoid photographing the bare breasted and nubile Yapese girls.

There are two hotels in Colonia, both adequate—the Eva, and Rai View at $25 a double.

If one of the field service vessels is about to sail—probably the MICRO SPIRIT—don't ask questions, take it. Some of the most classically primitive islands on earth await—Ulithi, Woleai, Fais, and Satawal—famed for its tattooed islanders. Schedules are relaxed, but generally there's a long voyage that takes up to five weeks, and a shorter one that calls at Ulithi and one other island.

Palau (Belau)

Palau, the end of the line for Air Micronesia, is now an independent nation called the Republic of Belau. Koror is her capital, and like other Micronesian towns was not developed with municipal beauty in mind. Nevertheless it's the real South Pacific, and if a ship never sails from there, there's plenty to do. There are 350 islands here all beautiful and inhabited by friendly animated people. The water is as clear as gin, and on the big island of Babelthuap you can walk the jungle to her villages, and hike to a pair of the finest waterfalls in the Pacific. Go North to the picture-perfect atoll of Kayangel, then go South to Pelelieu, a historically sobering place where 12,000 Japanese and Americans were killed in World War II.

Hotels are from marginal to near-luxurious. The Palau Continental, the best at $60 a double, the new Koror has doubles for $25. If you travel down to Pelelieu you can stay at one of several guest houses for $5 to $10 a double.

If you sail on from Palau your destination will be up for grabs, but will certainly be one of the Southwest islands of Sonsorol where there's a large coconut crab population, Merir, Puloanna, Tobi, or Helen Reef which is noted for turtles and sea birds.

From Palau you'll have to retrace your steps to return to Honolulu.

But one final admonishment is in order—when you travel in Micronesia be a curious traveler, not a tourist. Bring your sense of humor, roll with the punches, and accept the rewards of seeing islands as real and natural as any place on earth.

Monday, May 16, 1983 Honolulu Star-Bulletin A-11

Trust Territory Meeting Opens

Gannett News Service

WASHINGTON — The United Nations Trusteeship Council today opened its six-week annual meeting to hear reports on progress toward ending the Trust Territory of the Pacific Islands that is administered by the United States.

The Trust Territory covers 3 million square miles of Western Pacific waters and is the last trusteeship under the council's authority.

Reports by the Trusteeship Council and officials from the United States and Palau will be given on that young country's decision last February to end the 36-year-old Trust Territory in favor of a new "free association" status with the United States.

Palau voters ratified the compact that spells out free association, though a cloud still hangs over the results of another vote in which they failed to ratify a change in their constitution to permit the United States to bring nuclear weapons into their waters, as the compact demands.

A FIVE-MEMBER United Nations observation team, led by Trusteeship Council President Paul Poudade of France, oversaw the Palau voting.

The Federated States of Micronesia is scheduled to vote on the compact in June, though that date will likely be pushed back because of difficulties in extending an education program over the far-flung country.

Last year the Marshall Islands demanded a quick end to the Trust Territory at the U.N. meeting and asserted that it would lead the way.

But political differences over settlement of claims by victims of American nuclear testing in the Marshalls and a four-month demonstration against the U.S. missile testing range at Kwajalein cast doubt on the vote's outcome, and parties favoring the compact and an as-yet-undefined independence status backed off from an early vote.

Reports from the Bikini and Enewetak peoples on their efforts to be compensated for U.S. bomb-testing also are expected to be heard.

ENERGY CRISIS HURTS DEVEL

SAIPAN—"Reduced fuel allocations, power outages, and curtailed air flights, have occured in the Trust Territory. They may seriously impede socio-economic development of the islands, by interfering the transportation, communication, electrical production and other government services; particularly such essentials such as health and education."

So said Thomas Remengesau, Deputy Director of the Headquarters Office of Planning and Statistics, (Sept. 1) in an address to an Energy Technology Conference now being held at the Fujita Hotel on Guam. He addressed the conference on behalf of High Commissioner Adrian Winkel, Micronesian News Service said.

"Existing power plants operate only on deisel fuel, all of which must be imported," Remengesau said. "This total dependence on imported fuels makes Micronesia extremely vulnerable to global reductions in oil supplies, as Micronesia is economically disadvantaged in competition with industrial nations bidding for oil."

Remengesau said there is a growing need to identify and develop renewable energy resources and employ alternative energy technologies in the Trust Territory. "Equally important is the promotion of energy conservation. These are the objectives of this workshop," he said.

Energy planning in Micronesia requires two focal points, the OPS Deputy Director indicated. These points are examination of indigenous energy resources and conservation.

"Solar, wind, hydropower, ocean thermal, and fuel from biomass can have immediate and long run effects on the energy production capacity of the islands," Remengesau told the conference, adding that the technology for utilizing these resources has already been developed and made commercially available in different parts of the world.

On conservation of energy, Remengesau noted that the efficient use of energy will enable existing resources to better meet current needs. "Conservation efforts may include taxes and incentives, restructuring power rates, efficient use of equipment and vehicles, and substitution, where possible, of renew-

A 500-pound Leatherback Sea Turtle was captured on Kosrae recently by a fisherman in Utwe Harbor. The carapace (the shell which covers the back) measured 52 inches long and 46 inches wide. The turtle was determined unfit for consumption and had to be buried. (PIO Photo).

9/7/79 Commonwealth Examiner Vol I No. 35

WSZE - SHUTD

SAIPAN – Saipan's WSZE-TV went off-the-air Thursday (Aug. 30) to await the arrival of an engineer from San Francisco to make "technical adjustments" in an effort to improve its quality.

Wally Schick, General Manager of WSZE-Radio and TV, told the Examiner the "temporary shutdown" will be for about a month and possibly longer. He has "no idea" when the engineer is coming.

Schick said the owner and President of the Micronesian Broadcasting Company, Scott Kilgore, has ordered the money-loosing television station closed. Schick refused to release the contents of Kilgore's letter to the Examiners other than to say that the station will make "structural changes" in its operations. He added the TV will increased its "quality" but again declined to say how this may be accomplished.

He did not anticipate hiring more people to man the TV station nor purchasing new equipments. "But it will be a change for the better of our operations", Schick said in an interview.

Schick admitted that the TV operation and the FM radio "are a waste of money in our operation." He said he wanted to rent out FM

This leatherback turtle caught in Kapingamarangi in 1975 weights 300 pounds. The turtle is on the U.S. Endangered Species List. The Leatherbacks are the largest of all known turtles living today often weighing as much as 1000 to 1300 pounds.

CSIRO
MARINE LABORATORIES

Division of Fisheries Research
Division of Oceanography

Leach Street, Marmion, W.A.

A Division of the Institute of Animal and Food Sciences
A Division of the Institute of Physical Sciences

PO Box 20, North Beach, W.A. 6020
Telephone (09) 447 1388 Telex 93366

13th July, 1983.

Mr. George Balazs,
National Marine Fisheries Service,
Southwest Fisheries Center,
Honolulu Laboratory,
HONOLULU, HAWAII 96812,
U.S.A.

Dear George,

Thanks for the recent letter and enclosures. I have written Nitta expressing some interest in the island turtle subsistence review and asking for more details.

With regard to the sand samples you sent me and my using them in my manuscript. There are not enough of them to give me a good statistically significant picture of sand-moisture salinity relations, so I don't feel (even before I have analyzed the results) that I can use them in a publication. Nevertheless I will be very interested in seeing what they reveal.

With regard to the Japanese proposal for turtles harvesting in Meril (I've always seen it spelled and heard it pronounced Merir - but in the language of the South West Islanders the l's and r's (as in Japanese) aren't always easily distinguished). I'm curious as to why the islanders are using the lawyer that they are. One of their chiefs, a very impressive and honest guy, is also a U.S.-trained lawyer - Marianno Carlos. He could be depended upon to look after their best interests (economically and environmentally balanced) without any conflict of interest.

As to the dangers of pursuing the plan - you understand these better than I do. If I thought there was a good chance that the Japanese would really harvest on a sustained yield basis I'd be tempted to look further into the proposal because these turtles are likely underharvested (at least around Merir) at present. But who knows how to determine what constitutes a sustained yield? Moreover the Japanese have a policy, as you well know, of raping everyone else's resources while taking good care of their own. Witness their forest clad mountains versus the pillage that they carry out in the forests of South East Asia.

I presume you will point out to the delegation of four that there is no way on earth of determining, on the basis of a single year's harvest, the impact of continuing harvesting. That, to me, is the bottom line: the Japanese are claiming to be able to do the impossible.

Cheers,

R.E. Johannes

May or June 1983

Room 5B-25, Building 36
National Institutes of Health
Bethesda, MD 20205

World Wildlife Fund

Ladies & Gentlemen,

We would like to request your help in providing information, and possibly assistance, to friends of ours in the Republic of Belau. They have come to us for advice on dealing with a Japanese proposal to take turtles from Meril Island, one of the Southwest Islands of Belau. Meril is nearly uninhabited by people, and is a favorite site for green turtles to lay their eggs. It is perhaps one of the most productive turtle hatcheries in the Pacific. A Japanese corporation (whose name we don't remember) has approached the Southwest Islanders with a plan that would call for unlimited hunting of green turtles around Meril Island. In return for the turtles, the islanders would receive $1000 plus 15% of the profits from the sale of turtle meat and shell.

The Islanders traditionally catch turtles for their own use only, and they are concerned that a big increase in the number of turtles taken might adversely affect their turtle fishery. They have formed a committee to consider the proposal, composed of four persons from the Southwest Islands of Tobi and Sonsorol who are now living in Koror, the capitol State of Belau. These people are educated and thoughtful, but they are not sure how to go about getting information that will help them make a decision.

There are several aspects of the situation that concern us. Firstly, the proposal is to take as many turtles as possible in one year, in an "experimental" project, and at the end of that year to evaluate the impact on the turtle population and make a decision about continuing the project. This seems like a rash approach. Secondly, the lawyer who is advising the Southwest Islanders is the brother of an official in the Japanese corporation that has made the proposal. Thirdly, the company

is pushing for a quick decision. We worry that the reason for this may be their desire to conclude a contract before the new constitution is finished and such contracts come under the laws of the Republic of Belau. The newly-formed Republic of Belau has written its national constitution, but the individual states are still in the process of writing theirs. The people of the Southwest Islands are presently electing delegates and must write and ratify their constitution within the year. It seemed to us that the Japanese corporation might be trying to take advantage of the fact that the new republic is not yet on its feet.

Can you provide any information or advice to these people that would help them make an informed decision on this proposal? For example, are there data that indicate how many turtles can be harvested and still maintain a healthy population? If you can help, please correspond directly with the four committee members:

Elisabeth Kintoki, Modesto Petrus (husband & wife)
P.O. Box 398
Koror, Belau 96940

Laura Ierago, Prisco Ierago (brother & sister)
P.O. Box 531
Koror, Belau 96940

If you think another organization(s) might be better suited to deal with this matter, or if there are other organizations you think it would be useful to alert in addition to WWF, please forward a copy of this letter to them.

We are presently traveling in the Pacific and will not return until September. However, we are most interested in keeping informed of the course of events.

Thank you very much for your time.

Sincerely,

Ellen Elliott /

United States Department of the Interior

FISH AND WILDLIFE SERVICE
WASHINGTON, D.C. 20240

ADDRESS ONLY THE DIRECTOR,
FISH AND WILDLIFE SERVICE

June 27, 1983

Ms. Elizabeth Kintoki
P.O. Box 398
Koror
Republic of Belau

Dear Ms. Kintoki:

I have received a letter written by Ellen Elliott (sent to me by Ulrike Lichti) which requests information concerning the sea turtles of Belau. I am enclosing an appropriate section of P.C.H. Pritchard's book "Marine Turtles of Micronesia" which provides a summary of available information on the turtles. I have also forwarded a copy of Ms. Elliott's letter to the attached list of scientists who may be able to provide additional information and comments concerning the scheme to take turtles from Belau. I suggest that you contact these people as they (and I) share your concern about this venture.

As you may know, all sea turtles, with the exception of the Australian flatback, have experienced serious declines throughout the world, primarily for export to industrialized nations. The products include meat (often used as pet food), shell, and leather products. Sea turtle products are highly sought after because of their beauty and quality, although local peoples who supply the market rarely experience high return for their efforts. At the same time, this luxury market trade can deprive native peoples who traditionally used turtles in religious and other practices of turtles by turning them away from traditional practices to a reliance on a cash economy. Island societies could experience serious disruption without carefully detailed studies of the effects of exploitation on both them and the resource harvested. It is apparent that such studies are not yet available for the marine turtles of Belau, hence uncontrolled exploitation could prove very detrimental to both turtle and traditionally oriented populations.

In any case, uncontrolled exploitation is not scientific and should never be considered. Sea turtles may take decades to reach sexual maturity, and thus a depleted population could take years to recover, if it ever did so. This scheme should be viewed for what it is- a "get rich quick scheme" by individuals who care neither for the turtles nor the people of Belau. Although of course Belau is not controlled by Japan, such "rape and run" tactics are the worst form of colonialism as they deprive peoples of their natural resources and some of them ultimately of their culture. The short term gain may be attractive in these times of hard money, and of course that is just what this unscrupulous company is counting on. I urge you to use whatever influence that you might have to let the islanders know that such tactics have destroyed other traditional cultures (i.e. the Miskito Indians of Nicaragua) which relied on turtles.

Of course, there is no justification for treating such exploitation as an experiment. The real experimental work is much harder: turtles need to be marked and followed through many years to determine populational characteristics. Nesting success should be monitored, as well as hatching success and potential causes of mortality, such as predation, loss of eggs to erosion and storms, and sea water intrusion. Only when these characteristics are known can a management plan be developed which may (and I emphasize "may") allow controlled take above mere subsistence level. There is so much unknown even about the best sea turtles studied that I think it unlikely that commercial exploitation should be allowed to enter the international market at all under present conditions.

My best advice is caution, coupled with a desire to understand both the turtle populations and their interrelationships with local culture. This "experimental" project is certainly not scientific, and only masks the real desire to exploit the sea turtles regardless of consequences. The best available scientific data certainly do not justify this activity. Sea turtles are not domestic animals and cannot be thought of as such, much less managed this way.

I hope that these thoughts may be useful to you; if I can be of further help, please let me know (and keep me informed of events).

Sincerely

C. Kenneth Dodd J

C. Kenneth Dodd Jr. PhD.
Staff Herpetologist
Office of Endangered Species

CONTACTS:

Mr. Michael Weber
Sea Turtle Rescue Fund
Center for Environmental Education
624 9th Street N.W.
Washington, D.C. 20001

Ms. Anne Meylan
Department of Zoology
University of Florida
Gainesville, Florida 32611

Dr. Peter C.H. Pritchard
Florida Audubon Society
1101 Audubon Way
Maitland, Florida 32751

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

ADDRESS ONLY THE DIRECTOR,
FISH AND WILDLIFE SERVICE

United States Department of the Interior

FISH AND WILDLIFE SERVICE
WASHINGTON, D.C. 20240

In Reply Refer To:
FWS/LE LAW 8-04

SEP 13 1976

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

Dear Mr. Balazs:

This is in response to your letter of July 27, 1976, regarding the situation with hawksbill turtle coming from the Trust Territories. I certainly appreciate your interest. The problem related to hawksbill turtles is one for which we bear a deep concern. However, we must disagree with your reading of the Federal Regulations that indicates that we can intercept noncommercial shipments of hawksbill turtle shell coming from the Trust Territories. Although you are correct that any transportation or shipment of illegally taken endangered wildlife is itself illegal, it is one thing to state this as a legal proposition, and quite another to prove the illegal taking. In any prosecution for shipment of an illegally taken item we would have to offer proof of the unlawful taking and a preponderance of evidence on that element. In practical terms when we are dealing with shipments from a distant area it is very unlikely that we would be able to do this even with a great expenditure of time and money.

In a letter to us dated July 19, 1976, Dr. Pritchard also responded to our letter of July 13, 1976. His view was that the solution to the problem lies in the restriction of illegal taking in the Trust Territories themselves. We share this view and are taking some steps to accomplish it.

Our activities at this point are limited to cooperation with local authorities in the Trust Territories due to our budget and manpower limitations. Considering these limitations, it is unlikely that we will be able to mount a considerable direct enforcement attack in

the Trust Territories in the near future. However, we are bolstering our manpower in Hawaii and look to their indirect assistance to the Trust Territories to have a greater effect on the hawksbill turtle resources in that area.

I would be pleased to have any further comments or practical suggestions for solution to this vexing problem.

Sincerely yours,

Acting Associate
Director

United States Department of the Interior

OFFICE OF THE SECRETARY
WASHINGTON, D.C. 20240

In Reply Refer To:
FWS/LE LAW 8-04

JUL 13 1976

Dear Hal:

Thank you for your letter dated June 14, inquiring about the application of the Endangered Species Act of 1973 in controlling the transportation of endangered species, specifically hawksbill sea turtles, from Micronesia in the U.S. Pacific Trust Territory to the United States.

Section 3 of the Endangered Species Act of 1973 defines the term "State" to mean any of the several States, the District of Columbia, the Commonwealth of Puerto Rico, American Samoa, the Virgin Islands, Guam and the Trust Territory of the Pacific Islands. Therefore, transportation of endangered species from any of the Trust Territory Islands to other parts of the United States, by definition of the Act, is interstate commerce. Section 9 of the Act prohibits the transportation in interstate or foreign commerce by any means whatsoever in the course of a commercial activity. The Act also prohibits the sale or offer for sale in interstate or foreign commerce of any endangered species. However, the Act does not prohibit the transportation of endangered species in interstate commerce when such transportation is for noncommercial purposes. Therefore, U.S. citizens transporting privately owned, lawfully acquired endangered species from Micronesia to other parts of the United States are not in violation of the Endangered Species Act, regardless of whether the endangered species involved is pre-Act or post-Act.

In regard to your suggestion that regulations be published in the Federal Register to the effect that all endangered species would be treated as post-Act material subject to seizure unless there was proof positive presented that it was pre-Act, Section 9 of the Act provides that there shall be a rebuttable presumption that the fish and wildlife involved in any alleged violation of the Act was not held in captivity or in a controlled environment on December 28, 1973. This Section, however, is not relevant to the transportation of privately owned endangered species from the Trust Territory to other parts of the United States because the Act does not prohibit this activity.

We appreciate your concern in this matter and hope that this letter answers your questions. If we may be of further assistance, please do not hesitate to contact this office.

Sincerely yours,

Assistant Secretary for Fish
and Wildlife and Parks

Mr. Hal Scott
President
Florida Audubon Society
P.O. Drawer 7
Maitland, Florida 32751

I am not very happy with this response — but it apparently spells out the law. What are your thoughts?

Call from Kimberly Wright 7/28/76 -

She talked to Dr Endres et al. in Washington D.C. today.. Local FWS office is still not suppose to seize endangered species products coming from TT because they cannot list and prove a specific code violation. The problem revolves around Micronesians not being U.S. citizens, therefore when they leave territorial sea and go out on the high seas, they are not subject to the law. Therefore if cannot be proven that the turtle was not taken on the high seas. Question - are Samoans, Guamanians, Puerto Ricans, Virgin Islands, U.S. citizens?

It appears to me that there are 4 possible main sources of hawksbill from TT.

1. Turtle from beach
2. Turtle from territorial sea
3. Turtle from high seas
4. Turtle imported to TT from other area

and of course 5. Pelt material from any 1-4.

Laws can't accept probabilities - therefore it does not help knowing that in all likelyhood in come from beach or territorial sea.

July 19, 1976

The Honorable Nathaniel P. Reed
Assistant Secretary of Interior
Fish, Wildlife and Parks
Interior Building
Washington, DC 20240

Dear Nat:

Many thanks for your letter of July 13 to Hal regarding the Micronesian hawksbill turtle problem.

It strikes me that, if the law requires that the Trust Territories be regarded as having the status of States of the USA, then the Endangered Species Law should be enforced in the Trust Territories. In actuaá fact, the Trust Territory Code and U. S. Endangered Species Law are at variance in the Territories, the former permitting capture and commerce in hawksbill turtles subject to certain size and seasonal restrictions, while the latter of course offers the species complete protection. At the present time, even the less restrictive Trust Territory law is ignored in most places, and hawksbill products are popular articles of commerce in almost all Districts. If the authorities in Honolulu are no longer authorized to confiscate non-commercial hawksbill materials entering from the Trust Territories, it would appear to be obligatory that the laws protecting the hawksbill be properly enforced within the Territories. This will be difficult, since the habit is culturally ingrained, and Robert Owen, the Chief Conservationist for the Territory, has been threatened with personal harm if he starts enforcing the law zealously.

This is a serious dilemma, and I would most appreciate your advice on possible solutions. Hopefully something could be worked out within the framework of existing legislation, but if not it seems an amendment to the Endangered Species Act may be necessary.

Sincerely,

Peter C. H. Pritchard, Ph.D.
Vice President-Science & Research

sh
P.S. - Hal Sends his regards. I just read this letter to him over the phone.

Sept 1, 1976 HIGHLIGHTS

Newspaper in Classroom Workshop

A group of 35 teachers from all districts of Micronesia attended the second "Newspaper in the Classroom" conference ever to be held in the Trust Territory.

Held at the luxurious Continental Hotel on Saipan, the workshop, which started August 13 and ended August 27, was funded by the Frank E. Gannett Foundation headquartered in Rochester, New York.

The Foundation provided the participants transportation, room and board, and stipend.

In addition to receiving three credits from the University of Hawaii, the participants also learned from the conference the techniques of using newspapers in the classroom.

Newspapers would enable the Micronesian students an opportunity to understand the current developments in the world, according to Ms. Barbara Edwards, Community Relations Manager for Hawaii Newspaper Association, who coordinated the conference.

Most of the textbooks in the Micronesian classrooms are old and outdated, Ms. Edwards indicated.

Ms. Edwards was assisted in the conference by Ms. Betty Jenkins, a classroom teacher from Hawaii.

The instructors said that Guam's "Pacific Daily News" has agreed to provide the 35 teachers "free" newspapers for one year.

This conference was the second of its kind ever to be held in the Trust Territory. The first "Newspaper in the Classroom" conference was held at the Community College of Micronesia on Ponape in August 1975.

This District Administrators' conference was held recently at the Headquarters' conference room on Saipan. Acting High Commissioner Peter T. Coleman (speaking in the background) presided over the conference. Rear Admiral Kent Carroll (sitting next to Coleman, in uniform) also addressed the conference. Topics discussed in the conference included decentralization, general policies of the Acting High Commissioner regarding TTPI operations, the up-coming general election of the Congress of Micronesia on November 2, Sea and Air Rescue, Medical Evacuation, and Disaster and Typhoon policies.

Basswood Strikes Again

Its nice to know that the Coast Guard Cutter Basswood is out there.

Recently Basswood, on its routine surveillance to the southwest islands of Palau District, located the Australian cruise ship Linbard Explorer within the vicinity of Helen's Reef. She immediately alerted TT Headquarters on Saipan because the cruise ship was within three miles of territorial waters and that the 72 guests on board were planning to go "snorkeling, scuba diving, fishing and shell collecting" within the lagoon of Helen's Reef.

The Basswood skipper asked HiCom: "Does Linbard Explorer have permission to disembark its guests and come within three miles of Helen's Reef? If not, does HiCom want Basswood to relay message prohibiting Linbard Explorer from the Reef? If Linbard Explorer is able to put guests on the Reef, are there any acts prohibited while there or are any species protected by TTPI law from being removed?".

As it turned out, the cruise ship Linbard Explorer did have permission to visit the area and Mr. Boyd Mackenzie, Special Consultant to HiCom on district affairs, so advised the Basswood skipper.

"Australian ship Linbard Explorer cruising expedition in TTPI is known to this Headquarters. First authorization was granted to enter Helen's Reef last June for the purpose of studying wildlife and birds on the island. The ship is authorized to enter the area for a period not longer than forty eight hours", Mackenzie wired Basswood.

Mackenzie emphasized that the permission to enter the area was restricted to swimming, snorkeling, and scuba diving. He said the guests on board the Linbard Explorer were "not to engage in fishing, collecting shells, harvesting trochus, or remove vegetation and animal life on the island and the surrounding reef".

The Australian ship left the area without debarking passengers as they had intended.

Marshalls Legislature Passes ConCon Bill

The Marshall Islands Legislature, the Nitijela, has approved a bill calling for a Constitutional Convention to be held in the Marshalls District this coming year.

The bill, introduced by member Jina Lavin, provides $150,000 for the expenses of the measure, and stipulates that 48 candidates will attend the Convention.

According to the bill, the delegates to the Convention will include two representatives and one senator from the Marshalls delegation to the Congress of Micronesia, all eight of the seated Iroij (traditional leaders) in the Nitijela, one Iroij from Mejit, one from Ujelang/Enewetak, one from Arno, and a delegate from Likiep.

The thirty-three remaining delegates are to be elected from the various islands in the Marshalls.

The delegates will be charged with the responsibility of drafting a Constitution in English and Marshallese for the future government of the Marshall Islands.

The bill has been submitted to District Administrator Oscar DeBrum for his approval or disapproval.

Handicrafts of the Trust Territory of the Pacific Islands

By Robert E. McKnight*

The scattered islands of Micronesia cover an area of the Western Pacific Ocean slightly larger than Australia or the United States, but with a total land area considerably smaller than some of the world's larger cities. The Trust Territory of the Pacific Islands, administered by the United States Department of the Interior, includes all of Micronesia except for the group located east and south of the Trust Territory, known as the Gilbert Islands. While Micronesia can be differentiated culturally from neighbouring societies on all sides, the internal composition of Micronesian culture is quite varied. This is strikingly evident in the area of folk arts as they are expressed in contemporary handicrafts.

THE HIGH islands, particularly Yap and Palau of the Western Carolines, are characterized by an art background stressing heavy and colourful decoration of public buildings in red and yellow ochre and black and white dyes mixed with a composition of Para nut oil and lime. These colours, in the pictorial expression of multitudinous legends and semi-historical episodes, formed the chief decoration of the Palauan *bai* (club or council house) on gables and rafters, and were applied to post statuary decorating the more prominent canoe-sheds. Geometrical patterns or flat paint coverings were applied, usually in deep red ochre, both to clay and wood bowls in Palau, and repetitive white on black drawings were once found on the gable bordering boards throughout Palau, Yap, and the low islands of the Carolines.

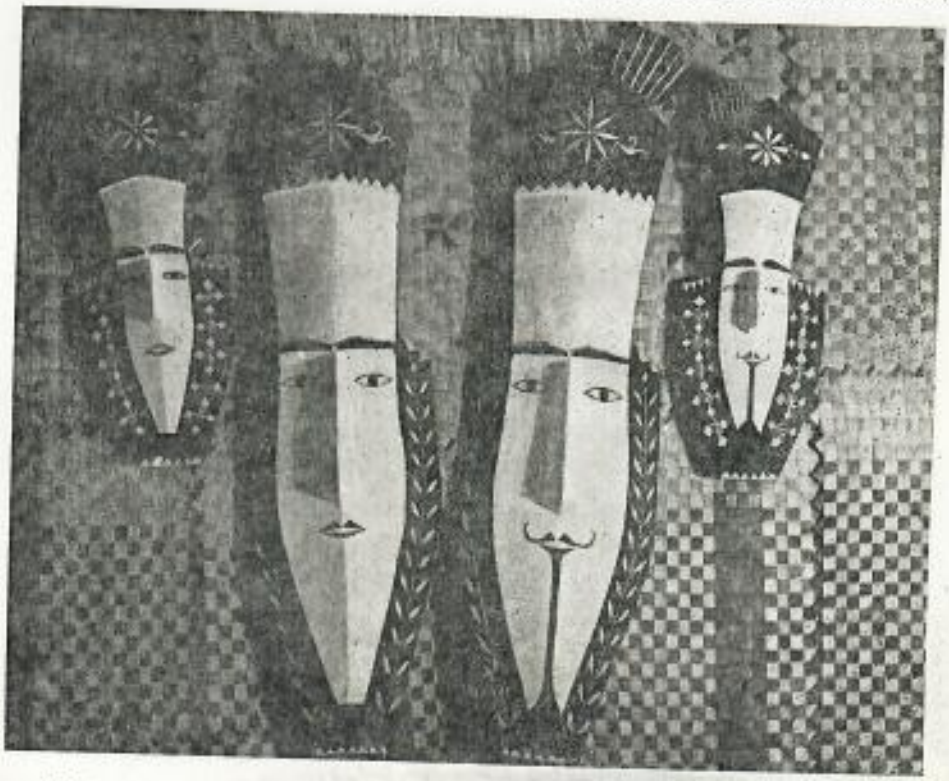
Shell-inlay work, again utilizing Para oil and red-ochre paint in conjunction with mother-of-pearl shell, was characteristic of the high art of Palau and some excellent examples are on display in European museums. One of the finest pieces in this tradition is a great bird bowl, festooned comprehensively with shell inlay, which was presented to Captain Wilson who wrecked an East India Company ship, the *Antelope*, on a reef at Palau in 1783. Covered bowls, cylindrical money containers, coconut candy jars, and ceremonial knives appear to have been part of the traditional media for elaborate shell-inlay work. Currently, following a somewhat changed technology no longer involving red-ochre paints, Palauan craftsmen produce a variety of bowls and jars with shell neatly embedded in a natural wood finish. Shell inlay also performs the service of eyes on statuary and is found as secondary pattern work on a variety of other contemporary items of woodcraft.

Wood-carving Techniques

Thus the western area of the Trust Territory of the Pacific Islands tends toward woodcraft, much of it rendered in the hard, dark red *dort* (Palauan) or *ifel* (Guamanian) wood. Among the most prominent items that may be listed are the Palauan story-board, the Tobi and Ulithi monkey men, the *bai* (miniature models of solid club houses, also from Palau), and representative statuary depicting the Yapese warrior, the Palauan woman with the tools of her garden, and the mother nursing her child, amongst hundreds of other themes.

Wood-carving throughout the western islands of the Trust Territory is a lively and inventive craft. Even the monkey man, which began its career as a small statuette placed in a canoe along with the deceased as a guardian, in this island form of sea burial, was never apparently intended to conform to a rigid shape or style. One would imagine that early craftsmen varied in skill and art expression among each other, and that the individual craftsman also sought to find some particular expression or mood in

The Mortlock "devil's masks," used in the past in ritual dancing to ward off natural disasters, or sometimes hung on the posts of god-houses or canoe-sheds. The form of the masks is believed by some to be associated with a mask-making tradition traceable back to Indian or Chinese sources.



* Community Development Officer, Saipan, T.T.P.I.

each of his creations. At least such is the case today.

A Tobi craftsman will turn out several monkey men following a particular theme (a highly satisfying phenomenon for one who has experienced marketing the objects), but will suddenly tire of this theme and try a new expression, pose or mood. One well-carved monkey man even turned up with a U.S. Army peaked cap on his grotesque head. Another inventive streak recently found expression in Yap, where a group of young students from the low Western Caroline Islands turned their skills in carving to the production of excellent, highly-polished deep-red wood replicas of a variety of sea fish.

Basketry and Weaving

Though basketry and hand weaving are known and practised throughout the Trust Territory, the acknowledged home of baskets, handbags, and a variety of other woven fibre products are the many atolls of the Marshall Islands. Although the technique may have been traditional only to Kusaie, near Ponape, the best known product in this field is the so-called Kili bag. Fashioned from the white-bleached fibres found only in the youngest shoots of the coconut palm, the tight (almost waterproof) weave is among the most attractive and durable in the South Pacific. Invariably not dyed, the product is always chalk white and, when the weave is applied to hats, has an effect like that of a fine Panama.

Current innovations applied to weaving in the Marshalls are hot-plate pads, and woven flowers which may be used for a variety of decorations and in dry flower arrangements. One inventive young lady found that a proper size of white Kili bag, adorned with a bright woven flower, could be transformed into a remarkably stylish hat.

Woven lava-lava are made throughout the low atoll islands of the Central Carolines, surrounding Truk and extending toward Yap. Fashioned both as everyday wear and as items for presentation to high-ranking island chiefs, one can take one's choice between severe lava-lava with broad black and white stripes, or lava-lava that are adorned with the most intricate patterns in a variety of dyes. This art has been decidedly on the wane over the last few decades and an effort is being made through projects at a community level to seek a revival of home weaving in plantain and pandanus fibres through the introduction of the faster hand looms of western manufacture.

A quick glance across the many islands reveals the Mortlocks, a large group of islands lying south of Truk, with another prominent and successful item of contemporary craft which has survived out of a long traditional usage. This is the Mortlock "devil's mask." Generally, these masks, which range in size from about ten inches to six and seven feet, are done with severe white and black paints in highly detailed patterns, making extensive use of repetitive and geometric formulas for borders. The general art style finds expression in an entirely different media on Ponape where the same general carving techniques—almost an inlaying of white paint on a black or brown surface—are applied to decorative dance paddles.

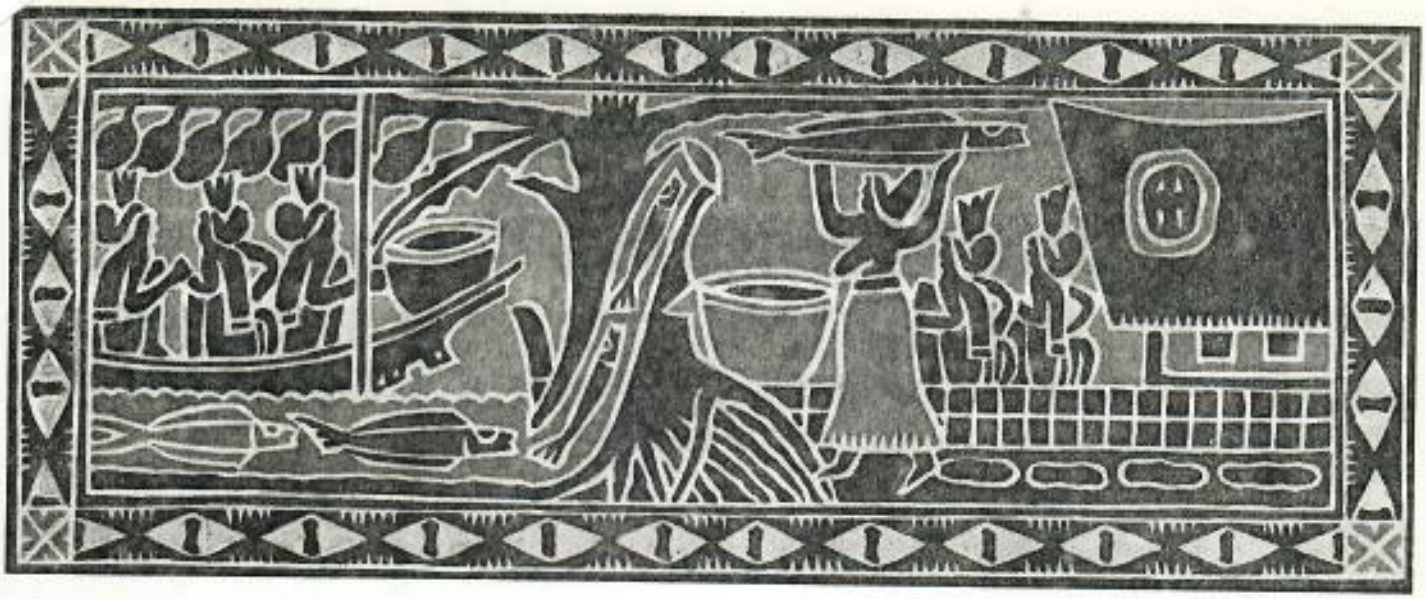
One of the Ulithi monkey-men, carved in hard wood and with shell inlay. These little figures were originally made to serve as guardian companions for the dead when they were set adrift at sea in a canoe.

A total list of items, ranging from turtle-shell craft to an occasional shell adze, which occasionally find their way to market in the Trust Territory, would occupy over twelve closely-printed pages. It is possible here, however, to elaborate on some items peculiar to the Trust Territory of the Pacific Islands, in terms of their background in custom and history of development as a manufactured item of handicraft.

Palauan Story-board

The Palauan story-board first gained recognition outside Palau when early Europeans sawed out the beams of Palauan council and club houses and crated them up for display in European trading companies and academic museums. (The destruction of these buildings conformed to the broader purposes of the time in detracting from the influence of native village clubs.) This destructive and impractical means of propagating oceanic art appears to have been terminated during the period of Japanese administration of the then League of Nations mandate.

At that time, a Japanese student of



This story-board illustrates the legend of Milad, the mythological grand-daughter of Latmikiak. Milad, who lived on the reef islet of Ngibtal, off Babelthuap Island, possessed a magic breadfruit tree with a hollow trunk that reached down into the ocean. Once in a while a large wave forced up through the trunk a large fish which provided food for the whole village. In time, however, the people became jealous, and cut down Milad's magic tree with their clam-shell axes. The ocean poured out through the severed hollow trunk and flooded the island, which sank into the sea, where, it is said, it may be seen lying in clear water to this day.

folklore, by the name of Hijikata, was more or less freelancing in Palau, studying the pottery, the stone imagery, and the kinship structure, as well as other forms of art and folklore. Perhaps as a formal programme under the Japanese administration, Hijikata, himself a masterful woodcraftsman, gathered around him about twenty young Palauan men and taught them not only their own forms of woodcraft (applied both to board and statuary carving) but also their own folklore, which could now make its appearance not only as a permanent decoration on the rafters and gables of public buildings of Palau, but also on the more portable and marketable story-board.

Hijikata was a "purist," insisting that his students adhere rigidly to the simple lines and local paint substances of the traditional medium. Boards produced under his direction could quite literally be mistaken for a slice from the original *bai* rafters. Interestingly, Hijikata, now an elderly gentleman living in Japan, continues to produce woodprints and cards in the art style that he taught in Palau.

After World War II, portable rafter carving was rediscovered along with the craftsmen, and the art and technology of story-board carving began to evolve within the atmosphere of a very favourable market. Under sales pressure, the tedious production of traditional paints was dropped in favour of commercial enamels, the boards took on a brighter appearance in order to appeal to the larger buying public, and the craftsmen, whilst experimenting, began to express individuality. One major innovation was the carving of hard woods to produce attractive natural-colour boards in deep relief. This technique, in the hands of a few craftsmen who had learned cabinet making, was then applied to the ornate Palauan coffee table with story-board themes applied to the surface, and to the boards edging the table, with stylized statuary for legs.

Story-boards may be purchased in sizes ranging from about 6 inches x 14 inches to lengths of several feet. As a rule, the dark, natural wood boards with deep carving tend to carry a higher price. Natural-finish boards cost about a third more for equivalent sizes and workmanship. However, quality and the name of the artist play a determining part in the price for this type of board.

Mask-making

The Mortlock "devil's mask" is, according to some authorities, an art form associated with a mask-making tradition which can be traced through Indonesia to an early Indian tradition, or even to a late Chou tradition in China around 600 B.C. In the Mortlock usage, the masks may be hung on the posts of god-houses or canoe-sheds, but other uses are mentioned. One, recalled by elders, is the use of the mask in dances apparently designed to acquaint young men with the power of the spirit world; another mentioned by some authors is the use of the mask by men dancing on the beach to ward off typhoons.

The masks are either "male" or "female"; the male masks are adorned with hair ornaments. The general style is quite rigid, always with a squared, flat (or only slightly rounded) head, and pointed chin. Colour is generally black and white, though red detail may be used. The face is typically surrounded by a repetitive, geometric border design. Eyebrows usually receive a stylized "seagull" treatment, and a similarly-styled moustache may be present. Sizes range from small ten-inch masks to masks four and five feet tall.

Tobi and Ulithi "Monkey Men"

The Tobi Island monkey men, as mentioned earlier, served originally as guardian companions for the dead when they were set adrift at sea in a canoe. Some authors suggest other traditional meanings in the belief that the little statuette represented some form of ancestor spirit. Apparently a similar tradition characterized most of the Central and Eastern Caroline Islands, at least in so far as scattered examples of small statuary, differently styled, can be found from Tobi up through Ulithi and over, and easterly as far as the outer islands of Ponape.

The little men seem first to have caught the commercial interest of German traders at Tobi, perhaps as early as 1860, and have experienced gradually wider recognition ever since. Prior to World War II, the form was encouraged at Tobi as a commercial item, and copied in Palau both by Tobi migrants and by Palauan craftsmen. If made in Tobi,

the wood is always either breadfruit or a wood with dark and very light-brown streaks, somewhat resembling the Hawaiian monkey pod. In Palau the craftsmen often use the dark brown and very hard *dort*. Characteristically, the statuette is severely naked, to the point of lacking detail; the face is triangular with a sharply diminishing forehead from which the name derives. Posture varies greatly, but is often a stylized squat. The grotesque is not unusual; one form has a large round face peering out between high pointed knees.

The Ulithi monkey man is probably a product of the same tradition as the Tobi guardian spirit. A highly-angular style and squat posture is rigidly followed. Production of the statuettes for commercial purposes was not initiated until shortly before World War II.

Navigation charts from the Marshall Islands have received sufficient prominence to be mentioned in any modern text about navigational techniques in the Pacific area. Constructed of thin strips of wood tied together in many patterns, and with shells mounted irregularly to represent land features, the charts depict ocean waves and current characteristics for a given area of the Marshall Islands.

Craftsmen seldom deviate for the sake of aesthetic design from true charts, and as a result, the sticks and shells often have a pleasingly random appearance. At the same time the prices of the true charts suggest the cumulative knowledge that has been invested in them rather than craftsmanship itself. A typical chart covers about two by three feet of wall space.

Dance Paddles and War Clubs

Dance paddles and war clubs or fighting sticks were characteristic of all the societies comprising Micronesia, but are now characteristically produced at Ponape. Two styles most commonly seen in dance paddles are those of Palau and Ponape. In Palau the paddle itself is about two and a half feet long, with the blade in the shape of an elongated diamond. The flats of the blade are painted with fierce faces representing various village heroes and warriors. Whilst occasionally available locally, these paddles have not been produced specifically for sale; rather, they may become "excess" following a dance.

In Ponape, on the other hand, dance paddles in various sizes have been produced for sale for several years. The style is exceedingly different from that in Palau, with white line designs of an intricate geometric pattern on black or brown covering the flat of the blade. The edge of the blade is attractively decorated with tufts of pandanus fibre, usually white but sometimes dyed in varied colours.

War clubs from Ponape and occasionally Truk are fearsome devices with sharp "bull horn" barbs extending from the flat of the blade at regular intervals. With the possible exception of an occasional museum piece constructed with a blade of sharks' teeth, this design is the most exotic and intricate in Micronesia. They are produced both as a miniature (twelve inches) and in full size (about four feet).

Love Sticks

Love sticks are a product of the Truk District, particularly Truk Atoll itself. Highly individualized, necessitated by their function, the sticks follow two overall patterns. The most common type is about four feet long and one-quarter inch square, with highly-detailed black and yellow geometric designs from the point nearly to the base. A second type is typically about two and a half feet long, flat, and about three-quarters of an inch wide with carved detail in natural hard wood.

Each stick, traditionally, was the "calling card" of a particular male and could be used to rouse a sweetheart by pushing the point through the thatch wall by her sleeping mat. The recipient of the stick could then feel the pattern of carving on the stick and identify the suitor. If he proved acceptable, she would draw the stick into the house. If not, she would push it out through the thatch.

One of the Truk "love sticks," used in a sense as a "visiting card" by a young man when calling on his beloved at night

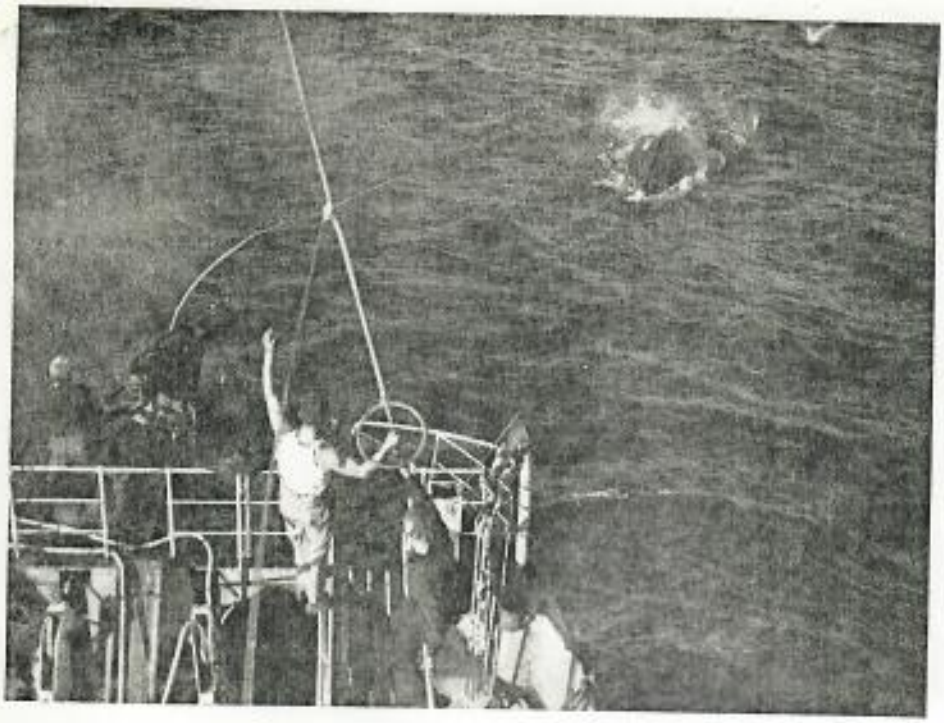
Mr. Cedric E. Gardiner

TEMPORARY BIO-STATISTICIAN

Mr. Cedric E. Gardiner, recently appointed as temporary Bio-statistician to the South Pacific Commission, was from 1924-47 in charge of the Vital Statistics Branch of the New Zealand Department of Statistics. In this capacity he was responsible for all official vital and health statistics, and he prepared a number of papers on demographic and health matters.

From 1948-63, Mr. Gardiner was Medical Statistician with the New Zealand Department of Health. His work in this period included the production of annual reports on medical and mental health statistics, and special reports on various other subjects, including *Carcinoma of the Cervix; Cancer Mortality and Morbidity; Needs of Elderly Patients in Public Hospitals;* and *Smoking by School-children in New Zealand.* Mr. Gardiner also compiled the *New Zealand Classification of Diseases for Statistical Purposes.*

During the years 1951-63, he was also a member of the WHO Expert Committee on Health Statistics and attended the Fiji Training Course in 1962 as a consultant. In this period too, he also acted as a lecturer to the Otago University Medical School, Dunedin; the Nurses' Post-graduate School, Wellington; the Health Inspectors' Training Course; and to the New Zealand Hospital Officers' Association.



"Fast fish!" is the cry as the harpoon goes home

Whales and Whaling in the Western Pacific

By R. J. A. W. Lever

The literature of whaling deals either with the early efforts in the Arctic with the hand-harpooning of Greenland whales from open boats or with the much later campaigns in the Antarctic against the blue whales, using harpoon guns from chaser ships. In fact, however, during the last 70 years or so, the term "whaling" suggests killing by explosive shells and then the mechanical flensing in the attendant factory ship in southern polar regions. The classics—Melville's "Moby Dick" and Bullen's "The Cachalot"—occupy a unique place in literature but descriptions of whaling in the Western Pacific are scattered in various books and journals and are not easy to find. This article attempts to give an account of whaling activities in Melanesia and Polynesia which it is hoped will be of some value.

Early History

It is generally accepted that the first whalers in the Western Pacific were operated on a small scale by the British in 1775, but serious whaling did not begin till the voyage in 1789 of the *Amelia* shortly after the arrival of Phillip's "First Fleet" in New South Wales. The powerful East India Company was able to prevent British whalers from operating in the Pacific Ocean at this time—and it wasn't until 1802 that these powers were finally relinquished. Naturally, these limitations encouraged the American whaling fleets, who became supreme in this area from the end of the eighteenth century till about 1860, except for the three years of the War of 1812. Few groups of islands in Polynesia went unvisited by the Nantucket and New Bedford whalers, who reached their heyday in 1846 with no less than 730 vessels engaged in this trade and taking £1,400,000 worth of whale products in that one year alone. The ultimate effect of this immense onslaught on the whale population will be dealt with later.

Because of the annual arrival of large numbers of the Southern right whales in Tasmania and New Zealand, there developed so-called "bay" or "shore" whaling in these countries in which the whales were captured only short distances from the coast.

Types of Whales Hunted

Only three species were hunted on a really large scale; the sperm, Southern right, and humpback whales. The sperm or cachalot (*Physeter catodon*) reaches a length of 60 feet in the male but only 30 to 35 feet in the female and has a very narrow sledge-like lower jaw with from 20 to 25 pairs of teeth, which provide the "ivory" described later. In the head also were the gummy, fatty spermaceti from the lower or "junk" part and the very valuable sperm oil from the "case" in the upper portion. This sperm oil was the source of the spermaceti candles from which the original unit of light, "candle power," was calculated.

It is interesting to note that the term "sperm whale" is derived from the odd idea of the old-time whalers that the spermaceti was actually the creature's sperm—the French were less imaginative and used the word "cachalot." The average quantity of oil obtained from one whale was six tons but a figure of 15 tons was sometimes reached. Finally, there was the more valuable ambergris, secreted in the whale's intestine, not in the stomach as some authors state. Even to this day, chemists have not been able to synthesize this product on which perfumers still depend and which costs in the vicinity of £4 per ounce!

The food of the sperm whale is confined to squid, giant specimens of which, obtained from very great depths, have been found in whales' stomachs. Dives of 400 fathoms are quite usual and up to 600 fathoms recorded. This whale is a lover of warm tropical seas and sperms found beyond 40°N or 40°S usually prove to be rogue males banished from the herd, as sometimes also happens with elephants. In the early whaling days, schools or "pods" numbered up to 100, but extensive hunting, in which nursing mothers and young were not spared, soon reduced this figure to about 15.

"Moby Dick," written in 1851, was based on actual incidents which occurred on board the U.S. whaler *Essex* in 1820 when sailing near the small Hender-

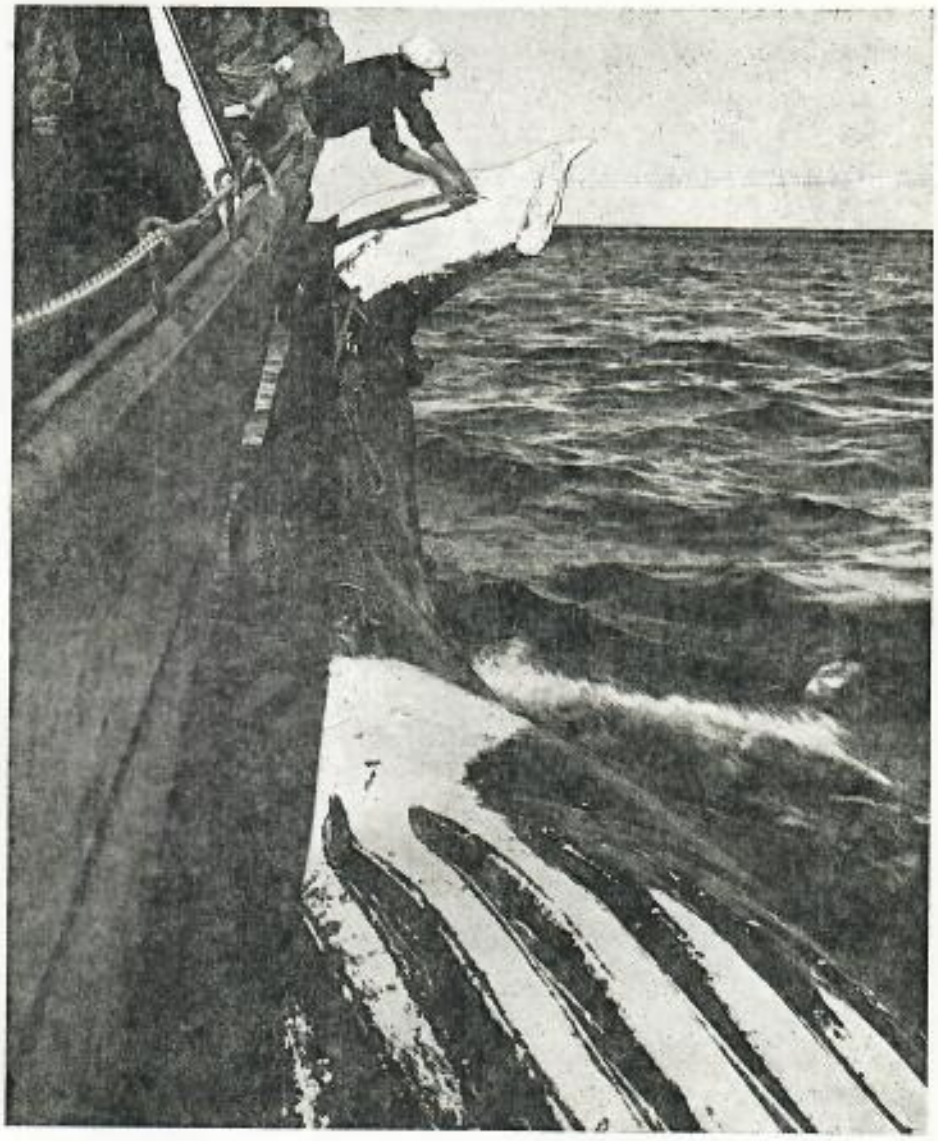
son Island, just off Pitcairn. An interesting habit of whales is quoted by Derrick (1) in which a small government vessel at anchor in a bay in Koro Island, Fiji, was chosen by two whales as a convenient object for rubbing their sides against so as to scrape off their barnacles—the reaction and language of the skipper is not recorded!

When dealing with the Southern right whale (*Balaena antipodarum*)* practically everything applicable to the sperm whale is found not to apply. The Southern right male rarely reaches more than 50 feet in length. It has huge lower jaws devoid of teeth, and from the roof of the upper jaw it has blankets of whalebone or baleen. Unable to chew, the whale obtains the large quantities of food it requires by swimming open-mouthed through shoals of shrimp-like "krill" or Euphausians, which are swallowed as the water is strained through the fringe of baleen. These Crustacea, about 2½ inches in length, do not occur in tropical seas, so the right whale in turn frequents both the South Polar regions and the waters around New Zealand and southern Australia, where they migrate to breed in sheltered inlets. Over a number of years at Twofold Bay near Eden, N.S.W., there was the remarkable occurrence of porpoise-like killer whales (*Orcinus orca*) which drove the much larger right whales into shallow water and attacked them there, to the great satisfaction of the bay whalers.

The third species of whale is the humpback (*Megaptera novaeangliae*) which reaches a length of 45 to 50 feet in both sexes and has very long flippers up to 14 feet long. It is very prone to attack by both lice and barnacles. Its distribution during the whaling days was restricted to Tonga, western New Caledonia, off the northern tip of New Zealand, and in the Cook Strait. Early records show that it was usually the first whale to be hunted when new fields were opened up, but it soon moved to other regions, either from fright or intelligent anticipation.

Main Whaling Grounds and Island Bases

Most British and American whalers entered the Pacific via Cape Horn, sailed up the coasts of Chile and Peru to the Galapagos Islands, then along the equator and so down to the Marquesas. There was also some movement of American vessels coming south from Hawaii. Certainly by 1813 there were a number of bases, described as forts, in the various sheltered bays of Nukuhiva and Hiva Oa, the scene of Melville's "Typee." This was written in 1846, just after the first French occupation of the Marquesas. Other bases were at Tahiti and Moorea in the Society Group, of which Cook's associate, Sir Joseph Banks, commented that, in the forty years prior to 1806, the human population had been decimated since the arrival of the European—and for this the whalers must bear their share of guilt.



The whale is inflated with air to facilitate towing. Strokes cut in the tail indicate the catcher's identity and the number of the catch for the day.

One of the most intensive areas of whaling activity was the extensive equatorial belt stretching as far west as the Gilbert Islands, and known as the "On the Line" whaling ground, with the ships at work there throughout the year. By contrast, the waters around northern New Guinea and the Solomon Islands had a season restricted to the months from October to March. Further east in Fijian, Tongan, and Samoan seas there was again year-round sperm whaling. To the south, in the region frequented by the Southern right whale, most activity occurred east of the Kermadecs, the Cook Strait, and off the South Island of New Zealand. The vicinity of the Kermadecs was given the name of the "Vasquez Ground," in which both sperm and right whales were taken.

Credit for the first serious attempts to plot the most fruitful whaling grounds belongs to Commander C. Wilkes of the U.S. Exploring Expedition of 1838-42. Nearly a century later, his fellow-countryman, C. H. Townsend, made a careful study of the log books of 1,665 whalers, and recorded the sites where nearly 54,000 whales had been harpooned. Far too little attention has been paid by British writers to his paper (3) with its four large maps showing the capture of the economic whales on a month-by-month basis throughout the whole world. The map accompanying this article has been re-drawn to summarize the very detailed information

* The writer has followed Burton's recent classification (2) in which *B. antipodarum* is used for the Southern right whale and the more usual *B. australis* reserved for the South Atlantic whale.

compiled by Townsend from the original sources.

Some of the favourite localities used as bases by the early whaling ships were Levuka and Kandavu in Fiji, Rotuma Island, Nuku'alofa and Vava'u in Tonga, and Pago Pago Harbour and Apia Roadstead in Samoa before its division into American and British spheres. Further south, whalers by the beginning of the 18th century were using Hobart and Launceston in Tasmania, and Port Jackson, Twofold Bay, and Portland Bay in Australia. Similar bases were soon established in New Zealand, of which Kororareka (Russell) in the Bay of Islands, Akaroa in the Banks Peninsula, Kapiti Island and Cloudy Bay in Cook Strait, and Dunedin are among the best known. Darwin landed at Kororareka when H.M.S. *Beagle* called there in 1835—at that time between thirty and forty ships were at anchor. What would one have given for a photographic record of these vessels and their tall timbers, now only a memory?

Blowing or Spouting

It is only within the last ten years that a reasonably satisfactory explanation has been given about the blowing of whales. It is many years since the early erroneous belief that sea water was spouted from the blowhole, but one problem still remained to be solved. If the spouting was actually the whale's breath, how did one account for it being clearly visible in hot tropical latitudes? Because, to be seen so easily, there should be a very marked difference in temperature, familiar to us all in cold weather. The explanation, given as recently as 1955, by Fraser and Purves (4), proved that the column of exhaled breath from the whale's lungs contained a nitrogen-charged foam, expelled in droplet or emulsion form so as to be visible even on the hottest tropical day.

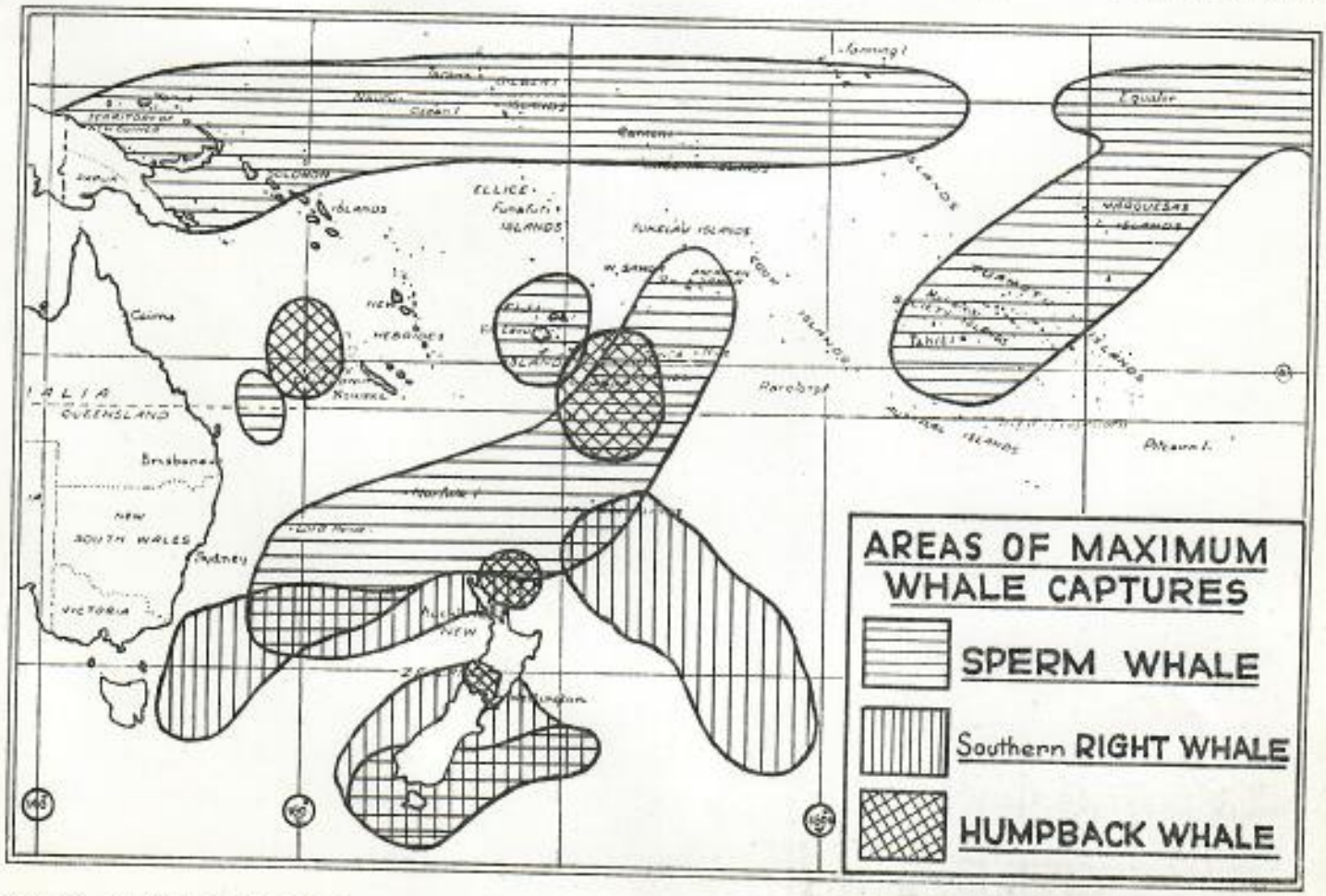
Skull of sperm whale

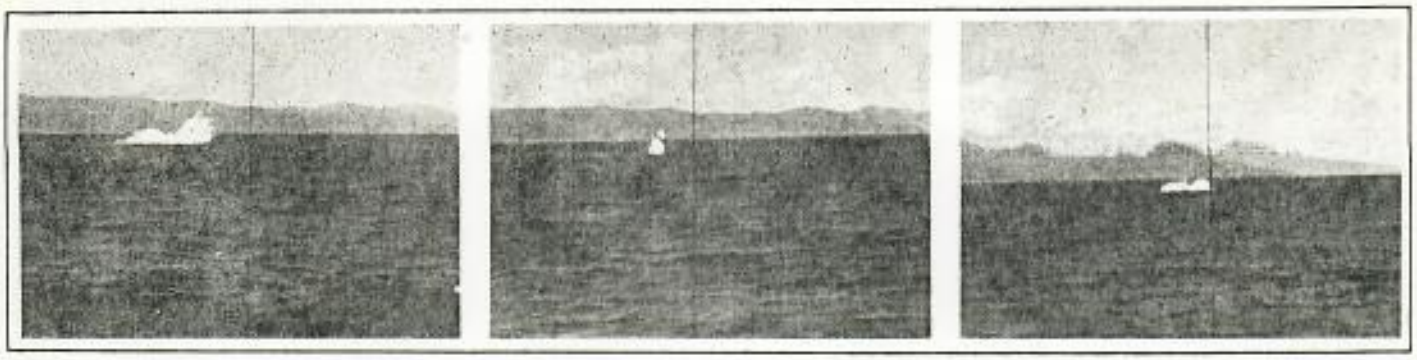
Differences in the types of spouting enable one to recognize the species of whale. The sperm whale's spouting issues from a single serpentine slit near the snout in the form of a column at an angle of 45°, whereas in the right whale, a nearly vertical double spout comes from a pair of parallel blowholes placed much further back on the head. Respiration in the sperm whale is regular with six breaths per minute for ten minutes followed by a diving period of 50 minutes. Departures from these times have been recorded, e.g. Slijper (5) quotes dives of 1½ hours. The series of photographs accompanying this article were taken by the author off the island of Kandavu, Fiji, and are enlargements from a sequence on 16 mm. cine film showing a whale splashing, taken from as near as the skipper was prepared to sail; this whale did not blow.

Whale Ivory

Besides spermaceti and ambergris already mentioned, sperm whales also provide ivory from the teeth in the lower jaw. To relieve the monotony of long periods of enforced idleness at sea, the old-time whaler spent many hours on what was called scrimshaw. This involved smoothing the teeth with a file or grindstone, followed either by engraving a pattern with a sail needle or actually carving the teeth, and finally polishing with wood ash.

In Fiji, the islanders still attach a high





Splashes caused by a humpback whale after jumping out of the sea off Kandavu Island, Fiji; these pictures were enlarged from a sequence of cine film shot by the author.

value to the polished teeth of the sperm whale, which are pierced at both ends and threaded with coir fibre. These *tambua* play an essential part in tribal ceremonies, and on recent Royal visits it was difficult to obtain enough of these teeth, largely as a result of their acquisition by New Zealand and American servicemen during the war.

In former times, the teeth were laboriously sliced lengthwise into pointed sections which were then made into necklaces. These were sometimes mistakenly believed to be dogs' teeth.

The Decline of Whaling in the Pacific

The period of intensive whaling in the Western Pacific lasted about 70 years, from 1790 till 1860, with a brief golden age from 1830 to 1845. The decline in the industry was because of a combination of events beginning with a financial crisis in the U.S.A. in 1857, followed four years later by the Civil War.

The short-sighted policy of ruthless slaughter caused the number of whales to be drastically reduced, and they were only saved from virtual extinction by the discovery of petroleum in Pennsylvania in 1859. Between 1830-40, no less than 41¼ million gallons of oil were obtained from the sperm whale (6). The number of Southern right whales killed between 1804 and 1817 by American whalers alone, reached the fantastic total of 193,000, or a yearly average of nearly 15,000, a mortality rate no animal could stand for long. Similar casualties inflicted in Australia and New Zealand, coupled with the withdrawal by Britain in 1842 of a protective tariff on foreign oil, led to the end of bay whaling. Petroleum replaced whale oil in the manufacture of candles and its use as oil for lamps; whaling then went into a rapid decline intensified by the substitution of flexible steel for whale bone in the corset industry. The respite for the whale came just in time to enable the population to rebuild and recover in much the same way as with bison on the land.

The effects of the whalers themselves on the native population were grave and far reaching. The introduction to primitive and isolated people of gin, rum, muskets, and new diseases (tubercular, venereal, and measles) began in the Pacific when the whalers, sandalwood traders, and recruiters first called at the islands. Of all the European types one's sympathy is most with the whalers as they landed on the beaches, after perhaps three years at sea without fresh meat, fruit, or vegetables, and in need of drinking water, firewood, and women. Unfortunately, with the ending of large-scale whaling in the 1860s, the effects of these first contacts were too deep-seated to be removed. Happily, a balance was later reached and the native population, with the exception of a few areas, made a recovery in numbers.

Sperm whale teeth or "tambua" from Fiji

References

(1) Derrick, R. A. 1957. "The Fiji Islands." Suva.

(2) Burton, M. 1962. "A Systematic Dictionary of the Mammals of the World." London.

(3) Townsend, C. H. 1935. *Zoologica*, Vol. 19, New York. Zool. Soc.

(4) Fraser, F. C., and Purves, P. E. 1955. *Nature*, Vol. 176 pp. 1221-2, No. 4, 495.

(5) Slijper, E. J. 1958. "Whales." Amsterdam.

(6) Harmer, S. F. 1928. *Proc. Linn. Soc.* 140. "History of Whaling."

Economic Development in the South Pacific

(Continued from page 20)

assembly of the total product, in many cases involving collection from a large number of small producers, the preparation of the product for the final consumer, and the actual distribution to the consumer. Increased efficiency in the field of marketing demands improved transport facilities, technical advances in the storage and processing of those products which cannot be marketed in their original state, and greater efficiency in both professional and non-professional marketing organizations to ensure a more advantageous disposal of the product and a satisfactory return to the producer. Progress in this direction has been significant but much still remains to be done.

Continued efforts in these several directions are a necessity, with improvements in the efficiency of labour and capital by improved training methods and the creation of incentives, by advances in technology, and by more efficient organization and leadership. The success of any plan for economic development depends, of course, not only on the extension of existing economic activities but also on improvements in the quality of the people themselves by extended health services and by education and training.

Leadership

The requirement for experienced leadership is not unimportant. It has been almost fundamental in administered territories that the knowledge and skill necessary for this leadership should be centred in the administrations of these territories, with growing emphasis on the transfer of administrative authority to local inhabitants. It follows that this leadership will come mainly from the administrations but it must be designed, perhaps with a greater use of bodies such as local councils and village meetings, in such a way as to avoid the tendency towards over-reliance on continued leadership or "follow-the-leadership" but rather to promote the creation of individual or collective initiative for the maintenance and extension of existing standards.

Peleliu governor: Raid went too far

By MARGARET SIZEMORE
Daily News Staff

The governor of Peleliu state in Palau compared Sunday's giant marijuana seizure to the U.S. invasion of Grenada and said the land and property of innocent people were damaged.

In a telephone call to the Daily News yesterday, Peleliu Gov. Yukio Shmull accused law enforcement agents of damaging water wells and farm structures on adjoining properties at the raid sites.

Law enforcement officers from Palau, Guam and the federal government seized what they said was more than $4 million worth of high grade marijuana at 16 different sites.

The seizure of the 1,500 mature marijuana plants and 500 seedlings — which altogether weighed about a ton — followed a three-month investigation.

One person was arrested and officials said more arrests were anticipated.

Drug Enforcement Agency resident agent Mike Gray declined to comment on Schmull's statements yesterday.

Schmull said the team deliberately damaged wells and burned down or destroyed several small shacks thought to be used for marijuana cultivation.

"I have alerted my people to stand by and be alert for any such actions in the future.

"We will take the necessary steps to be sure that residents' private properties will be well protected," Shmull said. "This Grenada-style situation must be stopped at once."

Shmull said a description of damages to the private properties will be sent to Palau Minister of Justice Thomas Remegesau and other government authorities.

Although Peleliu supports the Palauan government's crackdown on illicit drug trafficking, Schmull said his office eceived no word of the raids before they began.

Remengesau in an earlier release had emphasized that the ation was planned and run by the Palauan government, e anticipated similar crackdowns in the future.

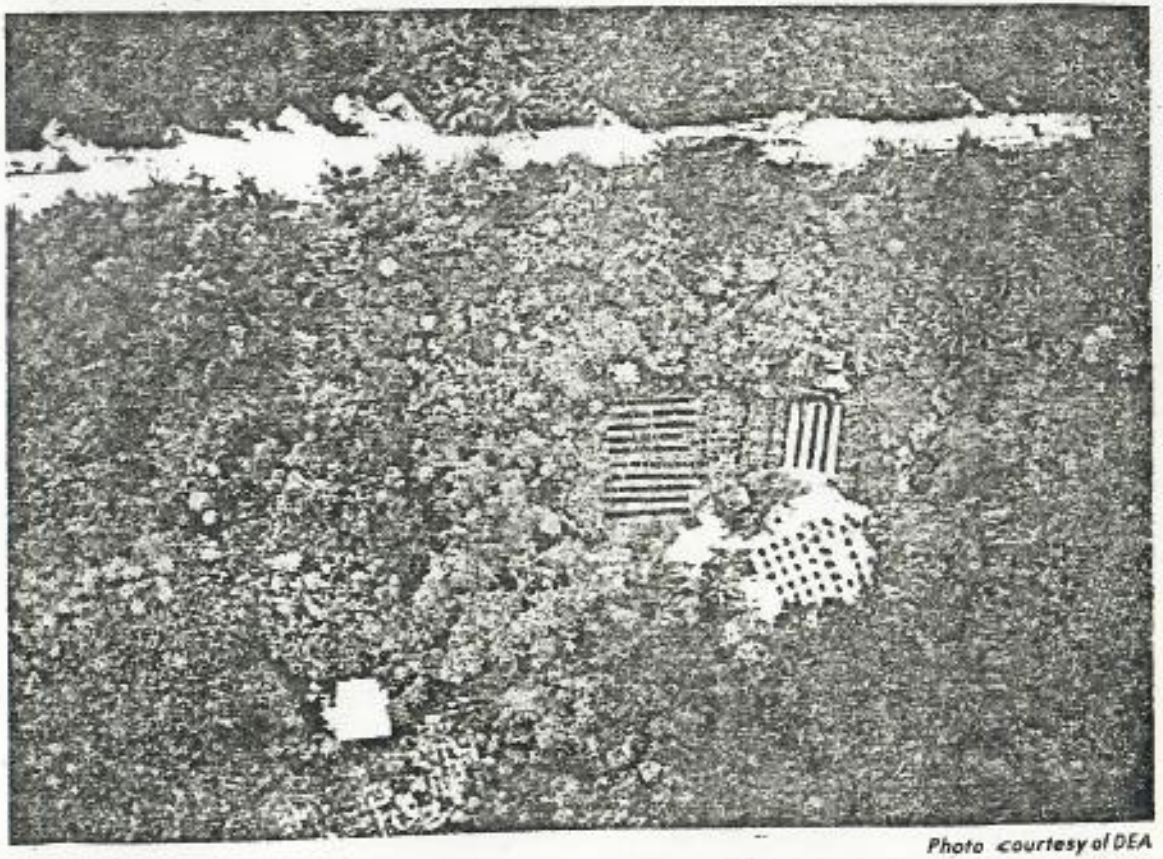


Photo courtesy of DEA

This aerial view shows the marijuana-growing operation on the island of Peleliu in Palau which was raided by law enforcement officials Sunday. Marijuana was being grown in 55-gallon drums, which can be seen in the center of the photo.

MARINE RESOURCES DIVISION, YAP STATE

FEDERATED STATES OF MICRONESIA

PHONE: 2185, 2294
CABLE: GOV YAP

POSTAL ADDRESS:
P.O. BOX 251
COLONIA, YAP
W. CAROLINE ISLANDS
96943

MEMORANDUM DATE: July 03, 1984

TO : Director, R&D

FROM : Chief of Marine Resources

SUBJECT: Turtle Regulations

Recent sightings of apparently illegally taken turtles and eggs lead one to the opinion the turtle regulations are not taken seriously in Yap. If the law presently on the books is unenforcable or otherwise undesirable, I suggest the State reconsider the regulations, rather than continue to make a mockery of the law.

Information available on the turtle populations in Yap State is dated and inconclusive. New data collection and analysis is needed prior to formulating intelligent management options. We have asked the U.S. Fish and Wildlife Service and the National Marine Fisheries Service unofficially to consider assisting us in the required research and conservation education. So far nothing has come of our discussions. We are presently understaffed, underequiped and underbudgeted to carry out the necessary investigations into the population dynamics of Yap's turtles.

It is understandable that the laws are disregarded due to the people's traditional dependance on the turtle for food. Perhaps traditional control and enforcement of the turtle fisheries is more appropriate than the present unheeded regulations. The issue obviously needs further consideration since the well-being of the turtles is closely tied to the well-being of the people and future generations. The Marine Resources Division staff are available to discuss the problem and potential solutions at anytime.

Thank you for your concern.

Roger Pflum

Roger Pflum

cc: Governor, State of Yap
Council of Pilung
Council of Tamol
Court, State of Yap
Attorney General, State of Yap
Manager, Yap Fishing Authority
Police, State of Yap
Transportation Div., State of Yap
U.S. Fish and Wildlife Service
FSM, Chief of Marine Resources
NMFS
MMA
George Belaz, Hawaii
Margie Falanruw, Yap Institute of Natural Sciences

MICRONESIAN MARITIME AUTHORITY
P.O. BOX D; KOLONIA, PONAPE
EASTERN CAROLINE ISLANDS, 96941

August 27, 1984

Mr. George Balazs
c/o National Marine Fisheries Service
Box 3830
Honolulu, Hawaii 96812

Dear George:

The enclosed police report should be of some interest to you. It at least shows some progress in the situation we have described in the past. My only concern is that people were prodded into action by Americans, rather than Micronesians. It is possible that the situation will revert back when there is nobody here to blow the whistle, but the precedent may have some effect. The crew of the government vessel seem to feel that it was their right to take the turtles, as they are mostly from the outer islands of Yap (many are my relatives and friends). They had visited Faraulep, the island which claims Gaferut, and probably had permission from the Chiefs there to get the turtles.

Sincerely,

Mike A. McCoy
Executive Director, MMA

August 24, 1984

Clement Mulalap
Assistant Attorney General
State of Yap
Western Caroline Islands 96943

Dear Clement:

I have been provided a copy of your August 15 letter requesting information on the wrongful taking of turtles by the Caroline Island's crew. In that regard, please find enclosed a copy of a report prepared by the DSI Officers who seized and released the turtles.

If you need additional information about this matter, please do not hesitate to contact me at your convenience.

Very truly yours,

David R. Hevitt
Attorney General, FSM

mkr

Enclosure

cc: President, FSM
Governor, Yap State
Marine Resources, Yap State
Mike McCoy, MNA
Lester Rudd, DSI

STATES OF MICRONESIA
SION OF PUBLIC SAFETY

COMPLAINT REPORT

DATE 8/13/84 PAGE OF

ACTION: ACTIVE ( ) INACTIVE (x) | INDEX INFO.: YES ( ) NO ( ) | No OF ADULT ARRESTS | No OF SUBJECT DETENTIONS | (F&F No.) DST-172-84

CLASSIFICATION: FOR INFORMATION ONLY – Illegal taking of turtles

CLASSIFICATION

DATE, TIME, DAY OF OCCURRENCE | PRIME DEPUTY REQUESTED NO ( ) YES ( ) LOC ( ) STAT ( ) VEH ( ) | VIA SECTY | TIME

LOCATION OF OCCURRENCE | TYPE OF LOCATION | TRACT

CODE: V—victim, W—witness, I—informant — list one witness (if named) and the informant on this page

CODE	No OF	LAST NAME	FIRST	MIDDLE	SEX	RACE	DOB	CHECK DAY PHONE BELOW
RESIDENCE ADDRESS			CITY	ZIP	RES PHONE (AREA CODE)			
BUSINESS ADDRESS			CITY	ZIP	BUS PHONE (AREA CODE)			
CODE	No OF	LAST NAME	FIRST	MIDDLE	SEX	RACE	DOB	CHECK DAY PHONE BELOW
RESIDENCE ADDRESS			CITY	ZIP	RES PHONE (AREA CODE)			
BUSINESS ADDRESS			CITY	ZIP	BUS PHONE (AREA CODE)			
CODE	No OF	LAST NAME	FIRST	MIDDLE	SEX	RACE	DOB	CHECK DAY PHONE BELOW
RESIDENCE ADDRESS			CITY	ZIP	RES PHONE (AREA CODE)			
BUSINESS ADDRESS			CITY	ZIP	BUS PHONE (AREA CODE)			

CODE: S—suspect, SJ—subject, P—patient, S/V—suspect/victim, SJ/V—subject/victim — circle code if supp. pages used for: V W S SJ P S/V SJ/V

CODE	No OF	LAST NAME	FIRST	MIDDLE	DRIVER'S LICENSE (STATE & No)
RESIDENCE ADDRESS			CITY	ZIP	RES PHONE (AREA CODE)
BUSINESS ADDRESS			CITY	ZIP	BUS PHONE (AREA CODE)
SEX / RACE / HAIR / EYES / HEIGHT / WEIGHT			DOB	AGE	WHERE DETAINED OR CITE No
OBSERVABLE PHYSICAL ODDITIES			AKA/NICKNAME		BOOKING No
CLOTHING WORN					MAIN
CHARGE					WEAPON USED
CODE	No OF	LAST NAME	FIRST	MIDDLE	DRIVER'S LICENSE (STATE & No)
RESIDENCE ADDRESS			CITY	ZIP	RES PHONE (AREA CODE)
BUSINESS ADDRESS			CITY	ZIP	BUS PHONE (AREA CODE)
SEX / RACE / HAIR / EYES / HEIGHT / WEIGHT			DOB	AGE	WHERE DETAINED OR CITE No
OBSERVABLE PHYSICAL ODDITIES			AKA/NICKNAME		BOOKING No
CLOTHING WORN					MAIN
CHARGE					WEAPON USED

VEHICLE USED IN CRIME YES ( ) NO ( ) UNKNOWN ( ) STORED ( ) IMPOUNDED ( ) | YR. | MAKE | BODY TYPE | COLOR

LICENSE (STATE & No) | VIN/FRAME No

REGISTERED OWNER

IDENTIFYING CHARACTERISTICS

CHP 180 SUBMITTED YES ( ) NO ( ) | GARAGE NAME & PHONE

VICTIM DESIROUS OF PROSECUTION YES ( ) NO ( ) | VICTIM INSURED FOR LOSS YES ( ) NO ( ) | E.A.P. No

SUSPECT/SUBJECT RELEASE APPROVED BY | TIME | ARREST REVIEW SUBMITTED YES ( ) NO ( )

BY DEPUTY: Lester Aucha [signature] | BADGE No 3

DEPUTY | BADGE No

STATION | UNIT/CAR No | SHIFT

APPROVED | BADGE No | TIME

ASSIGNMENT

SPECIAL REQUEST DISTRIBUTION

TT B/C BY | DATE | TIME | SECTY

REPORT CONTINUATION — NARRATIVE | URN | PAGE OF

SYNOPSIS: Ten (10) turtles were confiscated from aboard the M/S Caroline Islands on August 7, 1984 at about 1430 hours. Eight of these turtles were released into the ocean the same day, one died, and the other one was released into the ocean on August 8, 1984. These turtles were brought to Ponape on the M/S Caroline Islands.

ASSIGNMENT/ARRIVAL: This writer was assigned by Attorney General David NEVITT on August 7, 1984 at about 1235 hours to ascertain the validity of a report from Dick CROFT, Ponape State Marine Resources saying that some people were observed taking turtles from the M/S Caroline Islands. At about 1315 hours, this writer and Officer TAMNGIN arrived at the scene.

COMPLAINANT STATEMENT: Dick CROFT/male/DIRCTOR-Marine Resources State of Ponape

CROFT was contacted on August 7, 1984 at about 1320 hours by this writer and Officer TAMNGIN at his place of work. CROFT stated that earlier that day, he observed some people taking a large green turtle from the M/S Caroline Island and putit on a small white pick up truck. The pick up, as descriped by CROFT, was a lot smaller than a regular white pick up. CROFT FURther stated that the pick up truck was followed by a grey four(4) door sedan bearing an FSM emblem on the side. The identity of the people involved were not established due to the distance from the Marine Resources Office to the M/S Caroline Island.

MENDIOLA contacted: Lino MENDIOLA/Captain/Male/Age 38/Palikir, Ponape

Captain MENDIOLA was interviewed aboard the M/S Caroline Islands on August 7, 1984 at about 1345 hours by this writer and Officer TAMNGIN. After introducing ourselves to MENDIOLA, this writer explained the nature of the visit and that the Office of the Attorney General was not interested in prosecution

of the case if everybody cooperated. MENDIOLA assured that he would have everyone to cooperate with us and that no one will intervere. MENDIOLA further related that he had no idea about the law relating to the taking of turtles at certain time of the year. He only knew that selling of turtles is illegal.

OBSERVATIONS: This writer observed four big turtles on deck of the M/S Caroline Island , side closer to the dock. On the other side, there were six (6) turtles-2male and 4 female. All turtles were still alive, but appeared to be very weak.

RELEASE OF TURTLES INT THE OCEAN: After relaying the situation to the FSM Attorney General, this writer was instructed to take all the turtles and relese them into the ocean. With the help from CROFT and some of his employees, and Immigration Officers, all ten turtles were transferred to the Marine Resources boat and were transported out into the channel. About 1/2 mile from the reef, eight turtles were turned losee, but two were retured because they were too weak. One of them died during the night and the other one was released into the ocean by Marine Resources personnel.

MANGMOG contacted: Mathias MANGMOG/Chief Mate/35 yrs/Male/Euripik, Yap

MANgmog was contacted by DSI Officers Helgenberger and Seiola on August 7, 1984 at about 2300 hours aboard the M/S Caroline Islands. Officer Helgenberger explained to MANGMOG that he wanted to ask about the turtles. Mr. MANGMOG got very belligerant and ordered the two officers off the ship. Because MANGMOG was druhk and that they could not reason with him, the officers left.

On August 9, 1984 at about 1000 hours, this writer met MANGMOG at the CFSM Office after two attempts to contact him at the ship failed. After informing him that I wanted to talk to him about the turtles, MANGMOG came up to the

REPORT CONTINUATION _ NARRATIVE | URN | PAGE OF

BSI Office. MANGMOG related to this writer that they brought a total of sixteen (16) turtles on the M/S Caroline Islands, but three (3) died on the way and only thirteen (13) reached Ponape. Captain MEDIOLA, Robert WEILBACKER, Mad Mathias EWARMAI each took one turtle from the ship before police got there. WEILBACKER and EWARMAI are both working at the FSM Transportation Office. When asked how they caught the turtles, MANGMOG stated that some were caught on land and some in deep water, MANGMOG was insturcted by ths writer that it is prohibited to take turtles from June 1 to August 31 and from December 1 to January 31.

DISPOSITION: Case closed

August 13, 1984 / 1414

August 9, 1984

Mathias Maugmog
Chiefmate - Caroline Island
Eauripik, Yap
November 13, 1949

On July 31, 1984 we arrived at Gafemut Island in Yap and stayed until August 4, 1984. While at the island, we went out to get turtles. I am not sure how many we caught in the deep water, but we also caught several on the beach as they crawled in.

On August 4, 1984, we departed Gafemut Island and headed straight for Ponape. We caught a total of 16 turtles and brought them on the ship. One died before we left Gafemut, 2 died on the way, so only 13 reached Ponape.

August 7, 1984 the M.S. Caroline arrived Ponape. Before the 10 turtles were picked up by the police, Robert Weilbacher, Capt. Lino Mendiola, and Mathias Ewarmai

each took one. We were only planning to give away the turtles to friends, but no intention of selling any.

On the 12th of July we left Yap with stops on Ngulu, Fais, Faraulap, and Gaferut before coming to Ponape. I did not know that it was illegal to catch turtles at this time.

X [signature]

[signature]
8-9-84

George Balazs

MICRONESIAN MARITIME AUTHORITY
P.O. BOX D; KOLONIA, PONAPE
EASTERN CAROLINE ISLANDS, 96941

October 2, 1984

Mr. Shelton Neth
Area Supervisor,
Farmers Home Administration
Box 296, Kolonia Ponape
Eastern Caroline Islands
96941

Dear Mr. Neth:

I received your letter of Sept. 27, 1984 regarding information required from us to complete your "draft Natural Resources Management Guide" for Ponape State. After reading your letter, I fail to see how the responsibilities of the MMA as set forth in Title 24 of the FSM Code have any impact on any program assistance your organization may offer. We are responsible solely for the management of living marine resources within the Extended Fishery Zone (12 to 200 miles), and short of someone wishing to utilize a houseboat in that zone, I don't see any relation between our responsibilities and the FmHA.

Having stated the foregoing, I can add that my own experience with resource management brings to light one aspect of environmental impact which you might consider. This would fall under item #8 of your list, those of "Endangered Species and Critical Habitats". Of particular importance in the world today are adequate nesting beaches and forage areas (seagrass beds) to support populations of sea turtles. Since most nesting beaches occur in the outer islands, and those are usually on uninhabited or sparsely-inhabited ones, this may not be of concern to you. However, the increased population pressures throughout Micronesia may require people to consider housing in areas close to these habitats. Any human activity, and in patricular lights and fires, can discourage sea turtles from utilizing a nesting beach. For this reason it is always best not to situate human habitation in an area which might interfere with nesting, or even be susceptible to lighting from nearby dwellings. I realize that this may not be very critical in your compilation, but bring it up here for your consideration.

Sincerely,

Mike A. McCoy
Executive Director,
Micronesian Maritime Authority

ENERGY CRISIS HURTS DEVEL

SAIPAN—"Reduced fuel allocations, power outages, and curtailed air flights, have occured in the Trust Territory. They may seriously impede socio-economic development of the islands, by interfering the transportation, communication, electrical production and other government services; particularly such essentials such as health and education."

So said Thomas Remengesau, Deputy Director of the Headquarters Office of Planning and Statistics, (Sept. 1) in an address to an Energy Technology Conference now being held at the Fujita Hotel on Guam. He addressed the conference on behalf of High Commissioner Adrian Winkel, Micronesian News Service said.

"Existing power plants operate only on deisel fuel, all of which must be imported," Remengesau said. "This total dependence on imported fuels makes Micronesia extremely vulnerable to global reductions in oil supplies, as Micronesia is economically disadvantaged in competition with industrial nations bidding for oil."

Remengesau said there is a growing need to identify and develop renewable energy resources and employ alternative energy technologies in the Trust Territory. "Equally important is the promotion of energy conservation. These are the objectives of this workshop," he said.

Energy planning in Micronesia requires two focal points, the OPS Deputy Director indicated. These points are examination of indigenous energy resources and conservation.

"Solar, wind, hydropower, ocean thermal, and fuel from biomass can have immediate and long run effects on the energy production capacity of the islands," Remengesau told the conference, adding that the technology for utilizing these resources has already been developed and made commercially available in different parts of the world.

On conservation of energy, Remengesau noted that the efficient use of energy will enable existing resources to better meet current needs. "Conservation efforts may include taxes and incentives, restructuring power rates, efficient use of equipment and vehicles, and substitution, where possible, of renew-

A 500-pound Leatherback Sea Turtle was captured on Kosrae recently by a fisherman in Utwe Harbor. The carapace (the shell which covers the back) measured 52 inches long and 46 inches wide. The turtle was determined unfit for consumption and had to be buried. (PIO Photo).

Commonwealth Examiner Vol. 1 No. 35 9/7/79

WSZE - SHUTL

SAIPAN – Saipan's WSZE-TV went off-the-air Thursday (Aug. 30) to await the arrival of an engineer from San Francisco to make "technical adjustments" in an effort to improve its quality.

Wally Schick, General Manager of WSZE-Radio and TV, told the Examiner the "temporary shutdown" will be for about a month and possibly longer. He has "no idea" when the engineer is coming.

Schick said the owner and President of the Micronesian Broadcasting Company, Scott Kilgore, has ordered the money-loosing television station closed. Schick refused to release the contents of Kilgore's letter to the Examiners other than to say that the station will make "structural changes" in its operations. He added the TV will increased its "quality" but again declined to say how this may be accomplished.

He did not anticipate hiring more people to man the TV station nor purchasing new equipments. "But it will be a change for the better of our operations", Schick said in an interview.

Schick admitted that the TV operation and the FM radio "are a waste of money in our operation." He said he wanted to rent out FM

This leatherback turtle caught in Kapingamarangi in 1975 weights 300 pounds. The turtle is on the U.S. Endangered Species List. The Leatherbacks are the largest of all known turtles living today often weighing as much as 1000 to 1300 pounds.

Census Bureau Issues Report on Territories

1-28-85 HSB - Honolulu

WASHINGTON (AP) — Fewer than half of the people on Guam were born there, but on other U.S. Pacific territories natives make up the majority of the populations, the Census Bureau said.

American Samoa's population is 58 percent native, while 71 percent of the people in the Northern Marianas were born there and natives make up 97 percent of the people in the Trust Territory of the Pacific, the bureau said.

The statistics were contained in a series of Census Bureau reports on the detailed social and economic characteristics of the territories as of the 1980 national head count.

The bureau estimates the 1983 populations of the territories as 116,400 in Guam, 34,500 in American Samoa, 18,200 in the Northern Marianas and 124,000 in the Trust Territory of the Pacific.

SOME OF THE findings of the new studies included:

✔ More than half of the residents of these islands who had been born elsewhere came to the islands between 1975 and 1980.

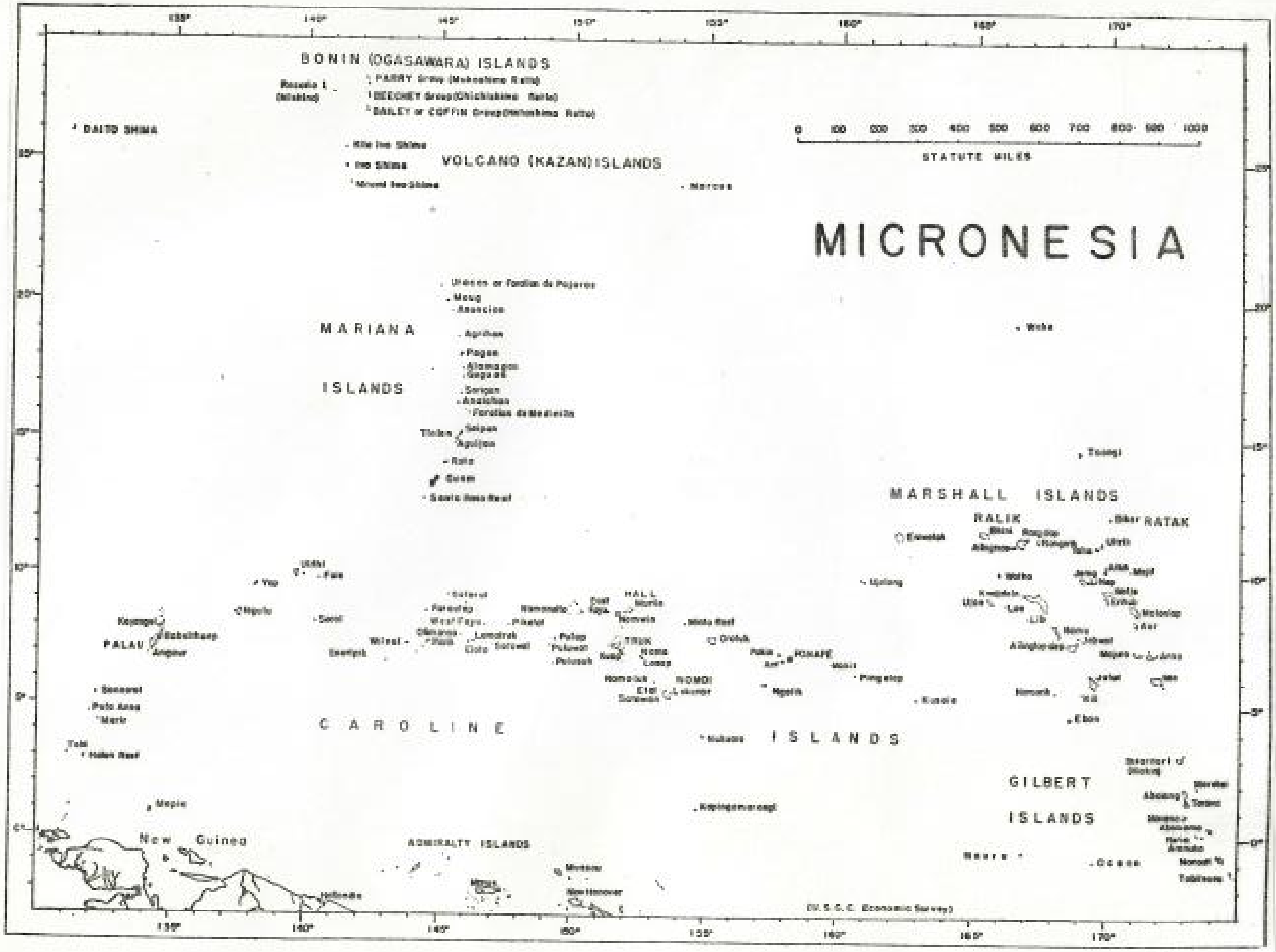
✔ Residents of Guam had a median income of $8,392 in 1980. Some 65.6 percent were high school graduates and 17.5 percent went to college.

✔ In American Samoa the median income was $4,219. Some 42.1 percent of residents were high school graduates and 7.6 percent had completed college.

✔ The median income in the Northern Marianas was $3,810. There, 44.7 percent finished high school and 11.3 percent college.

✔ The people of the Trust Territory had a median income of $1,383. Only 20.9 percent had finished high school and 2.8 percent completed college.

The median income figure is for persons aged 15 and over; the education figures are for persons aged 25 and older.


MICRONESIA
BONIN (OGASAWARA) ISLANDS
DAITO SHIMA
VOLCANO (KAZAN) ISLANDS
STATUTE MILES
0 100 200 300 400 500 600 700 800 900 1000
MARIANA ISLANDS
Guam
Wake
MARSHALL ISLANDS
RALIK
RATAK
CAROLINE ISLANDS
PALAU
HALL
PONAPE
NOMOI
TRUK
GILBERT ISLANDS
New Guinea
ADMIRALTY ISLANDS
(U.S.C.C. Economic Survey)

Tridacnid Clam Stocks on Helen Reef, Palau, Western Caroline Islands

WENDY HIRSCHBERGER

Introduction

Overexploitation of tridacnid clam populations appears to be a current problem in many areas of the Indo-Pacific. One area where some of the effects of harvesting have been studied is Helen Reef, a small atoll in the south Palau District, Western Caroline Islands, Trust Territory of the Pacific Islands. The submerged reef and lagoon, lying at approximately lat. 3°N and long. 131°E (Fig. 1, 2), occupy about 216 km² with a small island (Helen Island) located at the northern end. Depths inside the lagoon exceed 60 m; outside, the bottom slopes steeply. This remote area is uninhabited and receives only occasional visits from U.S. Trust Territory outer island support ships and foreign fishing vessels.

Figure 1.—Helen Island at Helen Reef atoll, in Palau's southwest islands.

Wendy Hirschberger is with the Northwest and Alaska Fisheries Center, National Marine Fisheries Service, NOAA, 2725 Montlake Boulevard East, Seattle, WA 98112.

In May 1971, the NOAA research vessel *Townsend Cromwell*, operated by the National Marine Fisheries Ser-

ABSTRACT–A survey of Palau District's Helen Reef was conducted in May 1976 to continue monitoring changes in tridacnid clam abundances. The densities of the four largest tridacnid species were slightly higher than observed in 1975; however, ratios of live individuals to empty shells continued to remain very low. Only Hippopus hippopus *showed a substantial decrease in the percentage dead. This is in contrast to* Tridacna maxima *which is subject to relatively no fishing mortality and showed less than 5 percent dead. These smaller species may possibly be used as natural population indicators at Helen Reef.* Tridacna squamosa *is still rare, probably owing to poor environmental conditions for this species.*

vice, NOAA, conducted a survey of the Trust Territory's marine resources. Only a stop was made at Helen Reef at this time, and the ship returned in March 1972 to survey the tridacnid clam populations. In their report, Hester and Jones (1974) concluded that the tridacnid populations at Helen Reef were large and that *Tridacna gigas* and *T. derasa* could possibly withstand a moderate, controlled fishery.

A resurvey effort was undertaken in April 1975 by a team of biologists supported by the Palau District Marine Resources Office, a division of the Trust Territory Department of Marine Resources, in response to increasing reports of foreign fishing vessels in the Helen Reef area. They found that tridacnid clam populations had apparently been reduced since 1972 (Bryan and McConnell, 1976).

In 1976 the Palau Marine Resources Office requested another resurvey in response to continued reports of unauthorized fishing vessels in the Helen Reef area. There was concern that continued fishing in this area could lead to severe stock depletions, with small chances of recovery. This report gives a description of the 1976 resurvey effort, monitoring changes in the abundance of tridacnid clams on Helen Reef, and provides population densities of the area with comparison to earlier surveys.

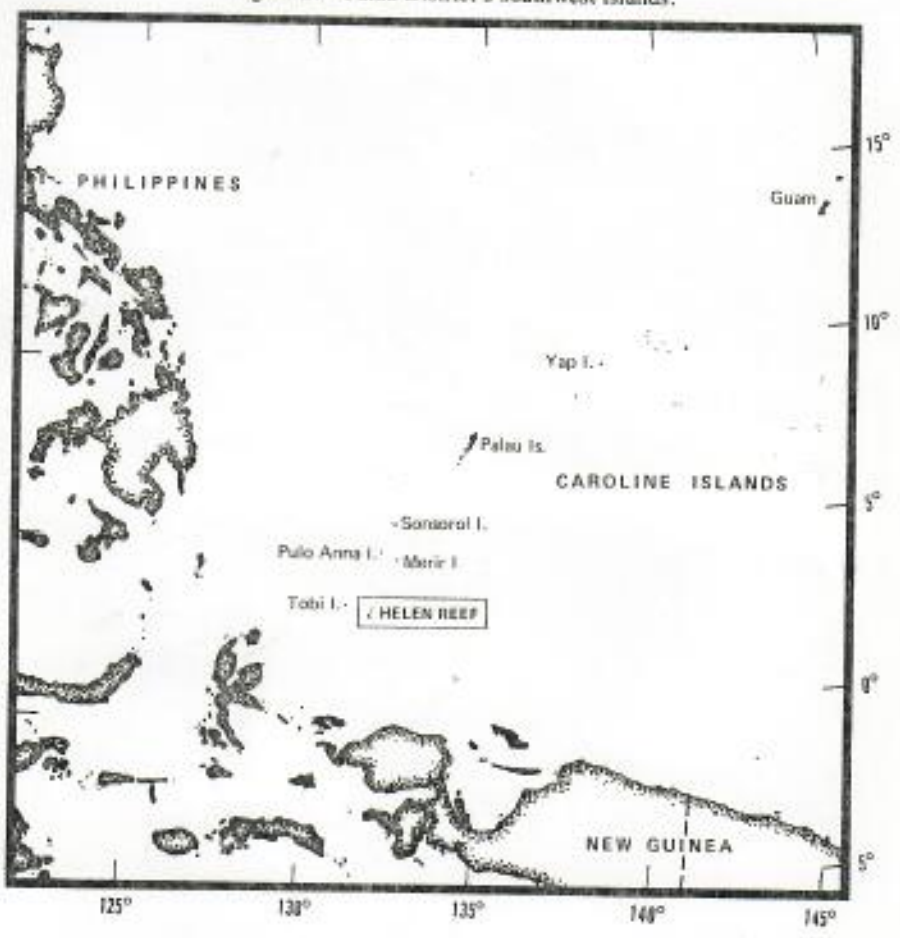
Natural History

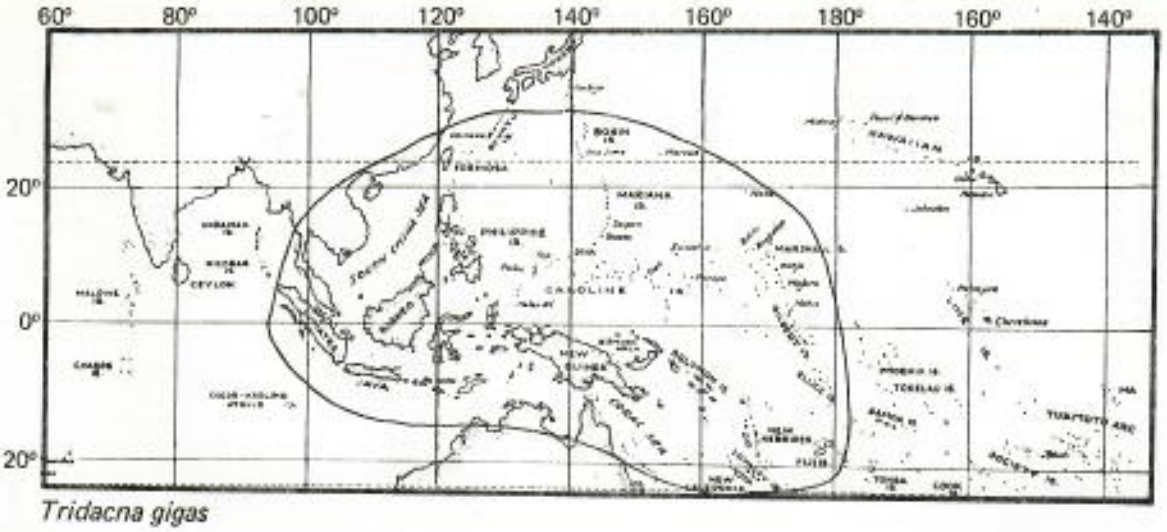
Because of its isolation, Helen Reef at one time supported large tridacnid clam populations. In one instance, Motoda (1938) reported observing approximately 38-46 *T. gigas* within 100 m^2. Although populations have been greatly reduced over the years, all six species of the Tridacnidae family still occur on Helen Reef: *T. gigas* (Linné), *T. derasa* (Röding), *T. squamosa* Lamarck, *T. maxima* (Röding), *T. crocea* Lamarck, and *Hippopus hippopus (Linné)*. These beautiful and sometimes colossal bivalves are found only in the Indo-Pacific faunal region (Fig. 3).

The two largest *Tridacna* species are *T. gigas* (Fig. 4a) and *T. derasa*. *Tridacna gigas* is the species usually referred to as the "giant clam," as old individuals may attain lengths of up to 135 cm (about 4½ feet). They usually occur on sandy areas of the reef or in areas of coral rubble and reef degeneration, within intertidal regions to approximate depths of 20 m. Although *T. gigas* exhibits a small byssus orifice, the adults remain unattached to any substrate. The dorsal margin and ribs exhibit deep undulation. *Tridacna derasa*, also a species capable of reaching large sizes, reportedly attain lengths of 50 cm (20 inches). These clams often live towards the outer edge of coral reefs and are usually unattached, although very young individuals (<10 cm length) develop weak byssal anchors. *Tridacna derasa* appear to prefer the more shallow reef areas (approximate depth range, 4-10 m).

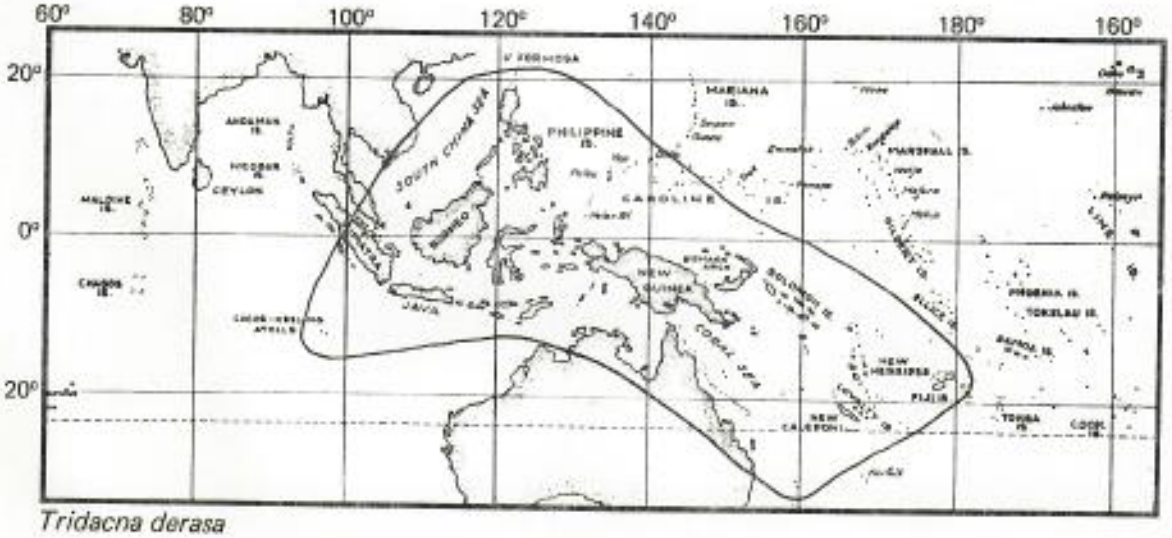
There are two slightly smaller tridacnids of commercial importance. *Tridacna squamosa* usually occurs on coral reef surfaces in depths less than 15 m, most often in protected environments such as reef canyons and fissures, sheltered lagoons, and marine lakes. These tridacnids are often referred to as "fluted clams" because of their characteristic broad, plate-like projections. In size, they can range up to 45 cm (over 17 inches). Although they are never imbedded, *T. squamosa* are often found nestled among coral and anchored with a weak but abundant byssus. *Hippopus hippopus* grow to 40 cm (close to 16 inches) in size and usually occur in sandy areas of the reef never more than 6 m in depth. Young *H. hippopus* attach by a weak, sparse byssus which disappears with age. These clams have heavy triangular shells and an undulating dorsal margin with very sharp, triangular, interdigitating processes.

Figure 2.—Palau District's southwest islands.

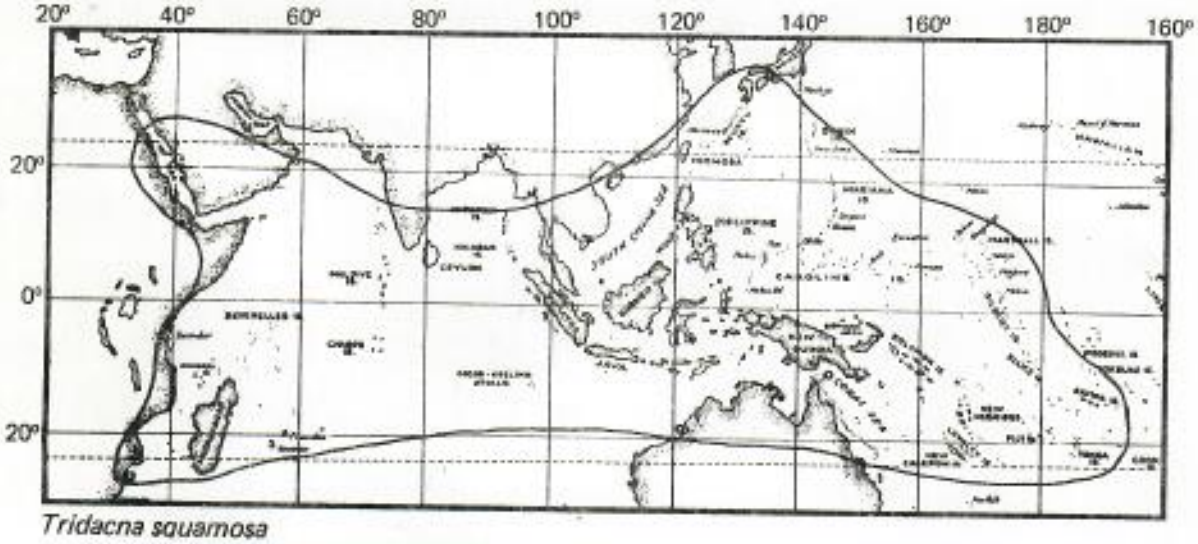




Tridacna gigas

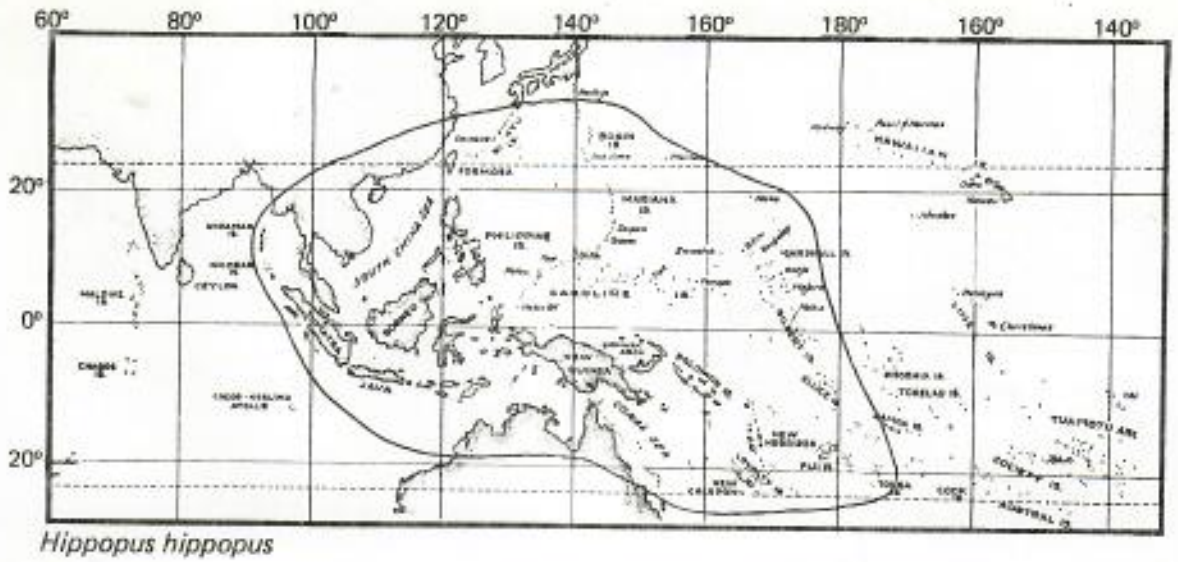


Tridacna derasa

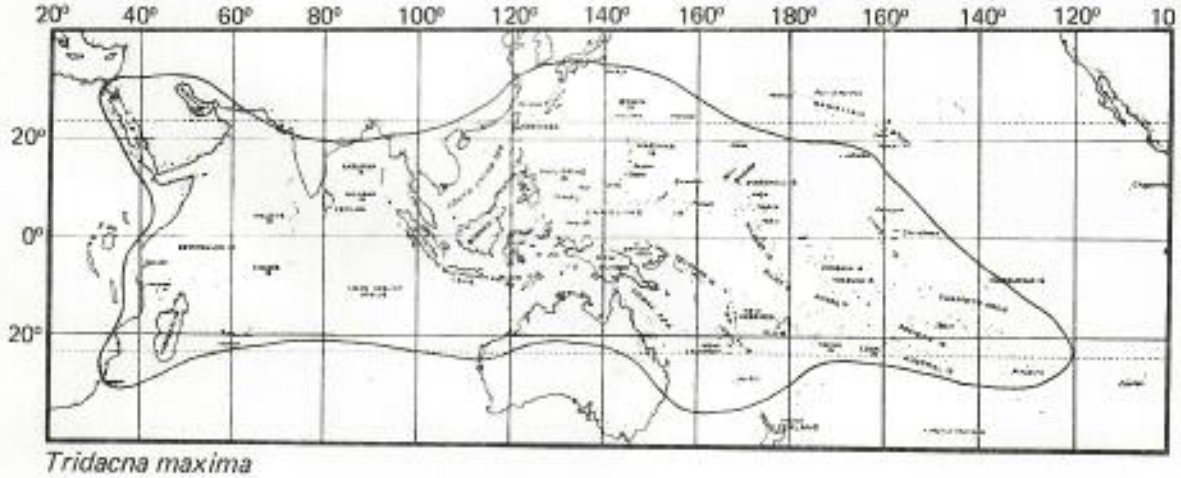


Tridacna squamosa

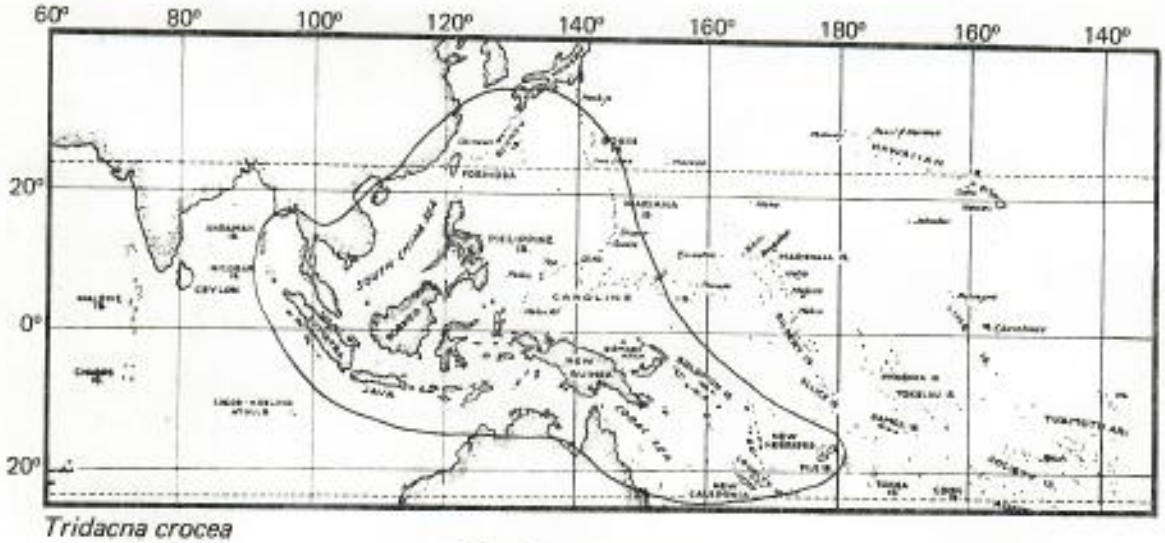
Figure 3.—Geographical ranges of tridacnid clams (from Rosewater, 1965).



Hippopus hippopus



Tridacna maxima



Tridacna crocea

Figure 3. — Continued.

Figure 4a.—*Tridacna gigas*, about 3 feet in length, on the reef at low tide.

Figure 4b.—*Tridacna maxima* partially embedded in coral.

The larger *Tridacna* species are the clams which are most often utilized by Palauans and foreign fishermen. The mantle and the adductor muscle tissues are highly favored food items, the larger clams producing a higher yield per expended fishing effort. Except for a small trade as a tourist item, shells are discarded.

The two smallest species, *T. maxima* (Fig. 4b) and *T. crocea*, are not usually harvested by foreign fishermen and are minimally used for food by Palauans. *Tridacna maxima* can grow to 35 cm (close to 14 inches). It can often be confused with *T. crocea*, but *T. maxima* is distinguished by its more triangular shape; its byssus keeps it firmly anchored halfway embedded in coral and coral heads. *Tridacna crocea* is the smallest species, approximately 15 cm (6 inches maximum) and is found completely embedded in coral heads on the reef flats and reef edge, remaining firmly anchored by a byssus.

Survey Methods

Attempts were made during the May 1976 survey to duplicate, as closely as possible, sampling locations and field methods used during the 1975 survey (Bryan and McConnell, 1976). Transect lengths were determined from the U.S. Navy Hydrographic Office Chart of Helen Reef, No. 6072. The same transects as reported by Bryan and McConnell (1976) were resurveyed. The bottom depths along transects varied from approximately 6 m on the ends, to a minimum of 1 m along the midsection. Two observers were pulled slowly behind a boat while all occurrences of live or dead tridacnid clams within a 2 m wide path below the boat were recorded on plastic writing tablets. Each biologist was responsible for counting two or three assigned clam species.

Total population sizes (N_j) for Helen Reef atoll were estimated by the equation (Cochran, 1963):

$$N_j = \left[\frac{\sum_{i=1}^{n} y_{ij}}{\sum_{i=1}^{n} l_i} \right] \frac{A}{w}$$

where Y_{ij} is the number of individuals of tridacnid clam species j observed along transect i, l_i is the length of transect i, w is the transect path width (= 2 m), and A is the total reef area (= 5.34×10^7 m^2; Hester and Jones, 1974), for n total transects.

Survey Results and Discussion

During the resurvey, we were able to repeat eight transects from the 1975 survey (Fig. 5). Summary data collected from the transects are presented

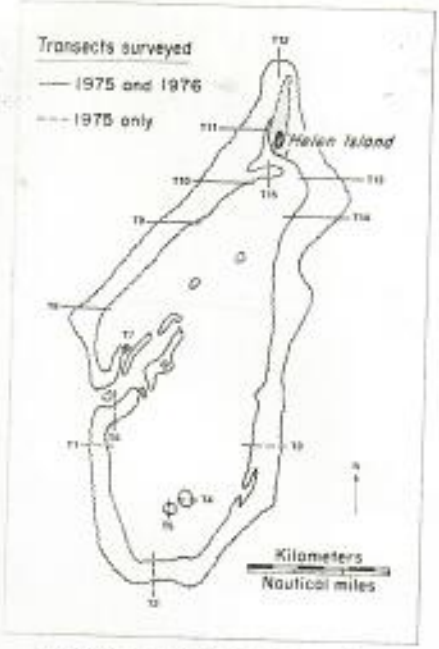


Figure 5.—Locations of sampling transects made on Helen Reef atoll, May 1976.

Table 1.—Summary of results from the 1976 survey of Helen Reef, Western Caroline Islands.

Transect	Location and direction of transect	Length of transect (m)	Area surveyed (m^2)	No. of live individuals counted	1976 Density of clams/100 m^2	[1]1975 Density of clams/100 m^2
T_8	lat. 2°54'42"N long. 131°45'14"E 270° true	970	1,940	3 *Hippopus hippopus*	0.20	0.10
				61 *Tridacna maxima*	3.10	3.10
				— *T. derasa*	—	0.10
T_9	lat. 2°56'20"N long. 131°46'53"E 270° true	970	1,940	2 *H. hippopus*	0.10	—
				1 *T. gigas*	0.05	—
				2 *T. derasa*	0.10	0.10
				34 *T. maxima*	1.80	2.00
				1 *T. squamosa*	0.10	0.10
T_{10}	lat. 2°58'00"N long. 131°48'10"E 270° true	1,130	2,260	5 *H. hippopus*	0.20	—
				47 *T. maxima*	2.10	2.00
T_{11}	lat. 2°59'05"N long. 131°48'30"E 270° true	800	1,600	7 *H. hippopus*	0.40	0.20
				1 *T. gigas*	0.10	—
				1 *T. squamosa*	0.10	—
				11 *T. maxima*	0.70	2.7
T_{12}	lat. 3°00'30"N long. 131°48'55"E 0° true	645	1,290	26 *H. hippopus*	2.00	—
				4 *T. maxima*	0.30	0.20
T_{13}	lat. 2°58'06"N long. 131°49'24"E 90° true	1,610	3,220	18 *H. hippopus*	0.60	0.30
				2 *T. gigas*	0.10	—
				4 *T. derasa*	0.10	0.03
				1 *T. squamosa*	0.03	—
				106 *T. maxima*	3.30	4.30
T_{14}	lat. 2°56'30"N long. 131°49'51"E 90° true	1,130	2,260	1 *H. hippopus*	0.04	0.30
				1 *T. derasa*	0.04	—
				11 *T. maxima*	0.50	0.20
T_{15}	lat. 2°58'00"N long. 131°49'00"E 180° true	480	960	1 *H. hippopus*	0.10	—
				38 *T. maxima*	4.00	5.70

[1]Data from Bryan and McConnell (1976).

in Table 1; also included for comparison are the 1975 estimates for tridacnid population densities. In many instances, the 1975 and 1976 estimates were quite close. For each survey, the mean observed densities were expanded to provide estimates of the total populations on Helen Reef (Table 2). Because of the reduced survey size in 1976, estimates of standing stocks for 1975 were recalculated using only the eight northern transects that were resurveyed in 1976. This was done to allow a more direct comparison between the two survey results.

Table 2.—Stock estimates for tridacnids on Helen Reef, Western Caroline Islands.

Species	1972 Est. of standing stock[1]	1975 Est. of standing stock [2]	1975 Est. of standing stock from $T_8, \ldots, T_{15}$[3]	1976 Est. of standing stock[4]
Tridacna gigas	49.8×10^3	8.6×10^3	None observed	13.8×10^3 (4.7×10^3 – 22.9×10^3)
Tridacna derasa	32.8×10^3	12.9×10^3	14.1×10^3	24.2×10^3 (8.1×10^3 – 40.3×10^3)
Tridacna squamosa	1.2×10^3	4.3×10^3	3.5×10^3	10.4×10^3 (3.8×10^3 – 17.0×10^3)
Hippopus hippopus	44.6×10^3	47.4×10^3	70.5×10^3	217.5×10^3 (89.1×10^3 – 345.9×10^3)
Tridacna maxima	1.7×10^6	1.4×10^6	1.3×10^6	1.1×10^6 (0.7×10^6 – 1.4×10^6)
Tridacna crocea	3.7×10^6	Ubiquitous	Ubiquitous	Ubiquitous

[1]Data from Hester and Jones (1974).
[2]Data from Bryan and McConnell (1976), computed from all transects.
[3]Data from Bryan and McConnell (1976), computed from only the eight transects resurveyed in 1976.
[4]80 percent confidence limits in parentheses.

The 1972 estimates for the larger clams, *T. gigas* and *T. derasa*, were high compared with 1975 and 1976 estimates. These species showed a large reduction in apparent population sizes between 1972 and 1975. The apparent differences in the most recent stock estimates for *T. derasa* were relatively small and should be attributed to survey variation. Some transect variation is inevitable despite attempts to duplicate 1975 methods, which may help explain the observance of *T. gigas* in the northern transects during the 1976 survey and the absence of observation in 1975. Recruitment can also be a consideration when observing population fluctuations but the extent that apparent increases were caused by recruitment remains unknown. Table 3 presents a comparison of the ratios of live and dead individuals for the two most recent surveys. In 1976, both species still showed large numbers of dead individuals, although the proportions of dead individuals were slightly less than 1975, especially for *T. derasa*. All empty shells of *T. gigas* and *T. derasa* observed were heavily encrusted with marine organisms, displaying little evidence of recent harvesting.

Tridacna squamosa has been reported at low densities during all previous surveys. In 1972, Hester and Jones (1974) observed only one *T. squamosa*; in 1975, Bryan and McConnell (1976) counted only two individuals. These earlier investigators indicated that this

tridacnid species is either very rare or not easily distinguished from *T. maxima* in this particular environment. During the 1976 survey, however, the two species were readily distinguished. Although three individuals of *T. squamosa* were identified, their densities were still low compared with all other species. *Tridacna squamosa* appears to prefer relatively protected areas, so wave exposure may be a limiting factor for *T. squamosa* at Helen Reef. Although their relatively large size would make them desirable for harvesting, since only one dead individual was observed in 1975, their population was apparently not strongly affected by this activity.

The 1976 survey showed a substantial increase in the apparent abundance of *H. hippopus*, compared with the 1972 and 1975 surveys, but the ratio of dead individuals to empty shells was still high. This species is characteristically very angular in appearance with dusky, sandy mantle tones. Their cryptic coloration makes them one of the more difficult tridacnids to count in the field, perhaps contributing to an underestimation of abundance by earlier investigators.

The most curious condition observed during the 1976 survey was the absence of large numbers of empty shells reported by Bryan and McConnell (1976). Foreign fishing boats had been observed in the area between the 1975 and 1976 surveys, possibly taking shells for the tourist market. Alternatively, heavy seas and rough weather could have broken up old shells and swept them off the reefs.

The two smallest tridacnid species have shown little variation in apparent population densities over the years. The small *T. maxima* have shown low variance in stock size, with very little variation in apparent densities from 1972 through 1976. The ubiquitous *T. crocea* was not surveyed in 1975 and 1976 because of the small size of individuals and high population densities. Large coral heads can be embedded with many *T. crocea*, and it would take much time and a more detailed sampling effort to survey this species reliably. Therefore, its presence in large numbers was only noted during the 1975 and 1976 surveys. Lack of fishing pressure may allow these smallest tridacnids to maintain a more constant population size.

Table 3.—Comparison of the number of live and dead tridacnid clams observed during the 1975 and 1976 surveys, Helen Reef, Western Caroline Islands.

Species	1975[1] Ratio of live: dead individuals	1975[1] Percent dead	1976 Ratio of live: dead individuals	1976 Percent dead
Tridacna gigas	4:206	98.1	4:47	91.5
Tridacna derasa	6:168	96.6	7:24	70.8
Tridacna squamosa	2:1	33.3	3:0	0
Hippopus hippopus	22:458	95.4	63:39	38.1
Tridacna maxima	629:23	3.5	312:5	1.6
Tridacna crocea	Ubiquitous	—	Ubiquitous	—

[1]Data from Bryan and McConnell (1976).

Table 4.—Comparison of the number of live tridacnids counted in 1975 along transects in north (transects 8 to 15) and south (transects 1 to 7) regions of Helen Reef, Western Caroline Islands (from Bryan and McConnell, 1976).

Species	Live individuals counted in north reef transects	Live individuals counted in south reef transects	Percent located in north reef transects
Tridacna gigas	0	4	0
Tridacna derasa	4	2	66.7
Tridacna squamosa	1	1	50.0
Hippopus hippopus	20	2	90.9
Tridacna maxima	367	262	58.3
Tridacna crocea	Ubiquitous	Ubiquitous	—

In Table 4 a comparison was made between the numbers of live tridacnids found in north and south areas of the reef in 1975 to examine the influences of large-scale distribution on population estimates. The reef was sampled by transects 8-15 in the north and by transects 1-7 in the south. Transects 8-15 in the north correspond to the areas that were resurveyed in 1976. The percentage of clams located in the northern eight transects in 1975 was calculated for each species. There appeared to be differences among some of the tridacnids in location preference. In 1975, *T. gigas* was observed only in the south, while almost 91 percent of *H. hippopus* were found in the north. Since *T. gigas* is usually quite visible, the apparent skewed distribution may only be a product of sampling variability since only small numbers of this species were observed. It is possible that a preference for the south reef area may exist but it is impossible to verify from this survey. This apparent preference for the north reef region by *H. hippopus* would contribute to a population overestimation in the 1976 survey. Other species appeared to be relatively evenly represented in both north and south regions.

Excluding *T. maxima* and *T. crocea* because of their lack of value to foreign fishermen, less than half (43.6 percent) the tridacnid clams observed on Helen Reef in 1975 were alive. In 1976, the conditions were much the same with only 40.1 percent of the clams surveyed alive. In natural reef environments, it is unusual to see so many empty shells unless fishing pressures have been high. Large percentages of empty shells have been observed following concentrated fishing activities (Motoda, 1938; Bryan and McConnell, 1976). Because of the lack of fishing pressure on the smaller species, perhaps *T. maxima*, and maybe *T. crocea*, indicate the normal ratios of live to dead individuals representative of tridacnid populations subject only to natural sources of mortality.

In May 1976, the effects of recent harvests were evident at Helen Reef

with tridacnid populations reduced from much higher levels of abundance (Motoda, 1938; Hester and Jones, 1974). The conditions of the clam resources observed in 1976 emphasized the need to prevent their further uncontrolled harvesting, especially since most of the clams observed in 1976 appeared smaller than the mean sizes reported in 1972 (Hester and Jones, 1974). Because the recruitment of tridacnid clams appears to be slow and irregular, large population depletions could have serious long-term effects. Wada (1952, 1954) suggested that because of the nature of spawning behavior in tridacnid clams, self-fertilization rarely occurs. Other observations have also shown no normal larval development after attempts at self-fertilization. If this is the case, then there may be some minimum threshold density from which reduced populations would be unable to recover.

Harvests of tridacnid clams from Helen Reef should continue to be restricted until increases in stock abundances have been observed and documented. Additional research is needed to determine allowable clam harvest levels, threshold densities, and stock recovery rates.

Acknowledgments

My thanks for survey assistance to Daniel McConnell, Michael McGrenra, Steven Patris, and Jeffrey June. My deep appreciation for support from Toshiro Paulis, Palau District Office of Marine Resources, who funded the survey.

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NATIONAL MARINE FISHERIES SERVICE
HONOLULU LABORATORY
P. O. BOX 3830
HONOLULU, HAWAII 96812

March 1, 1985 F/SWC2:GHB

Mr. Mike Gawel
Chief, Marine Resources
Department of Resources
and Development
The Federated States of
Micronesia, Kolonia, Ponape
Eastern Caroline Islands 96941

Dear Mike,

As we discussed during your recent visit, I am sending 50 turtle tags for Teresa Herring to take with her to Oroluk. If she has the opportunity to use them on nesting green turtles, she should apply two to each turtle. Detailed instructions for tag application are being enclosed with this letter. She should also refer to the "Manual of Sea Turtles Research and Conservation Techniques" that I sent several months ago. I'm sure she will do just fine on this preliminary visit to Oroluk.

Please ask Teresa to treat the tags as a valuable commodity, as being made of Inconel alloy they are not easy to obtain. As I mentioned to you, we have recently ordered a trial supply of titanium tags from Australia. We are hoping they will equal the performance seen with Inconel these past 8 years. Teresa should save, and return to me, any bent or otherwise malfunctioning tags that may arise. Nothing should be discarded, since they can always be reused by me on smaller turtles.

I'll be anxious to hear the results of Teresa's trip. The short interview report of hers you left me was very interesting and informative.

Sincerely,

George H. Balazs
Wildlife Biologist

Enclosure

GHB/11

bc: HL
Balazs

TAG NOS. - 4301 - 4350 (50)
+ PLIERS #3
(4301 - testing sealed in pliers sent)

George Balazs

OROLUK SEA TURTLE PROJECT

by: Teresa L. Herring
P.O. Box 9
Kolonia, Pohnpei 96941
FSM

INTERVIEW 1/85

NAME: Uruhed Dum (Kapingamarangi). Presently, living in Pohnrakied, Pohnpei.

AGE: early/mid 40's

DATE on Oroluk: 1962 June (1yr)

INHABITANTS: 6-12

ADULTS: Hawksbill Turtle- few nesting. Green Turtle- many nesting. Turtles were captured on Oroluk Island, the small island near Keltie Pass and in the lagoon. Brought back by canoe and held in a stone pen until eaten or sold to M/S Microglory. One turtle eaten per week and other times fish are eaten; monitored by chief.

NESTING: mainly from June - August. Every night approx. 13 crawls/nests occur in day from 5:00PM to sunrise AM. "We used to sit and carve and many turtles would crawl by us from nesting. Now, they only nest during nights and very few."The majority of nesting occurs on Oroluk I. and some on the island near Keltie Pass.

*see map.

HATCHLINGS: Eggs are not eaten. Nests are covered with wire until hatchlings emerge, then all are held in a cage in the water. Hatchlings are held for approx. 3 months until carapace is hard and large enough to decrease chances of shark predation. They are feed clam meat.

INTERVIEW 2/12/85

NAME: Ento Dack (Kapirgamarangi). Presently, living in Pohnrakied, Pohnpei.

AGE: 24

DATE on Oroluk: 1984 May - 1985 Jan.

Family: Uncle lived there (date unknown), but never told turtle stories.

INHABITANTS: 6

ADULTS: Hawksbill Turtle- no nesting. Green Turtle- few nesting. Turtles are seen while fishing outside reef and in lagoon near Oroluk I., but not captured. None are found on island near Keltie Pass. Turtles are captured on Oroluk I. after nesting and held

in a stone pen. One is eaten per month or when desired; no chief supervision. None sold to M/S Microglory.

NESTING: from May - Sept. There are 1 to 6 crawls/nests per night(?). Nests are only on Oroluk I.; none anywhere else.

*see map.

HATCHLINGS: Eggs are not eaten. Sometimes nests are covered with wire until hatchlings emerge, then held in a cage (?) for 3 months.

Note: Interviewee had difficulty understanding my questions and english.

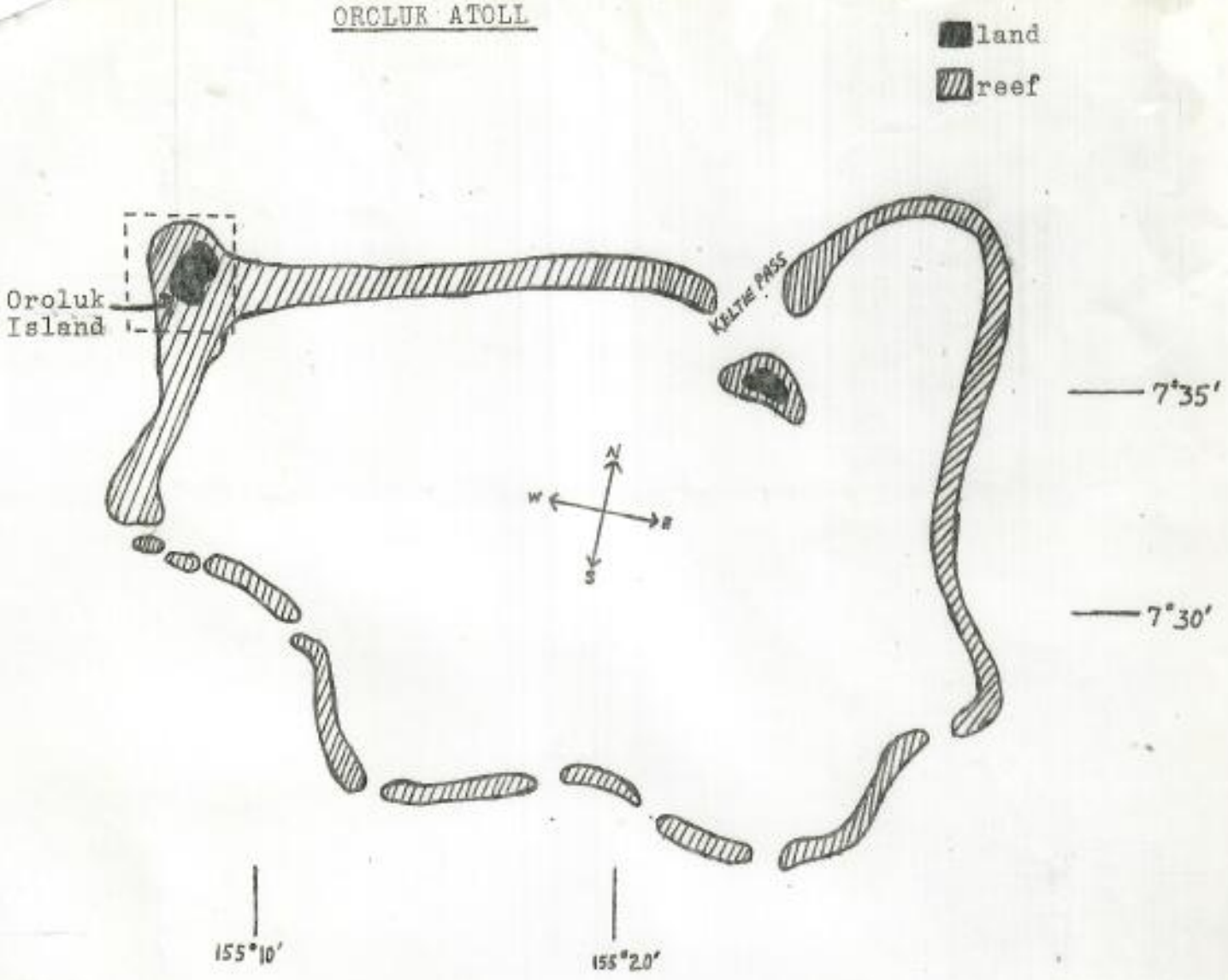
REPORT 1/85: by Barbara Armstong,PCV, after visiting Oroluk. Container (cooler-type) on land held 10 hatchlings and lagoon water is changed daily. Hatchlings were identified as Hawksbill Turtles by Barbara's Ponapean boyfriend, Kosaksy Phillip. One hatchling was taken by a passenger of M/S Microglory. Presently, two Kapingamarangi men reside on Oroluk Atoll.

SUMMARY: Presently, the majority of turtles seen in or around Oroluk Atoll are Green Turtles. Possibility of Hawksbill nesting. Adults are held in a stone pen for consumption by island inhabitants with possible sales to M/S Microglory. A decrease in the nesting population over 22 yrs.; half the nesting population number seen in 1962 is nesting presently. Nesting occurs only on Oroluk Island and none on the island near Keltie Pass. A conservation attempt by Kapingamarangi inhabitants has existed since 1962 until present, but possibly less of an effort now. All hatchlings are held for 3 months, then released.

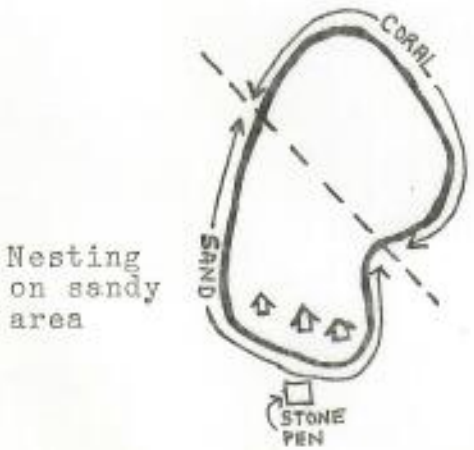
INTERVIEW QUESTIONS (only general):

Name, Age?
When on Oroluk Atoll? Family (father or Uncle)?
Usual # people there?
How long people have inhabited atoll?
When are adults seen in ocean? Where?
When are adults seen on land? Where?
When do females nest? Where?
How many are seen at night nesting?
Are turtles captured & held?
How long held? eaten? sold?
What happens to eggs? eaten? dug up?
What happens to the nests?
What happens to the hatchlings?

ORCLUK ATOLL



ORCLUK ISLAND



Nesting on sandy area

Note: map not drawn to scale.

IN — PLEASE NOTE AND RETURN

The Federated States of Micronesia
Dept. of Resources and Development
KOLONIA, PONAPE
EASTERN CAROLINE ISLANDS 96941
CABLE: FSM GOVT. PONAPE

Office of the Secretary

Thanks George,
John

WCSTC sent 12-10

November 6, 1984

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

Dear George:

We would be interested in tagging turtles at six outer islands of Ponape and at Kosrae in the summers of 1985 and 1986, as I discussed with you last week.

If it is possible for you to provide tags and applicators, standard data forms you use and a video film demonstrating tagging techniques, please do so. We can work out logistics training details later, but we should try to be ready for the peak nesting season, which will probably be May through September.

Could you please tell John Naughton that he should contact James Pennaz at Building 230 Fort shafter (438-1207) for data on the Nanpil Dam.

Sincerely,

Mike

Mike Gawel
Chief, Marine Resources

bj

12/20/84 Coordinator — Theresa Herring called

HER TIME WILL BE AFTER 10 ROLJK

The Federated States of Micronesia
Dept. of Resources and Development
KOLONIA, PONAPE
EASTERN CAROLINE ISLANDS 96941
CABLE: FSM GOVT. PONAPE

Office of the Secretary

June 26, 1984

Dr. George Balazs
NMFS
Box 3830
Honolulu, Hawaii 96812

Dear George:

The uninhabited turtle nesting island of Gaferut, belonging to the people of Faraulep in Yap Outer Islands, is scheduled to have the MS Caroline Islander stop there from July 25 a.m. to July 28 p.m, this summer. Any ship visits to Gaferut are extremely rare.

The ship should be leaving Colonia Yap July 12, Ngulu Atoll July 16, Fais Island July 20, Faraulep July 24, Gaferut July 28 and directly from there to Ponape, arriving August 1.

If you have staff and money available to spend 3 weeks on this trip to allow four days of study time on the Gaferut turtle nesting sites (this should be the middle of nesting season) I can help arrange logistics for passage on the Caroline Islander.

Late this summer we will be training 8 Peace Corps Volunteers to do marine resource assessment work in all of Ponape's Outer Islands and on Kosrae. I would appreciate greatly any multiple copies of appropriate literature you can send me for them on turtle biology, conservation, assessment and enhancement. By working with local fishermen and knowing local languages and customs I expect them to contribute well to understanding extent of turtle and other resources. Can you provide any standardized record keeping forms and investigation guidelines for them?

send Research & Cons. manual + Tokelau paper + Carr w. Atlantic Survey report

Sincerely,

Mike

Mike Gawel
Chief, Marine Resources

bj

BILL! → If (NO ONE) none interested in turtle conservation makes this trip, the entire group landing on Gaferut will probably concentrate, unfortunately, on taking turtles to eat.

March 12, 1985

James H. Lecky
Protected Species Program Coordinator
NMFS Southwest Region
300 S. Ferry St, Room 2001
Terminal Island CA 90731

Dear Mr. Lecky:

Could you please send copies of the following two publications to the listed eleven persons.

I. A review of subsistence uses of sea turtles in the Central and and Western Pacific with respect to federal regulations authorizing a subsistence take of green sea turtles in the Trust Territory of the Pacific Islands.

II. Five-Year status reviews of sea turtles listed under the Endangered Species Act of 1973.

1. Mike Gawel, Chief of Marine Resources, FSM
   P.O. Box 490
   Kolonia Pohnpei, FSM 96941

2. John Iou, Acting Chief of Marine Resources
   Yap State Government
   Colonia, Yap, FSM 96943

3. Marion Henry, Chief of Marine Resources
   Truk State Government
   Moen, Truk, FSM 96942

4. Mike White, Chief of Marine Resources
   Kosrae State Government
   Lelu, Kosrae 96944

5. Dashiro Ludwig, Acting Chief of Marine Resources
   Pohnpei State Government
   Kolonia, Pohnpei 96941

6. Teresa Herring, Oroluk Atoll
   P.O. Box 9
   Kolonia Pohnpei 96941

7. Dennis Linekarger, Kapingamarangi Atoll

8. Dave Rogers, Nukuoro Atoll
9. D
9. Dave Zoutendyk, Ngatik Atoll

10. Terry Moore, Mokil Atoll

11. Chuck Sayon, Pingelap Atoll

All these addresses are in the U.S. Postal System, same zone as Hawaii and do not require foreign rates for mailing.

The last six persons listed are starting an assessment of turtles in Micronesia to hopefully fill many data gaps on nesting sites, populations and traditional uses of sea turtles. The others have enforcement responsibilities aver illegal harvesting of turtles.

Please send us any additional new information or publications related to sea turtles or protected species occuring in Micronesia.

Sincerely yours,

Mike Gawel
Chief, Marine Resources

bt

cc: George Balazs

May 29, 1985 F/SWC2:GHB

Mr. John B. Iou
Acting Chief
Marine Resources Division
P. O. Box 251
Colonia, Yap
Western Caroline Islands 96943

Dear Mr. Iou:

Many thanks for your recent letter concerning the juvenile olive ridley sea turtle found near your FAD #5, and safely released a week later. I appreciate receiving this information, since live ridleys have not been commonly reported in your area of the Pacific. However, it would appear that pelagic juveniles may sometimes use this oceanic region as developmental habitat. It would be interesting to learn the source of these animals, which could possibly be as far away as Southeast Asia.

Under separate cover, I am sending you a packet of literature about sea turtles and their conservation problems. In addition, I am including a color poster illustrating the various species. Please feel free to contact me again if I can be of further assistance, or if more unusual cases involving sea turtles come to your attention.

Sincerely,

George H. Balazs
Zoologist

bc: HL
Balazs

Teresa L. Herring
P.O. Box 9
Kolonia, Pohnpei 96941

June 25,1985

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

Dear Dr. Balazs:

Presently, the Oroluk sea turtle project team is on island and proceeding with tagging. They will return to Pohnpei in mid-July. I'll inform you of the results then.

The acting chief of Pohnpei Marine Resources Department asked me if PMRD could be supplied with tags and applicator. They occasionally confiscate live turtles from the public market and would like to implement a tagging program. However, it would be under your supervision and requests. I can assist them in applying for the necessary permits (Green & Hawksbill) and train them properly. I discussed this with Mike Gawel and he supports it.

Thank you. I hope to hear from you soon.

Sincerely,

Teresa Herring

Teresa L. Herring
Peace Corps Volunteer, Pohnpei

Takahashi, K. 1942. Ecology of tropical resources. Kyu-gin-Sha, Tokyo.

ELDREDGE

Report on the parts of a Japanese book, "Ecology of the South" (Nampō no Seitai) sent by Lu Eldredge (Hi there, Lu!)

The page, usually found at the back of a Japanese book, which would give the full information about the book is not supplied. The foreword is dated April 1942.

The book has a sub-title, "Resources and Appreciation". It was written by a group of authors, college professors, I would guess, probably specialists in various fields of biology. It was designed to profit from the popular interest in the tropical areas taken over by the Japanese early in World War II, and is definitely aimed at a popular audience, I should say about middle school level. It seems to be focused mainly on Micronesia and Southeast Asia, but may stray to other interesting places.

Yes, I see that the authors were college professors, except for a couple who were from the South Seas Development Co. (Nanyo Kohatsu Kaisha).

The book has sections on land animals (a scorpion, a hedgehog, insects, the coconut crab), sea animals (corals, sponges, starfishes, sea turtles, etc.), plants and minerals. The marine section has some discussions of general coral reef theory and ecology. The overall format seems to be brief separate articles on a varied assortment of curious subjects.

Incidentally, the book is of course not written in "classical Japanese" and would not be difficult to translate, if anyone wanted to waste his time doing it. It is written in the kind of formal literary style that was generally used before World War II for any sort of "serious" writing, especially by college professors.

The marine section is by Keizo Takahashi, professor of zoology in the Tokyo University of Humanities and Science. It has the following headings:

Foreword
Coral reefs
  Environmental conditions of coral reefs
  Distribution
  How do coral reefs originate?
  Growth of coral
  Food of coral
  Reef-building coral animals
  Coral reefs and animal resources
Dugongs
Turtles
Trochus
Silver lip pearlshell
Black lip pearlshell
Nautilus
Window shell
Other useful shellfish
Sea cucumbers (trepang)
Sponges
Precious coral
Useful fishes

As an example of the depth and style of these articles, the one on precious corals is translated and attached. (Others could be translated, if desired, provided appropriate compensation in kind (frozen fruit bats? a pet iguana?) could be arranged.

True Coral

True coral is different from the reef-building corals; it is the precious coral which is used for ornaments and includes such species as red coral, Corallium Japonicum, pink coral, Corallium elatior, and white coral, Corallium konjoi. These three species are the main ones in Japanese waters, but in addition five other kinds occur there.

At present, Japan and Italy are the two countries which harvest true corals in large quantity, and in recent years our country definitely occupies the position of superiority in terms of volume. In Japan the fishing grounds off Tosa, the Goto Islands and Kosaiki Island have been famous since olden times, but in recent years those fisheries have deteriorated because of a marked drop in production, and at present the fishing grounds in the vicinities of Taiwan and the Ogasawaras are the most promising.

In our southern islands, white coral and red coral were first harvested in 1936 off Pagan Island, near Saipan, and after that the coral fishery rapidly flourished, centered in Saipan and with operations extending to the outlying northern islands, Tenian and Aguigan, where new fishing grounds were discovered. However, in none of these was the quality good, and operations soon ceased. In the Palau Islands, a fishing ground for good quality coral was discovered south of Peleliu I. in 1938, but its harvesting was attended with many difficulties, and at present the fishery is not very active.

In the Philippines, between 10 and 20 years ago, coral closely resembling the red coral of Japan was harvested, though in small quantities, in the Gulf of Davao, but at present there is no significant production.

Elsewhere, Corallium stylasteroides is produced at Mauritius I., in the Indian Ocean, and it is known that Corallium reginae is produced at Timor I., in the Banda Sea, and Corallium recundum in the Kei archipelago. These corals live at depths of 5 to 500 fathoms, attached to rocks, dead shells and dead coral.

well, heck! I'll be generous and translate another section, this one on the sea turtles beloved of all latter-day ecofreaks.

Turtles

There are three main species of sea turtles which occur in the southern areas. They are the hawksbill turtle Eretmochelys imbricata, the green sea turtle Chelonia mydas, and the red sea turtle Caretta olivacea. Among the main points for distinguishing these three species, in the hawksbill the upper jaw is curved into a hook with a sharp tip, and the carapace is formed of 13 large plates overlapping like roof tiles, while the 25 marginal plates give a sawtoothed form. In the green turtle, the beak is short and its edges are serrate. The carapace, like that of the hawksbill turtle, is made up of 13 large plates, but they overlap only slightly, and the marginal plates do not form a serrated edge. A further distinction between the hawksbill and the green turtle is in the plates of the frontal area of the head, which consist of two pairs in the hawksbill and one pair in the green turtle. The red sea turtle has five central plates in the carapace and 10 lateral plates, for a total of 15 plates, with the shell margins formed of 27 plates, so that it is easily distinguished.

(a) Hawksbill turtle, Eretmochelys imbricata.

The hawksbill turtle is an animal with strong characteristics as a marine turtle, and it preys on fish and shellfish with its strong beak. Its flesh is malodorous and unfit for eating, but its eggs are well flavored. The carapace has been widely utilized since ancient times, as "tortoise shell", for ornaments and artistic handicrafts. It is broadly distributed in the Indo-Pacific area, and in the Japanese administered islands of the tropical Pacific about 250 animals are taken yearly at Palau, Truk and Ponape, the majority of them from Palau waters. In recent years in our Pacific islands there has been a gradually declining trend, so for the conservation of the hawksbill turtle the taking of eggs and of small animals with a carapace length under 60 cm has been prohibited and the season for capture has been limited to February-May and September-October. The largest hawksbill taken at Palau was 1 m 5 cm in carapace length. At Palau the islanders take the hawksbill by harpooning animals from canoes when they are swimming at the surface, but the Okinawans take them by diving and attaching ropes to animals which are resting at the bottom, or, when they spot one swimming at the surface, they swim up to it from down wind, grapple with it and rope it. On the main island of Palau, the shell is prized for making ornaments and for dishes which are household treasures. The spawning areas of the hawksbill turtle are sandy beaches on the mixed coral reef islands where they resort for spawning each year from April to August. The eggs are most often deposited one or two fathoms above the high-tide line, but sometimes in sandy areas where grass is growing. It is thought that the turtles come in at night when the tide is high and come ashore on the sandy beaches. Where they have laid their eggs, the sand is heaped over them in a mound about 24 cm in diameter and about 15 cm high. If this is removed, 130 to 150 eggs are found buried at a depth of about 30 cm. The eggs hatch about 70 days after deposition, and the young immediately walk instinctively toward the ocean and enter the water. However, even after entering the sea they remain floating near the water's edge, and at this time many of them fall prey to birds, crabs and rats, so that it appears that almost all are destroyed.

(b) Green sea turtle, Chelonia mydas.

The green sea turtle is a species which is widely distributed in the Pacific, Indian and Atlantic oceans and in the Mediterranean Sea. In Japan it occurs in the waters of the Ogasawaras, Micronesia, Okinawa and Taiwan. In our country the breeding season is from January to April, but off northern Australia it is around

October-November. In both areas the turtles are seen around those times copulating at the surface of the sea. These turtles are of a docile nature, and their movements are not quick. Both the flesh and the eggs are well-flavored and are rich in nutrients, so they are prized everywhere. Some animals attain a carapace length of 1 meter, but they are completely harmless and feed mostly on seaweeds.

Green sea turtles occur particularly abundantly in the Torres Strait off northern Australia. In this area, they copulate around October, and the females come ashore at night and deposit their eggs in sandy beaches. They skilfully dig the sand with all four limbs and lay about 100 eggs the size of a pingpong ball. According to C. M. Yonge, at Heron I. in the Kyaricon group, the eggs hatch about 6 weeks after they are laid and the young immediately crawl toward the water's edge, however, while they are loitering there the majority of them are eaten by gulls or by sharks and other large fish. At Palau, these turtles, like the hawksbill, are a useful resource which is in need of fostering by the rearing of the young. It is thought to be important to rear them in a suitable facility for at least one or two years after hatching and then release them in the sea. At Heron I. a cannery has been built which makes canned soup from turtle flesh during the harvesting season for the green turtle. Natives are employed to catch them, which they do by taking those which have come ashore to spawn or by approaching them when they are copulating at sea and harpooning them. At this time, the frightened turtles will dive, so the hunters also dive with a rope and lash it around the front flippers while on the bottom. When they spot turtles at the surface, one man may approach them cautiously by swimming, with a rope, and grab a hold of the carapace. The turtle then dives to the bottom with the man, but other hunters on the boat easily pull them both up to the surface with the rope. Another interesting method capture employed in the Torres Strait area is that using a remora (Leptecheneis naucrates).

The remora is a fish related to the mackerels, but the spiny part of the dorsal fi fin is modified into a large oval sucking disk, with which they have the habit of attaching themselves to sharks and other large fish, turtles and even the hulls of boats and moving around in this way. In the Torres Strait, most sharks have remoras attached to them. This habit of attaching to things is utilized for capturing green turtles, either with fish which have been caught earlier and kept in shallow water on the coast, or with remoras which are caught en route to the fishing grounds, by baiting them in with powdered, roasted turtle bone scattered on the sea surface. A line is tied to the tail of the remora, and when a turtle is spotted, the remora is released near it. The fish goes right to the turtle and attaches itself to it, then the fishermen use the line tied to the remora to find the turtle when it dives to the bottom. One of them dives down with a rope and grabs the turtle and then is hauled back up to the boat with it.

In this kind of fishing, it sometimes happens that the remora loses sight of the turtle and attaches itself to a shark, but it is said that the islanders can tell from the feel of the line when this happens. When it is a turtle, they say, it always moves in a straight line, whereas a shark always changes course from side to side. There are dugongs in this area, but the remora method cannot be used to catch them, because the dugong's skin is too slippery for the sucking disk to hold on to it.

With imposition of restrictions on pearling, in Japan's tropical Pacific islands in recent years some of the pearling luggers, using Palau as a base of operations, have begun to hunt for green turtles in the Arafura Sea and off northern Australia. The objective is the turtle skin, which has come to be marketed at a considerable price as a substitute for alligator hide, and the enterprise looks promising.

July 29, 1985

Dear Dr. Balazs,

Enclosed are the humerus bones collected on Onoluk Atoll. I think they are all Green turtles. They were found randomly scattered around the island - mainly residental area.

Only 4 Green's were tagged and 3 nested during the project team's stay on Onoluk during June 3 - July 8, 1985. The Kapingamarangi residents reported that 20 green turtles nested from April 24 - May 1, '85.

I will leave for vacation next week and will return in Sept. Then I will send you a more thorough report of the projects results.

Thanks for your assistance!

Sincerely,
Teresa Murray

WORK DATES : June 3 – July 8, 1985

OROLUK SEA TURTLE DATA (ALL GREEN)

TURTLE #1 : 6/04/85 False crawl tags: #4302 #4303

6/11/85 NEST #eggs: 120
size: 110 cm
identifiable characteristic : cuts + small hole on right front flipper

TURTLE #2 : 6/26/85 False CRAWL tags: #4304 #4305

size: 90.5 cm
Ident. Charac: hole on her carapace.

TURTLE #3 7/1/85 NEST tags: #4306 #4307

size: 100 cm #eggs: 132

TURTLE #4 7/4/85 NEST tags: #4308 #4309

size: 100.7 cm #eggs: 128

section G
The Sunday Star-Bulletin & Advertiser
Honolulu, April 15, 1984

Palau fishing

Increasing exploitation by

from the sea

mike markrich

NGEMELES ISLAND, Republic of Palau — The shallow reef ends abruptly and drops over a thousand feet into deep, blue water at this isolated underwater cliff at the edge of the Palau archipelago.

In these waters, a diver can hover over the lip of a vast undersea cliff and see hundreds of fish among the coral heads and giant, yellow sea fans. Small silver jacks known in Hawaii as papio swim idly by as I make my way past huge schools of tiny red fish that swarm around me. In this world the sea is so rich and the people so few that even the 5-foot gray reef shark that swims 20 feet below takes no notice of me or my scuba-diving companions.

But times are changing in this small island nation with a 264-mile-long barrier reef at the western end of the Caroline Islands. In a world where nations compete for steadily declining natural resources, the richness of this isolated and abundant ocean area has drawn the attention of fishing fleets from all over the world.

Two or three foreign boats a year are confiscated by the Palauan government for fishing illegally in the nation's waters, according to Toshio Paulis, director of republic's office of marine resources. Last year a Taiwanese fisherman was shot and seriously injured when the boat he was on was attacked by Palauans who objected to the boat's fishing illegally for giant clams on their reef.

"Palau is open for anybody who's interested in fishing," says Paulis. "However, Palauan people want outsiders to talk with us first. If you are an outsider, we want to know if your coming here is good for both of us or just good for you."

Koichi Wong, Palau's minister for natural resources, would like to see this fledgling government patrolled by U.S. Coast Guard vessels to keep the foreign boats out.

Waikiki Aquarium photo by Bruce Carlson

The reef in Palau: Foreign fishing boats bring conflict in their harvest of the ocean's resources.

The boats, largely from Taiwan, come to harvest the adductor muscles from giant clams that can weigh as much as 750 pounds and grow to length of 4½ feet across. The muscle, the size of a small grapefruit, is prized as a gourmet item and, according to University of Hawaii clam specialist Gerald Heslinga, sells in the Orient for $65 per pound.

Palauans object to outsiders coming onto the reef, cutting the muscle from a clam that may have taken 10-20 years to grow, then leaving the rest of the clam to die on the coral reef.

"They (Palauans) are beginning to realize the importance of taking care of their resources. There are still some hardheaded people who care only for themselves today

foreign boats

and don't think of tomorrow but most Palauans don't feel that way," said Paulis.

The ocean resources within Palau's lush, 560-square-mile lagoon were once enough to provide food and resources for everyone — but the realities of life in the new Republic of Palau dictate new needs for food and foreign capital. Approximately half of Palau's 15,000 people live in the main town of Koror and, with an increase in Japanese tourism expected next year, some fishery experts foresee even greater demand on Palau's fishery resources.

Palau's new constitution gives control of adjoining reef areas to each of the country's 16 states. These reef areas, which extend 12 miles out to sea, are controlled by the chiefs in a manner similar to that of the Hawaiian konohiki system.

According to Paulis, this represents a significant change from the recent past when reef areas could be fished by Palauans from different parts of the country.

Today, said Paulis, with reef areas being fished to their maximum sustainable yield and fish prices increasing dramatically, even Palauans who fish in other states run the risk of being chased or shot at.

Noah Idachong, who works with Paulis, said Palauan government policy is to maintain control of the nation's reef and open-ocean fishery, but the republic is interested in increasing fishing exports by working with fleets from countries such as the United States and Japan on tuna fishing.

In addition, because there are very few Palauans who actively bottom-fish and because there are large unexploited reserves of fish such as opakapaka and onaga here, several fish dealers from Hawaii have become interested in importing fish from Palau.

Paul Sardinia, manager of the Palau fishery, said 11,628 pounds of fish were sent to Hawaii last year.

But Palau fishery experts insist that no matter how many fish are eventually exported, they intend to maintain control of their resources.

Mainichi Daily News
Dedicated To International Understanding

Japan Firm Seeks Rights To Capture Palau Turtles

–Int'l Convention Bans Trade–

A Japanese company is trying to obtain rights to capture green turtles, without limitation, from local residents of the newly formed Republic of Palau in the Pacific.

The number of green sea turtles (Chelonia mydas) is decreasing and such an agreement might lead to the extinction of green turtles, said Iataru Uchida, 51, director of Himeji Municipal Aquarium in Hyogo who was commissioned to investigate the matter through the World Wildlife Foundation (WWF), Japan.

Uchida said that the area is the most important breeding place for green turtles in the Pacific. He plans to make an on-the-spot survey about the matter.

The name of the Japanese company in question is not known.

In July this year, the company submitted an offer to residents of Maril Island, Palau. The draft of the offer indicated that the company would pay 15 percent of the sales of the meat and shells plus $1,000 for unlimited capture.

International trade in green turtles is banned by the convention on International Trade in Endangered Species of Wild Fauna and Flora, excluding arrangements for academic purposes.

But Japan approves the capture of 14 species including green turtles. In order to protect domestic industry dealing with turtles, Japanese law allows for the trade of green turtles. Japanese traders can import them with permission from the government of exporters.

In Koror, the capital of Palau, a four-man committee was established to study the offer of the Japanese company. Subsequently, the committee sent a letter to the WWF, United States, seeking its advice.

Uchida of the Himeji Aquarium has already sent a letter to the local committee, suggesting that green turtles should not be sold to the Japanese company.

In Japan, total imports of sea turtles hit an all-time high in 1979 at 127 tons. Since then, the amount has been decreasing. In 1980 when the wildlife protection treaty came into effect, it amounted to 75 tons, in 1981, 50 tons and in 1982, 44 tons.

Recently, however, restaurants specializing in turtle dishes have been opening one after another across the country and demands for sea turtles meat are surpassing the available supply.

2 Die In Gifu Gas Explosion

HASHIMA, Gifu — Two persons were killed and 17 others injured, seven of them seriously, in a propane gas explosion which occurred Tuesday night at a building in Hashima, Gifu Prefecture, Police reported.

Most of the victims were guests at snack shops housed in the building, police said.

The blast took place at 11 p.m. Tuesday inside the "Makoto" barbecue restaurant on the ground floor of a two-story building in Takehana.

The explosion destroyed the restaurant and two adjacent snack shops, police said.

Fujimo Takahashi, 35, a company employee, and Kimiko Fujisawa, 36, were killed on the spot, while 17 others were taken to a nearby

591 Election Violators Held

Police arrested 591 persons for vote-buying and other election law violations in connection with the Lower House election on Dec. 18, the National Police Agency reported Tuesday.

The arrested were among 4,225 persons questioned for illegal election campaigning in 1,651 cases, the agency said.

The number of arrested persons represented a decrease of 84 compared with the previous general election held

Police Arrest 2 RP Thieves

CHIBA — Japanese police have arrested two Filipinos for allegedly breaking into houses in Chiba

アオウミガメに

アオウミガメ　体長約一㍍、甲羅は濃い緑色で暖海に広範囲に分布。産卵場は、太平洋ではわが国の屋久島付近が北限にあたるが、最良産卵場は亜熱帯域にある。肉は[illegible]約五[illegible]で、肉とともに食用になる。甲羅はアクセサリーなどに加工できる。

ベラウ共和国　五十六年一月、自治共和国として成立。人口約一万二千人。世界初の「非核憲法」を制定したことで有名。軍事権は米国が握るかわり、財政援助を受けるという「自由連合協定」を米国との間で結んでいたが今年八月、議会がこの協定を否決している。周囲には多数の島があり、アオウミガメの絶好の繁殖場になっている。

日本委員会への連絡によると、ベラウ共和国南西部にあるメリル島で、今年七月ごろ、日本企業が島民に「海ガメを無制限でよろしいから、見返りとして総額一千㌦」(約二十三万円)と肉と甲羅の売上額の一五%を住民に支払う」という内容の捕獲契約を提示したというが、企業名や詳しい契約内容はわからない。

しかし、ベラウ共和国から米国等への連絡では、中間仲介の貿易商といい、ワシントン条約の実施で、表立って動物の取引ができなくなったため対日感情もよいところに目をつけたとみられる。

現地では日本企業の申し出を拒絶するために同国の知識人らで構成する「四人委員会」を首都コロール市に設置。WWF米国委に手紙で契約を結ぶべきかどうかアドバイスを求めた。

古賀会長から協力要請を受けた内田館長はさっそく「四人委員会」のメンバーに「海ガメは商品にするべきではない」という意見書を送った。

アオウミガメは野生動植物の保護を目的にした"ワシントン条約"で、学術研究目的以外の国際的な商取引が禁止されているが、わが国では国内業界保護などの理由で規制からはずしており、輸出国の許可があれば輸入できる。大蔵省発行の日本貿易月表によれば、わが国の甲羅など海ガメ製品総輸入量は五十四年の百二十七ﾄﾝをピークに、ワシントン条約が実施された五十五年は七十五ﾄﾝ▽五十六年五十ﾄﾝ▽昨年四十四ﾄﾝと、徐々に減ってはいるものの最近では海ガメ料理専門店が各地でオープン、食肉用海ガメの需要は供給を上回っている。

内田至・姫路市立水族館長

WWFJの古賀会長の話　わが国はワシントン条約で商取引が禁止されている対象のうちアオウミガメなど十四品目を留保しており、外国から批判もある。海ガメについては内田館長が最も詳しく、現地の指導、調査を依頼した。

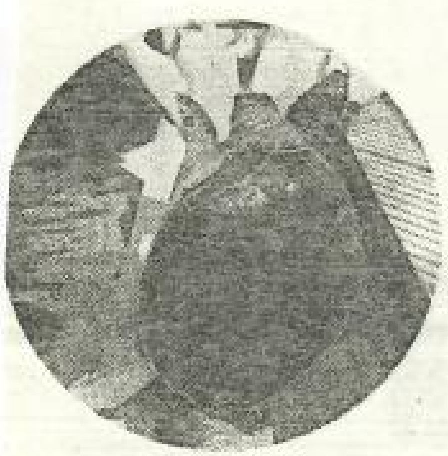
日新聞　1983年(昭和58年)　12月28日

"札束の銃口"

日本企業が「乱獲」を要求

ベラウ共和国

食肉や装飾品の原材料にアオウミガメを大量に買いつけようと、太平洋での重要な繁殖地であるミクロネシアのベラウ共和国に日本企業が進出、現地住民との間に安値で無制限にアオウミガメを捕獲できる契約を取りつけようとしていることが世界野生生物保護基金(WWF、総裁エジンバラ公フィリップ殿下)の調べでわかった。同日本委員会(WWFJ、古賀忠道会長)を通じて調査を依頼された海ガメの権威で兵庫県姫路市立水族館の内田至館長は「ただでさえ乱獲で激減しているのにそんな契約をされては太平洋の海ガメは絶滅してしまう。詳しい情報が入り次第、現地に行き調査したい」という。世界的な野生生物保護の機運が高まる中で、日本企業のエコノミックアニマルぶりが各国の批判を浴びそうな気配だ。



姫路市立水族館のアオウミガメ

Palau Sept. 1985 - Peter Milone

Turtle Headstart Program

Project leader Becky

- Headstart program began in 1982
- Hawksbill Turtle eggs collected & incubated. Hatchlings raised to 6 months of age & released.
- Eggs collected on rock island beaches 80-95 eggs collected each trip & incubated 50-60 days. Many eggs lost on rough boat ride back to MMDC 50% of incubated eggs hatch but many are dehydrated.
- 90-95% of hatchlings survive to 6 mos. Hatchlings are tagged & released on island from which eggs were taken.
- Records indicate 1300 hatchlings released - 242 were tagged. Tagging program began in January 1984. No returns yet.
- Turtles in captivity bite each other causing infection
- Major purpose of program is conservation & enhancement. Eggs often pilfered from beaches.
- Japan has donated $18K for project of $120K coming for both tanks incubation system. Strategy is for 50% release 50% for farming.

Presently constructing a simulated beach for captive breeding. 2 6yr. old turtles being held for breeding trials

1984 Results

Nests located	71
Nests w/out eggs	61
Nests w/ eggs	10
# Boat trips	26
Hatchlings released	1086

MMO statistics computer out of commission 2 mos. from power surges. Replacement parts expected.

One Hong Kong boat licensed to fish live grouper for delivery to Hong Kong. Vessel equipped w/ live boat wells. 40 tons capacity per boat

Japanese pearl oyster venture initiated in Palau. 50,000 seed delivered

John Eads licensed to fish in Palau. Leased one of Yamaha 35' vessels to bottomfish for reef

8/30/85.

PETER:

IF YOU GET THE TIME COULD YOU CHECK OUT THE ATTACHED PROJECT IN POHNPEI. IF MIKE GAWEL OR TERESA HERRING PCV HAVE A PROGRESS REPORT I'D LIKE TO GET A COPY.

THERE IS A HAWKSBILL HEAD-STARTING PROJECT IN PALAU THAT I WOULD LIKE TO GET SOME INFO ON AS WELL.

1. HOW LONG HAS IT BEEN OPERATION? 1982 ⇒ present
2. HOW MANY ANIMALS HAVE BEEN COLLECTED OVER THE YEARS? eggs collected + incubated
3. WHERE & HOW ARE THE CRITTERS COLLECTED?
4. WHAT ARE THE CRITERIA FOR SELECTING HATCHLINGS OR JUVENILES?
5. WHAT IS THE PURPOSE OF HEAD-STARTING HAWKSBILLS?
6. WHAT IS THE SURVIVAL RATE OF THOSE ANIMALS IN CAPTIVITY.
7. WHAT TYPES OF PROBLEMS, IF ANY, ARE THEY EXPERIENCING IN TERMS OF ANIMAL HUSBANDRY (DIET, MEDICATION, BEHAVIOR, ETC.)?
8. ARE THE ANIMALS TAGGED PRIOR TO RELEASE? IF SO, DO THEY HAVE ON DATA ON RETURNS?
9. IS ANYONE COLLECTING DATA ON DISTRIBUTION &/OR NUMBERS OF SEA TURTLES IN PALAU? NO
10. ~~PIC~~ PHOTOGRAPHS WOULD BE MOST APPRECIATED.

Thanks.

2. raise hatchlings to 6 mos (1300 ~~1850~~ released) 242 tagged
Japanese donated $18,000 to project ; 120k more for boats, tanks
incubation system 50% release 50% farm turtle strategy
≈ 50% of eggs hatch but ~~many~~ are dehydrated - many lost on rough boat
ride back to MMOC - 70-95% survive to 6 mos ; problems of pilferage at MMOC
80-95 eggs collected each trip taken once a week

os incubation 50-60 days

→ eggs collected on rock island beaches based on tide + weather conditions

major purpose is conservation

turtles occasionally bite each other causing infection

hatchlings tagged on back flippers + released on island from which eggs were taken.

No returns yet; tagging began in January 1984

simulation beach for breeding in captivity

2 6yr. old turtles being raised for breeding

Sand wall thermometer (Max + Min Registered)

VWR Scientific 61178-039

836-1877

1984

# Turtle nests located	71
Nests w/out eggs	61
Nests w/ eggs	10
Number of boat trips	26
Hatchlings released	1086

[Hatchlings in raceway (Jan 85) 462]

December 12, 1983

To George Balazs,
Hawaii Institute of Marine Biology

I am a biology student from Lewis & Clark College, Portland, Oregon presently on an overseas study program in Micronesia. The focus of the trip is on marine biology and micronesian culture. We're each picked a topic to research, and my interest is the Hawksbill turtles. Our group stayed one month at the Micronesian Mariculture Demonstration Center in Palau and I spent time with Mr. Becky Mad raisau, head of their turtle program, and Mr. Gerry Heslinga.

Our program ends January 21-28 in Honolulu and since I'd be in the area, I was hoping to make an appointment with you to discuss some of the questions I have about the turtles.

Also, do you have copies of the following publications?

BIOLOGY AND CONSERVATION OF SEA TURTLES
editor KAREN A. BJORNDAL
SMITHSONIAN INSTITUTION in cooperation with
WORLD WILDLIFE FUND, INC.

CONSERVING SEA TURTLES
author NICHOLAS MROSOVSKY
THE BRITISH HERPETOLOGICAL SOCIETY, 1983.

SYNOPSIS OF BIOLOGICAL DATA ON THE HAWKSBILL TURTLE (*Eretmochelys imbricata*)
prepared by W.N. NITZELL
FOOD + AGRICULTURE ORGANIZATION OF THE U.N.
FAO FISHERIES SYNOPSIS No. 137

I'm not finished gathering data from the above and am afraid that I won't be able to locate them at the UH-Manoa library.

Please let me know about a convenient time to meet with you in January.

Thank you for your time,
Sincerely,
Claudia Johnson

CLAUDIA JOHNSON
BOX 749
KOLONIA, PONAPE
CAROLINE ISLANDS
96941

PERMANENT ADDRESS:
316 PEYTON ST.
GENEVA, ILLINOIS 60134

BOX 1290
LEWIS + CLARK COLLEGE
PORTLAND, OR 97219

MICRONESIAN MARICULTURE DEMONSTRATION CENTER
POST OFFICE BOX 359
KOROR STATE
REPUBLIC OF PALAU, 96940

September 10, 1984

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

Dear George:

I am sorry for being late to write, thanks a lot for your help for the Rotifers Brachionus plicatilis. I have just received the letter from Mr. Wayne J. Baldwin that he can probably help out in obtaining the Rotifers as soon as I send him some sort of document or importation permit from the Republic of Palau.

You have mentioned about the marking or tagging the Hawksbills turtles before I release them, which I am also interested in, but due to financial problems we have encountered, only one hundred six months old reared baby Hawksbill have been tagged and released but the rest seven hundred were not tagged or marked.

If possible, could you help me by providing a small metal flipper tags. I'll be most grateful to have some. Thanks for your help and cooperation.

Best regards,

Becky B. Madraisau

MICRONESIAN MARICULTURE DEMONSTRATION CENTER
POST OFFICE BOX 359
KOROR STATE
REPUBLIC OF PALAU, 96940

11-19-85

George -

To my knowledge these clam boats had no turtles on board - at least no mention was made of turtles at the time the boats were confiscated. I didn't see the cargo offloaded, however.

You may be aware that the Japanese Tortoise Shell Association has awarded the MMDC a grant of US$100,000+ for continuation of the turtle head starting program.

Best wishes,

Jerry Hasenyager

U.S. DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
Southwest Fisheries Center
Honolulu Laboratory
P. O. Box 3830
Honolulu, Hawaii 96812

January 27, 1986 P/SWC2

Mr. Becky B. Madraisau
MMDC
P. O. Box 359
Koror State
Republic of Palau 96940

Dear Becky,

I am eager to learn how your hawkbill conservation project has been progressing since I last corresponded with you some months ago. Enclosed are several recent publications that I thought you would find interesting. One of them describes the successes we obtained in the experimental use of small metal flipper tags on hatchling green turtles.

I would really appreciate hearing from you. Please let me know if there is any way I can be of assistance.

Sincerely,

George H. Balazs
Zoologist

Enclosure

12-20-83 11SB

Washington Approves $1 Billion in Aid for Republic of Palau

By Howard Graves
Associated Press

The Reagan administration agreed yesterday on a $1 billion economic package for the fledgling Republic of Palau in a move toward ending trusteeship over the Western Pacific islands.

The agreement would give Palau economic parity with the Federated States of Micronesia and the Marshall Islands, two other political entities in the Trust Territory of the Pacific Islands, said Ambassador Fred M. Zeder II.

The U.S. Congress on Dec. 13 approved legislation which would implement a so-called Compact of Free Association for the FSM and Marshalls.

Those island governments, with an estimated combined population of 120,000 persons, would receive about $2.5 billion in U.S. financial aid over a 15-year period.

PALAU, WITH about 14,000 population, would receive its funds over a 50-year period, said Howard Hills, legal adviser for the Office for Micronesian Status Negotiations.

All three governments would be responsible for their external and internal affairs, except for defense, when the world's only remaining trusteeship is terminated by the U.N. Trusteeship and Security Councils.

The United Nations established the Trust Territory in 1947 after the United States won the islands from Japan during World War II. The area also is known as Micronesia.

A fourth entity, the Northern Mariana Islands, in 1975 voted for commonwealth status with the United States when the trusteeship ends.

Zeder said Palau's new compact also was initialed yesterday in Washington, D.C., by its president, Lazarus Salii, and representatives of its national congress.

to: George Balazs
From: Archie Carr

DATE = ?

To: David Carr
102 West Third Avenue
Tallahassee, Florida 32303

From: Marc L. Spaulding
Dept. Sociology
U.O.G. Station
Mangilao, Guam 96923

Re: Hawksbill Turtle Farm, Koror, Palau

While on University of Guam business in Palau, I happened to learn of a mariculture project in the city of Koror. The project, although supported by modest funding, is well organized and large enough in size to be of interest to the C.C.C. Perhaps information sharing between C.C.C. and MMDC (Micronesian Mariculture Demonstration Center) would be beneficial to both organizations.

The MMDC project is about two years old, and include the farming of:

1. Hawksbill turtle
2. Giant clams, and
3. Reef fish which are native to Palauan waters.

The turtle farming project was begun with $28,000 donated by the Japanese Turtle Shell Association. As you know, turtle shell is highly valued in Japan and I believe that the "seed" money for the farm home in Koror is to help ensure a constant supply of Hawksbill turtle shell for jewelry, combs, and the like.

Hawksbill turtle shell products are readily available on both the islands of Palau and Yap here in the Micronesia. One of the major reasons that the killing of Hawksbill turtles continues in the outlying islands is that there is no enforcement mechanism for the fines and sentences to be imposed on would-be poachers. The simple fact of the matter is, that here in Palau anybody who wants to can catch Hawksbill turtle. Furthermore, the government has no boat to patrol the nesting grounds in the southern Rock Islands where it is relatively easy to get turtle.

The following is a summary of the information I was able to obtain about the farming project in Palau.

Project Director: Becky B. Madraisau, MMDC
P.O. Box 359
Koror, Palau 96940

-Although Becky has no formal training in biology/ecology he seems very energetic and quite capable.
-He stated that his major goal is the "conservation" of the Hawksbill turtle.

Project Data:

1. Over 1500 Hawksbill turtles have been released in the last two years
2. Currently there are 375 turtles being raised in tanks. Turtles vary in size from the hatchling stage up to about 4-5 inches carapace.
3. Turtles are returned to the sea when their carapace reaches 20 cm.
4. The released turtles are tagged with a small plastic tag in the rear flipper. I was unable to obtain any information regarding tag returns from Mr. Madraisau.
5. Turtles are fed a diet of sardines which Becky catches himself.

I hope that the above information is of some use to you in your efforts at turtle conservation. If there is anything I can do to assist those efforts, please feel free to call me.

ON

M. L. Gaudiano

NATIONAL MARINE FISHERIES SERVICE
HONOLULU LABORATORY
P. O. BOX 3830
HONOLULU, HAWAII 96812

February 24, 1982 F/SWC2:GHB

Mrs. Suzanne Ellard Acker
P. O. Box 177
Kolonia, Yap
Western Caroline Islands 96943

Dear Suzanne,

I'm sorry that I missed seeing you on your recent visit to Honolulu, but nevertheless I want to take this opportunity to send the enclosed materials on sea turtles. Any information that you can gather on the current conservation status, ecology, and human usage of turtles during your forthcoming visits to the Outer Islands of Yap (and elsewhere) will be most appreciated. The enclosed background articles authored by Mike McCoy and Peter Pritchard should give you a good idea of what is generally known about turtles in Yap as of a few years ago.

The following list will give you some idea of what questions should be asked when talking to local people on each of the islands. Try to search out elder fishermen and others who command a high reputation among their people.

1. What species are present in their relative abundance?

2. Does nesting occur and at what locations?

3. How many turtles nest each night during the peak month or months of the breeding season?

4. Have tags ever been found on turtles? If so, what are the details of recovery?

5. How many turtles by species are taken each month or year?

6. Does poisoning from eating turtles ever occur?

7. Are eggs gathered and eaten, and in what quantities?

8. Are their more, fewer, or the same number of turtles now than when the informant was young?

Again, your offer to help out is really welcome. I send you and your husband best regards, and look forward to hearing from you when your time permits.

Sincerely,

George H. Balazs
Fishery Biologist

GHB:ey
Enclosure
cc: Balazs; HL

February 25, 1981 F/SWC2:GHB

Mr. Michael C. White
Fisheries Specialist
Marine Resources Division
Truk, Eastern Caroline Islands 96942

Dear Mr. White:

I am extremely interested in following the outcome of the Japanese sea turtle "farming" group that recently visited Truk and other areas of Micronesia. Any information that you can provide on this topic would be greatly appreciated. As Mike McCoy may have told you, the data presented by Mr. Kurata at the November 1979 Washington Sea Turtle Conference were not well received. Mr. Kurata was not a formally invited speaker, but rather was granted time to address the conference during one of the lunch time sessions that were organized at the last minute.

I am in contact with Mike about this situation, but any help that you can give from your end would certainly be most useful.

Sincerely,

George H. Balazs
Fishery Biologist

bc: Balazs
HL

GHB:iht

SPC Fisheries Newsletter No. 33 - June 1985

This article is based on the transcript of the `Pacific Sealink´ PEACESAT session on `Illegal and Destructive Fishing Practices.´ The `Pacific Sealink´ series is jointly organised by the University of Guam, University of Hawaii, University of the South Pacific, and the Federated States of Micronesia Marine Resources Division.

BLAST FISHING IN THE PACIFIC

by

John Naughton
National Marine Fisheries Service
Honolulu, Hawaii

Introduction

The use of dynamite and other explosives for fishing is commonplace throughout the tropical Pacific, although usually illegal. There is much anecdotal information on the impact of underwater explosions on fishery resources and their habitat, but little real data can be found in the existing literature. The most complete account was found in Wood and Johannes´ book entitled Tropical Marine Pollution, published in 1975.

It is clear that dynamite or blast fishing in a habitat such as a live coral reef can be devastating, although destruction of the habitat by explosives in coral reef communities and rates of recovery have never been adequately evaluated. The depth at which a charge is exploded and the size of the charge have an imporant influence on the extent of damage to the benthic habitat in an area.

History of the Problem

Blast fishing in the Pacific Islands began in earnest during and immediately after World War II, particularly in those islands touched by the war. In Palau during the war, fishermen were provided with hand grenades and other explosives to fish for the occupying Japanese troops. After the war many islanders became munitions experts and wre able to defuse mines, bombs and other ordnance. In the 1960s one could still see huts in the jungles of Palau built over a single large piece of ordnance to keep the powder dry for use in constructing fish bombs.

When World War II vintage powder became rare, fishermen began to use commercially available explosive compounds. A common form of powder used in the Philippines consisted of 75 per cent potassium chlorate, 15 per cent charcoal, and 10 per cent sulphur or cornstarch (Ramas, 1969).

The most recent type of explosives used are those stolen or taken from construction companies. Dynamite and blasting caps are commonly utilized by both civilian and military construction teams in the many projects underway throughout the Pacific Islands and can be readily utilized as fish bombs.

School classifications used by the Skipjack Programme were: subsurface, breezer, finner, rippler, jumper, splasher, boiler, and smoker. For the purpose of this report, the final three categories have been combined to approximate what fishermen would consider a foaming category. Results are presented in Table 1 and summarized in Table 2. More precise information on the areas covered within each country is published in the Tuna Programme Final Country Report series available at the SPC.

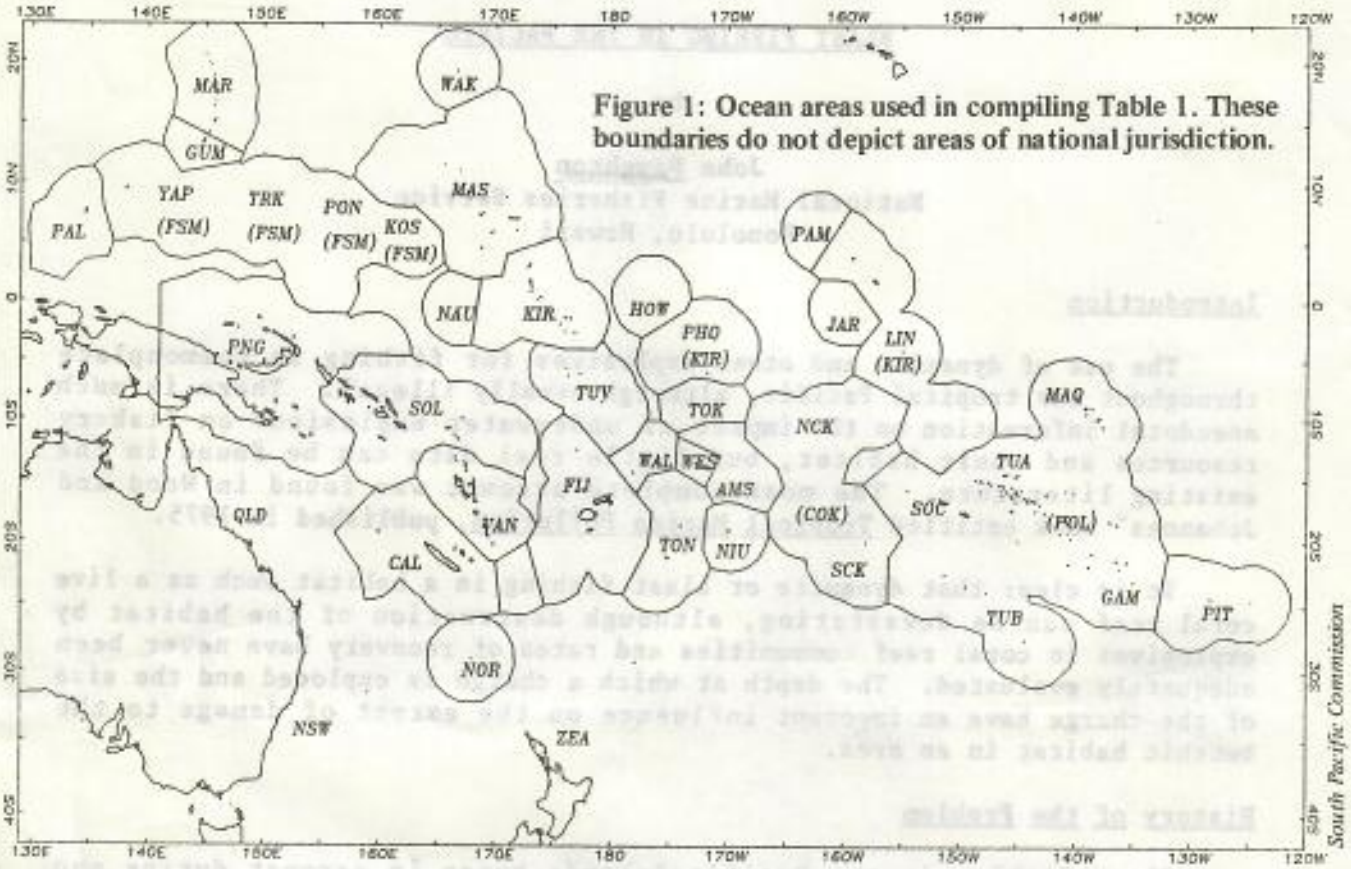


Figure 1: Ocean areas used in compiling Table 1. These boundaries do not depict areas of national jurisdiction.

Table 2. Summary of sightings

Total no. of hours spent sighting	=	5556
Total no. of schools sighted	=	4181
Total no. of foaming schools sighted	=	938
Total no. of schools sighted per hour	=	.75
Total no. of foaming schools sighted per hour	=	.17

The amount of ocean surface covered during each hour of spotting from the SPC research vessels is difficult to quantify and is affected by such factors as cloud cover, sea surface conditions, intensity of bird activity and alertness of the crew. Bearing this in mind, it is thought that an approximation of the coverage would be in the order of 60 to 70 square nautical miles of ocean surface per hour of sighting. Searching from a modern purse seiner, especially one equipped with a helicopter, would obviously result in the location of more schools.

The results listed in the tables should not be considered definitive as the number of hours sighted and area covered within each country was quite limited. The information, however, should prove useful especially in the cases where a high incidence of foaming schools was recorded.

Another interesting development has been the recent use of seal bombs in blast fishing, particularly in Guam and the Northern Mariana Islands. These explosives originate from the California-based puse seine tuna fleet and are used to herd tuna and dolphins in the large purse seine nets. They have become readily available in Guam and are reportedly in common use for blast fishing on the reefs.

Direct Impacts of Blast Fishing

The most obvious detrimental impact of blast fishing is the devastation that can occur to living coral reef communities. Maragos (personal communication) reported the complete destruction of living reefs in Indonesia where blast fishing has been extensively employed. Ramas reports that on some nearshore reefs in the Philippines formerly teeming with life, blast fishing has reduced the habitat to dead coral debris occupied by only a few small fish. Personal observations have confirmed the loss of coral reef habitat from blast fishing in Guam, Truk and Palau.

The most pronounced damage is seen in areas of calm water with many delicate, branching corals. Examples can be seen in Truk lagoon where reefs formerly rich in Acropora coral thickets have been reduced to rubble. Lesser damage can be seen at blast fishing sites such as Double Reef, Guam, where the reef is composed of robust coral forms associated with the conditions of a high-energy environment and large ocean swells.

Another substantial impact from blast fishing is the large quantities of fish that can be killed during a single blasting operation. This is particularly true when an area is chummed with bait until a high biomass of fish has accumulated. Charges are then thrown or pre-set, and a tremendous fish kill can result. In these cases often the fishermen only harvest the larger or more desirable species and leave the rest. The great reduction of several species of fish in Palau has been attributed to blast fishing, particularly during seasonal spawning migrations when the fish are densely aggregated (Johannes, 1981).

Blast fishing on surface schooling fish or fish attracted away from the bottom by chum, although resulting in high mortality of fish, is much less destructive to the habitat than detonation of charges directly on the reefs. Personal observations have confirmed this in Palau.

Indirect Impacts of Blast Fishing

Other more subtle impacts can result from blast fishing. In Indonesia, Maragos reports a complete community change on those reefs heavily blasted by fishermen. Fish communities changed from typically reef-associated species to herbivorous species, which graze on filamentous algae growing on dead coral rubble.

In Fiji, Owens (1971) attributes blasting, along with other human activities, as combining to eliminate most of the predators at all stages in the life cycle of the crown-of-thorns starfish, Acanthaster planci. This could lead to the current Acanthaster coral predation problem affecting reefs in urban areas throughout the Pacific.

Blasting may also contribute to another serious problem associated with coral reefs, that of outbreaks of ciguatera fish poisoning. The relationship between disruption of reefs by man, such as during blast fishing, and the subsequent development of ciguatera in the immediate area seems too frequent to be coincidental.

A problem that has never been dealt with seriously (except by blast fishermen) is the actual physical damage and death of fishermen that can result from use of explosives in fishing. In Palau, the Philippines and other Pacific islands, it is not uncommon today to see older men with missing fingers, hands or even arms from making and using explosives for fishing. Blast fishing was particularly dangerous in the post-World War II era when live ordnance had to be defused and unstable, homemade explosives were made. Today the use of commercial dynamite and other explosive products renders blast fishing much safer.

Management and Enforcement

It is clear that blast fishing is extremely destructive in most cases and should be illegal, as it is in the vast majority of the Pacific Islands and coastal countries. The big problem appears to be enforcement of the laws. Blast fishing can be so lucrative, and the probability of being caught so low, that it is rampant in many areas.

In some areas local enforcement by village chiefs keeps the problem in check, at least near the villages. Wass (personal communication) reports this as being the case in areas of American Samoa. Most of the blast fishing occurs in the remote areas away from villages.

For enforcement purposes it is important to be able to recognize fish killed by explosives. Recent inspection of fish shipped from Truk to Guam for sale clearly indicated they were taken by blast fishing (Hamm, personal communication). Ronquilllo (1950) summarized anatomical damage observable in fish by explosives as follows:

1. The air bladder, if present, is almost always ruptured and blood clots are found in the lumen.

2. The vertebral column may be fractured in any part along its length.

3. Localized haemorrhages are present around the area of fractured parts due to the destruction of the blood vessels and tearing of the adjacent tissues.

4. Parts or all of the contents of the body cavity may be damaged or crushed with haemorrhages, depending upon the size, shape, position and distance of the fish from the explosion.

5. Fracture and/or dislocation of the abdominal ribs from the vertebral column may be found especially in spiny fishes, with accompanying haemorrhages present in the area of the fracture.

6. The blood vessels below the vertebral column may break and cause haemorrhages of varying degrees along that region.
7. Rupture of the parietal peritoneum, especially that attached to the abdominal ribs may occur.

Dislocation and/or fracture of the vertebral column and ribs, if present, are clearly shown in an x-ray. The air bladder, if ruptured, will be filled with blood and will be obliterated in the negative. If not ruptured and, therefore, filled with air as in normal fish, it occupies a definite shape and position in the abdominal cavity.

Many Pacific Island governments are recognizing the serious nature of blast fishing and are increasing the penalties for those caught conducting this illegal activity. In Guam there was a change in the law in 1981 making the use of fishing with explosives (as well as chemicals and electricity) a felony. Two men were recently convicted of this felony. The Palau House of Delegates is currently reviewing a bill that, if passed, will increase the penalties for fishing with environment-damaging materials such as explosives.

Resource managers are recognizing the importance of coral reefs, not only as fishery resource habitats, but for their recreational and aesthetic value. Managers are beginning to take into account the uniqueness of a particular reef and its proximity to, and use by, various interest groups. This approach is especially important in those Pacific islands where tourism is becoming, or has the potential to become, an important industry. The problem is recognized in Truk where local scuba diving operators watch closely for anyone blast fishing. They recognize the damage that can be done, not only to fish populations, but to the beautiful reefs and historic shipwrecks in the lagoon, which are the base for tourist industry development in Truk.

Education

Education is undoubtedly the key to the problem. The coastal populations of Pacific Island countries have to be made aware of what they have to lose. They must recognize that corals are the foundation species on which tremendous numbers of other organisms depend. So central are corals to the integrity of the reef community that when they are selectively killed, migration or death of much of the other reef fauna results. The tragedy of destroying a section of living coral reef by blast fishing, merely to harvest a few pounds of fish, must be understood. Fisheries Officers can and should play a key role in educating the public, particularly the fishing public with which they have daily contact.

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Micronesia progress

98-61-1

The future political status of our Trust Territory in Micronesia is one of the longest-running stories in the Pacific Islands, and there may be more to come.

Next year will mark 40 years since the U.S. took control of these thousands of North and Western Pacific islands under a mandate from the United Nations.

Actually our tenure is longer, if you count the World War II years during which we wrested control of the islands from Japan. We began negotiations with the islanders in 1969 for a new political status.

SO ANOTHER milestone was passed last week when President Reagan signed a bill granting self government and broad foreign policy autonomy to two of the four island groups — the Republic of the Marshall Islands and the Federated States of Micronesia.

Under the "free association" arrangement with the U.S., they will control virtually everything except defense and will receive some $2.4 billion in economic aid over a 15-year period. They could later opt for full independence.

A third island group, the Northern Marianas Islands, has already chosen closer and permanent status as a U.S. Commonwealth.

The fourth, the Republic of Palau, will have a separate compact of free association, if its people approve a new version of the agreement with Washington in a vote now set for February 24.

ALL THIS still calls for approval by the United Nations, and there is some question of how the Soviet Union and nations of the communist bloc will respond to status agreements that provide for anything less than full and immediate independence. Perhaps the new spirit of Geneva will be a favorable factor.

Of course, the U.S. could just put the new agreements in effect on its own. But those who have followed the long tangled history of Micronesia's future status may be forgiven if they feel a few more twists and turns may lie ahead.

5-16-86 HSB A-9

Air Force Drops Aid to Castaway

An Air Force plane was sent today to a desolate South Pacific atoll to get a closer look at its shipwrecked inhabitants and drop additional emergency supplies until the group can be rescued.

The C130 transport plane left Andersen Air Base on Guam at 10 a.m., Hawaii time, for Pikelot Island where as many as eight people were sighted on Wednesday, said Bryce Kenny, Coast Guard spokesman in Honolulu.

Aboard the plane were several members of the news media.

Pikelot Island is a deserted atoll in the western Caroline Islands, 2,800 miles southwest of Honolulu and 400 miles southeast of Guam.

The crew of a Navy P-3 saw an SOS written in the sand on the island Wednesday. The crew reported seeing five to eight people on the beach standing alongside a makeshift shelter, Kenny said.

The crew dropped emergency rations — food and water — before leaving, Kenny said.

PIKELOT, WHICH is ¾ mile by ⅛ mile and surrounded by a reef, is overgrown with shrubs and a few coconut trees, Kenny said.

The Coast Guard still is trying to get one of several ships in the area to divert its course to go to the atoll and pick up the group, Kenny said.

The island is too small for a plane to land and so far the Coast Guard has not discussed sending a helicopter to Pik Kenny said.

Officials do not know who people are, their condition where they came from, o there is any water or food the atoll.

The rescue has cre "tremendous" news media a tion, said Kenny, who said has been called by dozen newspapers and television reporters.

April 22, 1986 F/SWC2:GHB

Ms. Teresa L. Herring
Peace Corps Ponape
P. O. Box 9
Kolonia, Ponape 96941

Dear Teresa,

Many thanks for sending me a copy of the Pohnpei sea turtle conservation guide you recently assembled. This is indeed a worthwhile effort. I was especially pleased to hear that multiple copies have been circulated so that the document will be on permanent file at various locations. All too often workers fail to record what they have undertaken and accomplished, thereby causing predecessors to "invent the wheel over again." You are to be commended for documenting your activities and ensuring their preservation.

The video tape on tagging and measuring techniques that I had promised to send to you and Mike Gawel will be mailed in a few weeks. It turned out to be a very short and simple portrayal, but I believe it will fulfill the need.

Best regards. I wish you well in your future work.

Sincerely,

George H. Balazs
Zoologist

cc: Jack Woody
MIKE GAWEL

cc: Balazs ✓
HL

Group stranded on island, Coast Guard says

By Mark Matsunaga
Advertiser Staff Writer

They're not Gilligan, the Skipper, the Howells, Ginger, the Professor and Mary Ann.

But a group of at least five persons is apparently marooned on a deserted Micronesian island 2,800 miles southwest of Honolulu.

Coast Guard officials here can hardly wait to just sit right back and hear their tale, the tale of a fateful trip.

Meanwhile, however, they were working to arrange the castaways' rescue yesterday.

Coast Guard spokesman Brice Kenny said the people were spotted by a U.S. Navy Reserve patrol plane Wednesday afternoon (Hawaii time).

They had stamped out "SOS" on the beach and erected shelters that appeared to be wreckage from a boat.

Who the castaways are and how and when they wound up on tiny Pikelot Island is a mystery, Kenny said.

"They could be people from (other nearby) islands. They could be on a holiday from the Mainland. They could be from Europe, for all I know," Kenny said.

The crew of the California-based P-3 Orion which spotted them dropped an emergency packet of food and water, Kenny said.

"There are a number of ships in the area," Kenny said, and the Joint Rescue Coordination Center in Honolulu was trying to arrange for one of them to pick the marooned people up.

Pikelot is about a quarter-mile long and one eighth-mile wide, Kenny said. "There's probably no water, nothing to eat there," he said.

Pikelot, about 300 miles southeast of Guam, is part of the western Caroline chain.

Several groups of castaways have been rescued from the same island during the past dozen years.

The Air Force rescued 20 ailing Truk Islanders from the tiny island in May 1979. The victims were part of a group of 50, including women and children, that was stranded on Pikelot with less than a day of food and water when an accident disabled their sailing canoe.

The plight was discovered by chance when an American pilot flying overhead noticed a distress message — the words "food," "water," and "3 head wound" — scribbled into the sand.

In September 1975, the Navy rescued nine shipwrecked Yap islanders who had been stranded for a week on Pikelot island. A Royal New Zealand Air Force crew had spotted their large "SOS" message written on the sand.

UNIVERSITY OF FLORIDA
GAINESVILLE, 32611

DEPARTMENT OF ZOOLOGY
223 BARTRAM HALL
904-392-1107

20 March 1986

Ms. Elisabeth Broughton
Micronesian Mariculture Demonstration Center
P.O. Box 359
Koror State
Republic of Palau 96940

Dear Ms. Broughton:

Thank you for your letter requesting a copy of the Manual of Sea Turtle Research and Conservation Techniques. I have enclosed a copy of this volume, and I hope it is of help to you.

I would appreciate it very much if you could find the time to write to me about the headstart program in Palau. As chairman of the Marine Turtle Specialist Group of the International Union of the Conservation of Nature (IUCN), I am very interested in all such projects. Any information on the source of eggs/hatchlings, numbers of hatchlings maintained, how they are raised (diet, tanks, etc.), how long they are kept before release, how and where they are released, or any general information would be valuable.

I wish you success with your work. Please let me know if I can be of further assistance. I have also enclosed a recent publication on hawksbills that may be of interest to you.

Sincerely,

Karen Bjorndal

Karen Bjorndal
Chairman, IUCN/SSC Marine Turtle
Specialist Group

Elisabeth Broughton
MICRONESIAN MARICULTURE DEMONSTRATION CENTER
POST OFFICE BOX 359
KOROR STATE
REPUBLIC OF PALAU, 96940

Karen A. Bjorndal
Dept. of Zoology
Univ. of Florida
Gainesville, Florida 32611

Dear Dr. Bjorndal,

I am a Peace Corps Volunteer working with the Hawksbill sea turtle headstart program in Palau. We are attempting to expand and update our project. To help with this could you please send (or describe how to obtain) a copy of the:

Manual of Sea Turtle research and conservation techniques. 2nd ed, Nov. 1983. prepared by the Western Atlantic Turtle Symposium held in San Jose, Costa Rica 17-22 July 1983.

This will be a large help. Thank-you for your time.

Sincerely,

Elisabeth Broughton

Elisabeth Broughton
MICRONESIAN MARICULTURE DEMONSTRATION CENTER
POST OFFICE BOX 359
KOROR STATE
REPUBLIC OF PALAU, 96940

Archie Carr
Dept. of Zoology
Univ. of Florida
Gainesville, Florida 32611

Dear Dr. Carr,

I am a Peace Corps Volunteer working in the Republic of Palau with a growing Hawksbill turtle headstart program. Could you please send me reprints of the following papers.

CARR, A., Stancyk, S. 1975. Observations on the ecology and survival outlook of the Hawksbill turtle. Biological Conservation, 8, pp 161-172.

CARR, A., Meylan, A.B. 1180. Extinction or Rescue for the Hawksbill? Oryx, 15, pp 449-450.

Thank-you for your help.

Sincerely,

Elisabeth Broughton

March 26, 1986 F/SWC2:GHB

Ms. Elisabeth Brougton
P. O. Box 359
Koror State
Republic of Palau 96940

Dear Elisabeth,

Dr. Archie Carr at the University of Florida recently sent me a copy of the letter you wrote to him mentioning your work as a Peace Corps Volunteer in the Palau hawksbill headstart program. Both Dr. Carr and I are members of the IUCN Marine Turtle Specialist Group, a meeting of which we just attended last week in Waverly, Georgia. Our Group is very much interested in learning more about the status of the Palau project. We are willing and able to provide assistance in whatever way that may be necessary and appropriate. It would therefore be greatly appreciated if you would write at your earliest convenience providing us with a summary of current project activities, including future plans.

I have enclosed several publications on sea turtles that you may not presently have in your collection. I look forward to hearing from you.

Sincerely,

George H. Balazs
Zoologist

Enclosures

cc: Dr. Archie Carr
Dr. Karen Bjorndal

cc: Balazs
HL

U.S. DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
Southwest Fisheries Center
Honolulu Laboratory
P. O. Box 3830
Honolulu, Hawaii 96812

January 27, 1986 F/SWC2

Mr. Becky B. Madraisau
MMDC
P. O. Box 359
Koror State
Republic of Palau 96940

Dear Becky,

I am eager to learn how your hawkbill conservation project has been progressing since I last corresponded with you some months ago. Enclosed are several recent publications that I thought you would find interesting. One of them describes the successes we obtained in the experimental use of small metal flipper tags on hatchling green turtles.

I would really appreciate hearing from you. Please let me know if there is any way I can be of assistance.

Sincerely,

George H. Balazs
Zoologist

Enclosure

'Castaways' aren't that at all

The "castaways" discovered this week on a tiny Western Pacific island said by radio yesterday they aren't castaways at all. They're researchers from Guam who were dropped off there for a research project but ran out of food and water sooner than they expected.

An Air Force C-130 from Guam flew over quarter-mile long Pikelot island yesterday and dropped supplies to the half-dozen or so people who had made an "SOS" signal with palm fronds. The island, in the western Caroline Islands of Micronesia, is 300 miles southeast of Guam and 2,800 miles southwest of Honolulu.

According to information received here yesterday by the Coast Guard's Joint Rescue Coordination Center, the people on Pikelot used a radio which was dropped to them to put out the word that they are researchers from Guam's Council of Arts and Humanities and had run out of food and water early this week.

They told the Air Force plane yesterday that they had been dropped off on the island as part of a Caroline Islands research project that began Feb. 1 and is to continue through the end of July.

Coast Guard spokesman Brice Kenny said said it is not immediately clear who will pick up the group, "but at least they now have a radio and they are all in basically good shape."

Is there a future for the giant clam?

The threatened and endangered species list published by the International Union for the Conservation of Nature now contains an important new addition: giant clams, family *Tridacnidae* — a group comprising the largest and most valuable bivalve molluscs in the world.

During the last fifteen years, Asian fishermen have quietly but systematically fished for giant clams in restricted waters, causing a precipitous decline in clam stocks. Although the poachers face imprisonment, stiff fines, and vessel forfeiture, the muscle of the giant clam is a highly sought after delicacy in the Far East. Risks of fishing are slight when weighed against the considerable financial returns. Taiwan alone imports between two and three hundred tons of clam muscle annually worth an estimated $20 million or more.

With recent extinctions in many areas of Micronesia, giant clams have become victims of perhaps the most conspicuous example of overfishing in the South Pacific. This is particularly tragic at a time when

Tridacna gigas, the so-called "killer clam".

many Pacific Island nations are gaining political independence and striving to strengthen their economies: giant clams are both a commercial and an aesthetically important resource.

Pacific islanders have been farming giant clams for centuries. Adult species are moved from the outer reefs to more accessible locations in the lagoons to allow the clams to be harvested at leisure. A question that has been asked with increasing frequency by scientists in the Indo-Pacific area is: could giant clams, as with oysters and mussels, be masscultured? The answer appears to be yes.

Attempts to masscultre giant clams, in fact, began in the 1960s. These early efforts were disappointing, resulting in high larval losses and complete mortality in sixty-ninety days. During the past six years, however, research programs have been initiated in Tahiti, Australia, Papua New Guinea, Tonga and Fiji. Several of these research groups have attempted the masscultre of giant clams seed in a laboratory setting but it has been a small research center based on Palau in the Caroline Islands that has been the forerunner in the development of giant clam mariculture technology.

The Micronesian Mariculture Demonstration Center on Palau is run by marine biologists Drs. Frank Perron and Gerry Heslinga. During the past four years, the MMDC staff has successfully reared four of the six species of giant clams, including the much-maligned "killer clam", *Tridacna gigas*, which may reach a width of over one meter and weigh

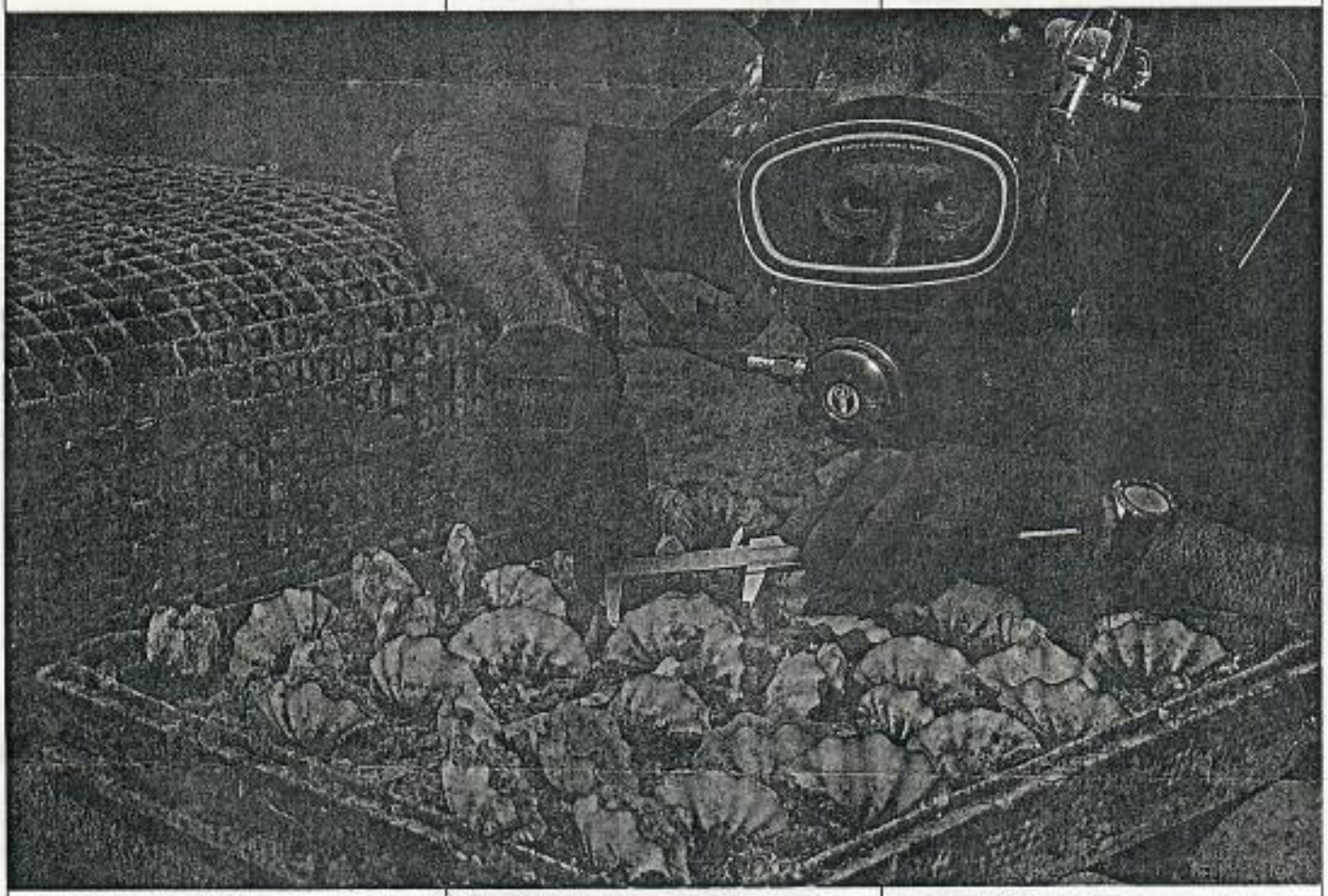
in excess of two hundred kilograms.

In conjunction with the Pacific Fisheries Development Fund, the MMDC reexamined the practicality of producing large numbers of juvenile clam seed and, as a result of their research, major advances have been made in hatchery technology. The facility, in its present form, is now capable of producing an estimated fifty thousand clam juveniles a year.

the bitter kidney, all the soft parts can be eaten).

The growth rate of the giant clam results in part from its particularly interesting method of feeding. Giant clams are now known to derive part or all of their nutrition from algal cells called zooxanthellas which live within their tissues. These microscopic plants use sunlight for energy and via the process of photosynthesis produce sugar-like substances within the tissues of

clams in Palau, like many marine animals, spawn on a predictable lunar cycle. Millions of microscopic eggs and sperm are released into the surrounding water where fertilization takes place. Within one day the minute clam will develop a protective shell and a multi-purpose organ called a valum that permits feeding and swimming. After a seven-day swimming phase, during which locally occurring phytoplankton must be provided as a



This capability represents an exciting prospect for both the conservation of an endangered species and commercial culture: sufficient juveniles can now be produced to supplement existing clam stocks in nature. But one of the most intriguing aspects of this culture is that the clams, when raised without any supplemental feeding, have proved to be the fastest growing bivalves in existence, producing large quantities of meat (with the exception of

the clam which the clam then feeds on — an association called symbiosis. This means that the clams can be grown anywhere that there is sufficient sunlight to sustain their zooxanthellae, be it shady lagoon or land-based tank system.

The larval rearing process currently used by the MMDC relies on the natural spawning of adult, tank-held clams, a method developed over thirty years ago by oyster biologists in England. Captive

food, larval clams settle to the bottom of the tank and select a place for attachment. Shortly after settlement, the juvenile clam acquires several zooxanthellae which eventually multiply into millions. No special aftercare is required other than thinning to avoid overcrowding.

At a size of two-three centimeters, hatchery-bred clams can be transferred to the open sea enclosed within a simple mesh cage. Protec-

After transfer from the hatchery to the open sea, the growth of the clams is watched closely.

tion is essential as clams smaller than ten-fifteen centimeters have been found to suffer heavy larval losses from fish predators. An acceptable market size of fifteen centimeters can be achieved in about three years in either a land-based tank facility or suitable seabed.

A giant clam reseeding program has been initiated in Koror State, Palau. Laboratory-spawned clams greater than fifteen centimeters have been found to survive well in nature with no special aftercare. To demonstrate that the Palau hatchery could act as a center for giant clam distribution for most of the tropical Pacific, the MMDC has shipped hundreds of juvenile clams by air to Hawaii and Guam with considerable success. The entire rearing process can be achieved with technical simplicity and minimal input of time, labor and energy.

A multidisciplinary project involving collaboration between Silliman Marine Research Center, Philippines; James Cook University, Australia; Ministry of Agriculture and Fisheries, Fiji; University of Papua New Guinea; and the MMDC will further examine the biology and mariculture of the giant clam.

It is now evident that sufficient clam seed can be produced to have a significant impact on giant clam abundance in localized areas, and exciting prospects exist for commercial culture. The future of the giant clam seems assured ●

Text by
Sarah Cunliffe
Photographs by
Gerry Heslinga

SUPPORTING DOCUMENTATION

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MICRONESIAN MARICULTURE DEMONSTRATION CENTER
POST OFFICE BOX 359
KOROR STATE
REPUBLIC OF PALAU, 96940

6/13/86

Dear George –

Thank you for your letter of 24 May and for thoughtfully enclosing the clam article.

I spoke with Betsy Broughton and she said her replies have been sent out – so you should have heard from her by now. Please let me know if you have not.

Mr. Madraisay, the leader of the MMDC turtle project, has never been very cooperative about communicating the results of his work. This is very unfortunate but there isn't a whole lot that can be done about it.

Regards, Jerry

June 30, 1986 F/SWC2

Ms. Elisabeth Broughton
Peace Corps Volunteer
Micronesian Mariculture
Demonstration Center
Post Office Box 359
Republic of Palau 96940

Dear Ms. Broughton:

Many thanks for your letter dated May 28th along with the helpful little report telling about the hawksbill project. I appreciate receiving this interesting information. I was also pleased to read that a descriptive note is planned for publication in the Marine Turtle Newsletter.

There were two questions that arose while I was reviewing the data in your report. I notice that the average number of eggs per nest varied considerably during the five-year period, 1982-86. For example, in 1982 there were 88 eggs per nest (1,491 divided 17), while in 1984 there were 203 eggs per nest (2,031 divided by 10). Do you have any idea what may have caused these differences? My other question relates to the survival rate of the young turtles after they have been reared for 6 to 8 months. By adding up the column "No. eggs hatched," a total of 3,037 hatchlings have been produced since 1982. How many of these turtles were alive and released at 6 to 8 months of age? Were all of them held to be captive reared, or were some released immediately as hatchlings? I noted that 278 juveniles have been tagged since June of 1983.

Again, thank you for taking the time to answer my letter. I look forward to hearing from you again when your time permits.

Sincerely,

George H. Balazs
Zoologist

bc: Karen Bjorndal
Balazs
HL

Palau Sept. 1985 - Peter Milne WPPO

Turtle Headstart Program

Project leader Becky

- Headstart program began in 1982
- Hawksbill turtle eggs collected & incubated. Hatchlings raised to 6 months of age & released.
- Eggs collected on rock island beaches 80-95 eggs collected each trip & incubated 50-60 days. Many eggs lost on rough boat ride back to MMDC 50% of incubated eggs hatch but many are dehydrated.
- 90-95% of hatchlings survive to 6 mos. Hatchlings are tagged & released on island from which eggs were taken.
- Records indicate 1300 hatchlings released 242 were tagged. Tagging program began in January 1984 No returns yet.
- Turtles in captivity bite each other causing infections
- Major purpose of program is conservation & enhancement. Eggs often pilfered from beaches.
- Japan has donated $18k for project of $120k coming for hatchlings incubation system Strategy is for 50% release 50% for farming.

Presently constructing a simulated beach for captive breeding. 2 6yr old turtles being held for breeding trials

1984 Results

Nests located	71
Nests w/out eggs	61
Nests w/ eggs	10
# Boat trips	26
Hatchlings released	1086

MMDC statistics computer out of commission 2 mos. from power surges. Replacement parts expected.

One Hong Kong boat licensed to fish live grouper for delivery to Hong Kong. Vessel equipped w/ live boat wells. 40 tons capacity per boat

Japanese pearl oyster venture initiated in Palau. 50,000 seed delivered

John Eads licensed to fish in Palau. Leased one of Yamaha 35' vessels to bottomfish for reef

Carving the meat on Satawal

taking steps on their own

PACIFIC DAILY NEWS 3 AUG 86 GUAM

Turtles

By JILLETTE LEON-GUERRERO GUEST
and
TIM ROCK

The decline of the turtle population in the Pacific is of particular concern to atoll residents. Turtles are hunted for their meat here and meat is not always in abundant supply on these isolated isles. In recent years, poaching of these animals by foreign fishing vessels has decimated the population worldwide, putting the havksbill and five other species of sea turtles on the endangered list.

Large foreign fihing vessels, most notably from Taiwan, fish the islanders' waters and hunt turtles at the traditional hunting grounds. The larger vessels able to stay months in the area claim a much larger catch than the island hunters. Atoll residents slaughter only what they can carry in their relatively smaller canoes.

Islanders make annual voyages to unpopulated islands that are known to be breeding grounds. The turtles hunted for the celebration mentioned on the previous pages and pictured above were found on Pig island in the Outer Carolines.

Pig Island is traditionally claimed by the Satawalese who journey to the island during the summer months when the sea is normally calm.

Other islanders wishing to visit the island gain permission from the chief of Satawal although Truk Island also lays claim to it.

Pig is approximately a half mile in diameter. The island has no lagoon and no anchorage.

The only source of water on the island is from two 55-gallon drums used to collect rainwater. Mountain apples and wild taro grow there providing turtle hunters with food and drink.

In recent years, the Satawalese have become increasingly concerned with the conservation of their natural food resources.

Living as they do, the Satawalese keep an ecological balance with their environment.

The chiefs, whose word is law, are responsible for the conservation of the island's resources and have the authority to prohibit harvesting of anything.

A ban on tuba drinking was in effect while the "Isatis" (see page 5) was visiting the island. The chiefs decided that during previous breadfruit seasons too many men were falling out of the trees drunk. This prompted them to put a halt to cutting tuba during the breadfruit season.

The same goes for fishing and hunting. Turtles can only be slaughtered when a chief is present. Hunters have been known to wait over a week for the arrival of a chief to kill a turtle.

While turtle eggs are a favorite delicacy, now that islanders know that turtles are struggling for survival few are collected. When they are collected, they are reserved for the children and the very old.

This pracitce stems from a turtle hatcheries program instigated in the islands in the mid-70s. Education was thought to be the key and advice for promoting the survival of turtles has been heeded by hunters.

Similar to Ducks Unlimited on the mainland where duck hunters are in the forefront of duck propagation, turtle hunters in the islands are assuming a similar role. In addition, a turtle rearing program has been introduced by biologists in Palau.

The journey from Satawal to Pig Island is done in outrigger canoes which must carry the hunters and their supply of food and water. This leaves a limited amount of room for their catch.

While they are concerned, they feel powerless in the fight against the raping of their resources by foreign fishing vessels. The demise of these resources would prompt the death of certain aspects of their culture and rob the world of one of the few natural existences still practiced by man.

Aug 3 Pacific Daily News (in case you haven't seen it yet)

George,
Not sure just how much the problem is any more with Taiwanese fishing vessels in the Yap outer islands , as it is with government field trip ships, etc. The island of "pig" is really "Pikelot" on the charts. Satawalese name is "Peek" which can be spelled "pig" or "pik" or whatever.

islander

photo by Tim Rock

One of the most graceful creatures of the ocean is the sea turtle. Evolution has taken it from land and made it a natural inhabitant of oceans throughout the world. Its powerful strokes and effortless turns and arcs make it an animal scuba divers relish observing.

It has had to sacrifice its mobility on land to gain this proficiency in the water, however. This has meant that adult and baby turtles alike face their most trying times during their abbreviated stays on land. Man and animals have effectively reduced the turtle population worldwide to the point where all species of sea turtles are considered to be endangered.

Turtles have long been a part of Pacific diet and lore. To see that they continue to retain their place in the islands, a unique program in Palau has been instituted. That story begins on page 6.

About the cover: The sea turtle is most vulnerable when it returns to its birthsite to lay eggs. Man has often been a predator but in this week's story, he has become a savior of the sea turtle as well. Illustration by Apolinar Medina.

ONLY YEST

BY DEB WOODSIDE
ISLANDER Staff

1955

The Filipino Community of Guam organization named ***Carmen Dela Cruz*** as its new president.

At the Hilltop Playhouse, Small Miracle premiered under the directorship of Speed Margolies. Among the actors in the play were ***Dr. Jack Baker, Red and Brownie Sorenson, USMC Lt. Col. and Mrs. Charles Barrett.***

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1975

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***A look at some Pan Am nostalgia...bottom
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of Pan Am offices from the Butler building to
of the old Pan Am Hotel used natural ventila***

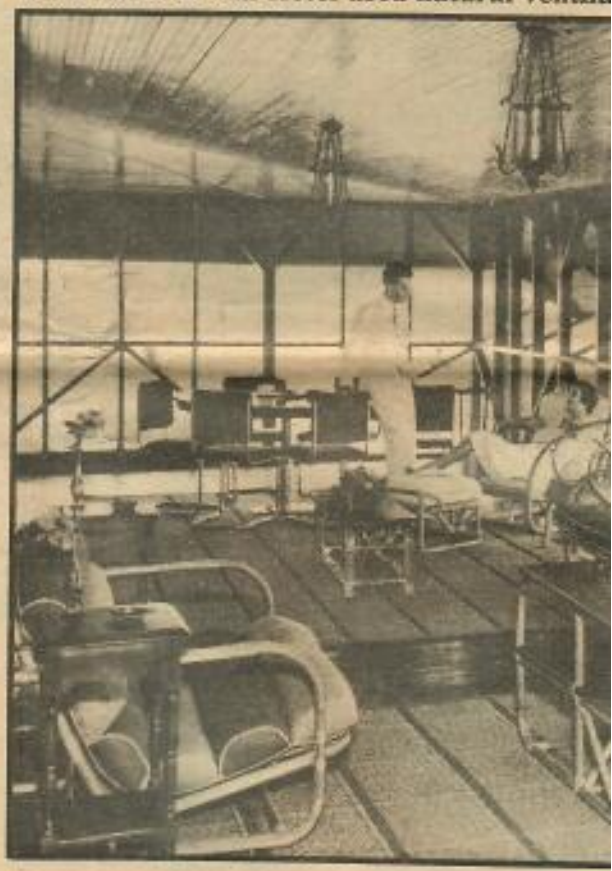

photo by Tim Rock

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Publisher — Lee P. Webber
Managing Editor — Stephen V. Nygard
Editor — Tim Rock
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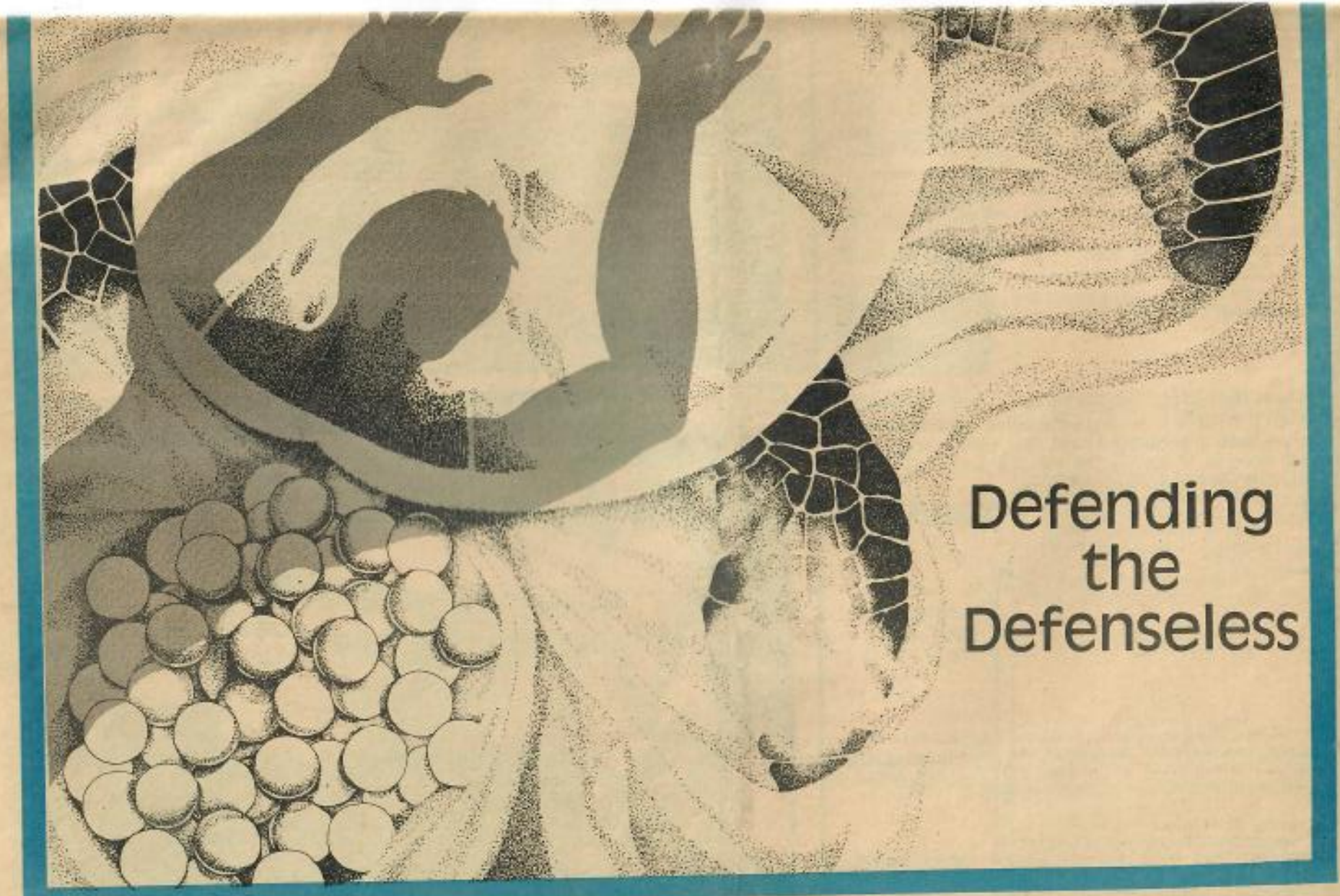
August 25, 1985



Defending the Defenseless

Living Off the Sea

The plight of one large hawksbill was witnessed at Koror's port when the field trip ship arrived from a voyage to the southern islands of Tobi, Sonsoral and Helen Reef. The sea turtles are captured alive so their meat doesn't rot on the long trip back to Palau's main island. This one was transported in a lifeboat. The turtles are virtually helpless on land but are still quite powerful. In picture one, it is unloaded to a nearby pickup, its frenzied thrashing (two) necessitating five men to push it into the bed of a pickup (three). The tailgate of the pickup

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photos by Tim Rock

and carnivorous fish. Since only about 30 to 40 percent of the hatchlings are able to dig their way out, their odds of survival have already been more than halved. After contending with birds, fish and other unfavorable conditions only about two to three percent will actually make it to six months of age.

At the MMDC, Madraisau points out the astonishing difference at the hawksbill survival rate when raised in captivity. The hatch rates increases 10 to 20 percent and instead of only 2 to 3 percent making it to age six months, 95 percent of the babies will grow to an age of increased survival. Since 1982, over 1300 hawksbills have been raised at the lab.

The babies in the tanks at the far end of the holding system are almost as small as painted pet shop turtles. Their miniature antics capture the attention of visitors to the MMDC. Some remark that the little hawksbills are cute; others think they are kind of ugly. Comical they are as they bump into one another and spin in circles. One reaches over and nibbles another's flipper. Another blows tiny bubbles.

Madraisau takes a handful and places them on the wire screen on top of the tanks. They sit motionless for a moment, then each and every one turns and heads toward the sea. He tries to point them toward the water in the holding tanks, but they still head to the sea. He points them completely away from the ocean but they eventually do a 180 and take off.

"It's natural," he tells me, "You can't fool them. They know where the ocean is."

And when this natural call sends the grown hawksbills back to their birth beaches, Madraisau attempts to be there. He estimates that he is able to harvest about 20 per cent of the nests he actually locates in the Rock Islands. "The rest are poached," he says, his expression turning somber.

The poaching he speaks of is by other Palauans. Hawksbills are consumed as part of the traditional economy of Palau. But Becky points out the problem is that traditional ways of harvesting are giving way to the greed of the poachers. Even local people are taking the eggs, undersized turtles and layers. A black market for the eggs and other turtle products is alive and many are ignoring the country's resources in favor of a quick buck.

Still, Madraisau feels he is making some gains in the preservation of the turtles in his country. This year he has instituted a tagging program designed to enable him to better understand turtle behavior and at the same time reveal the effects his program might be having on future mating and laying.

When the turtles are to be set free, Madraisau returns to the exact island, the exact beach, the exact spot where he got their mother's eggs months prior. He releases them here in hopes that he can maintain their balance with nature. The tagging started only recently, 231 individuals carry them, so it may be at least five or six years before he finds out if his incubated babies will return as they would had they been born in nature.

Story & Photos
By TIM ROCK
ISLANDER Editor

The rusty hulk of a ship limped into port. Registered in Taiwan, the old boat wore its years of being at sea tiredly. Streaks of rust adorned its sides and the bridge was a bastion of chipped paint and fogged windows. The crew was sun-parched and tired. They had been on the ocean for months and had hoped to be on their way home. Just south of the Palau archipelago, near the island of Angaur, the old deisel sputtered and complained. After hours of work, it was obvious it would have to find the nearest port for repairs. Sputtering toward Malakal Harbor, the captain sensed trouble but knew of no other way to solve his dilemma.

When customs and immigration officials boarded the aging vessel, they set about checking the ship's and the crew's papers. One officer wandered to the hold of the ship and lifted the hatch cover. He gasped when he saw the cargo. The interior was filled with the muscles of giant clams. Piled on top of them were turtles. They were green and hawksbill sea turles, endangered species that only local islanders were allowed to hunt for subsistence

Many of the green turtles were undersized, barely large enough to make a single meal. Others were layers, female turtles capable of bearing eggs. In the hours of interrogation that followed, the captain revealed that he had stopped on Palau's southern islands of Tobi, Sonsorol and Helen Reef, breeding grounds for hawksbill turtles. The green sea turtles were taken from another unihabitated atoll in Palauan waters. The tridacna clams were killed only for their aductor muscle, the rest of the massive bivalve was left to rot.

In the days that followed, the ship was seized and the crew confined and eventually deported. The captain wired to his company for funds to pay a stiff fine and also left the country. Smart money bet that the same captain and crew would be back in Palauan waters or those of some other small nation raiding the natural resources. Turtle meat and shell fetches a high price in Asian markets. The giant clam trade

may be a billion dollar business. The loss of the rusty scow and the fines imposed was a mere handspanking for these sea pirates.

The depletion of the country's natural resources is a real concern to Becky Madraisau. He is a fisheries specialist at Koror's Micronesian Mariculture Demonstration Center. It has already put Palau on the map for its work in giant clam reproduction. Now Becky is trying to make headway in raising the hawksbill turtle at the facility.

"We hope to increase the population in the Rock Islands," Madraisau says positively.

To do this, he and a team of other biologists and volunteers have been making trips to the islands, which resemble a scattering of emerald mushrooms dotting the deep blue waters of central Palau. Some islands are composed of sheer limestone cliffs but others have secluded beaches and reaching bars of fine, tawny sand. It is here that the hawksbills come to lay their eggs in the late spring and early summer months.

Since 1982, workers have been collecting the eggs from the nests of the turtles and taking

Below: The eggs are retrieved from Palau's Rock Islands.

them back to their facility for incubation. It takes approximately 60 days for the young turtles to hatch from their sand-covered light boxes in the lab. Madraisau checks the potential turtles daily, noting any change in the incubators. Cracks in the sand or raised lumps indicate someone may be stirring. When it happens, he wants to be ready as dozens of miniature hawksbills will spill from their nest and instinctively head to the sea.

Walking along the series of tanks at the MMDC, he points out the various stages of development in the turtles he is currently raising. Some are heading toward independence. Their shells are about the size of a hubcap and they will soon be large enough to be released into the wild. They now recognize the presence of a human as that of the person who feeds them and pop their heads out of the water looking for a handout. Their movements are already smooth and graceful as they glide by to observe the situation.

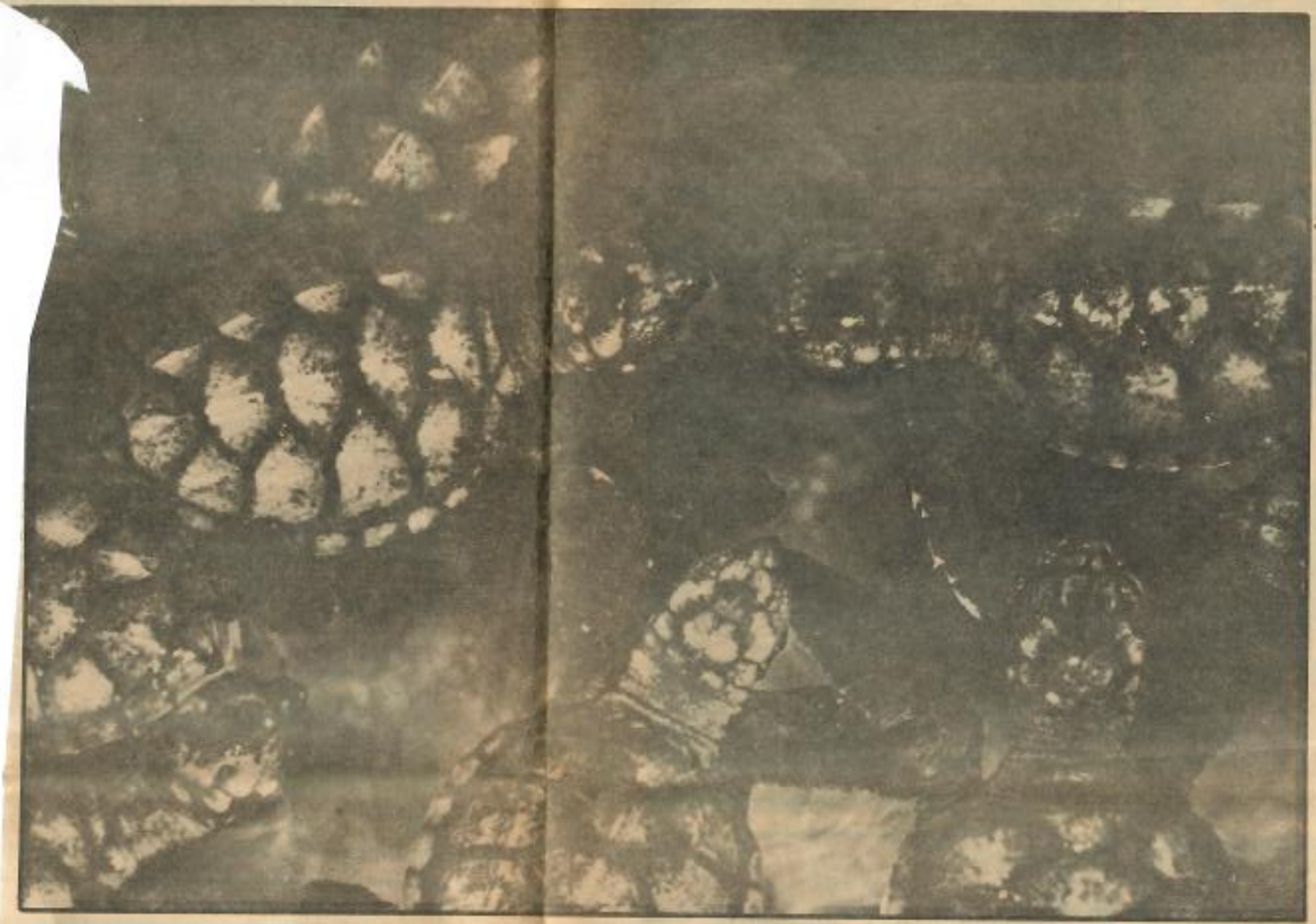
Born swimmers who only return to land to lay eggs or be born, turtles have adapted to the ocean better than most any other reptile. Their lung capacity allows them to remain submerged for more than an hour while active and as long as four hours while resting. They can also suck water into their mouths and absorb the dissolved oxygen through their nasal and oral membranes. Tear glands near their eyes are miniature desalination plants...they remove the salt from the water the turtles take in with their food. Like salmon, they are known to migrate thousands of miles to return to the exact island, reef and beach where they hatched. They employ their navigational computers after eight to ten years of maturation.

When Madraisau steps into the picture to retrieve the eggs that the turtles have traveled so far to deposit, he is doing the miled mother a favor. Within the first three days after a turtle has laid the eggs in the nest, predators ranging from wild dogs and pigs to man gobble or snatch them. Oddly, it seems that after the first few days, the eggs are safe as animals have much trouble finding the nest.

When the frenzied babies burst through the sand and head for the water, they are again faced by a host of predators... mainly sea birds

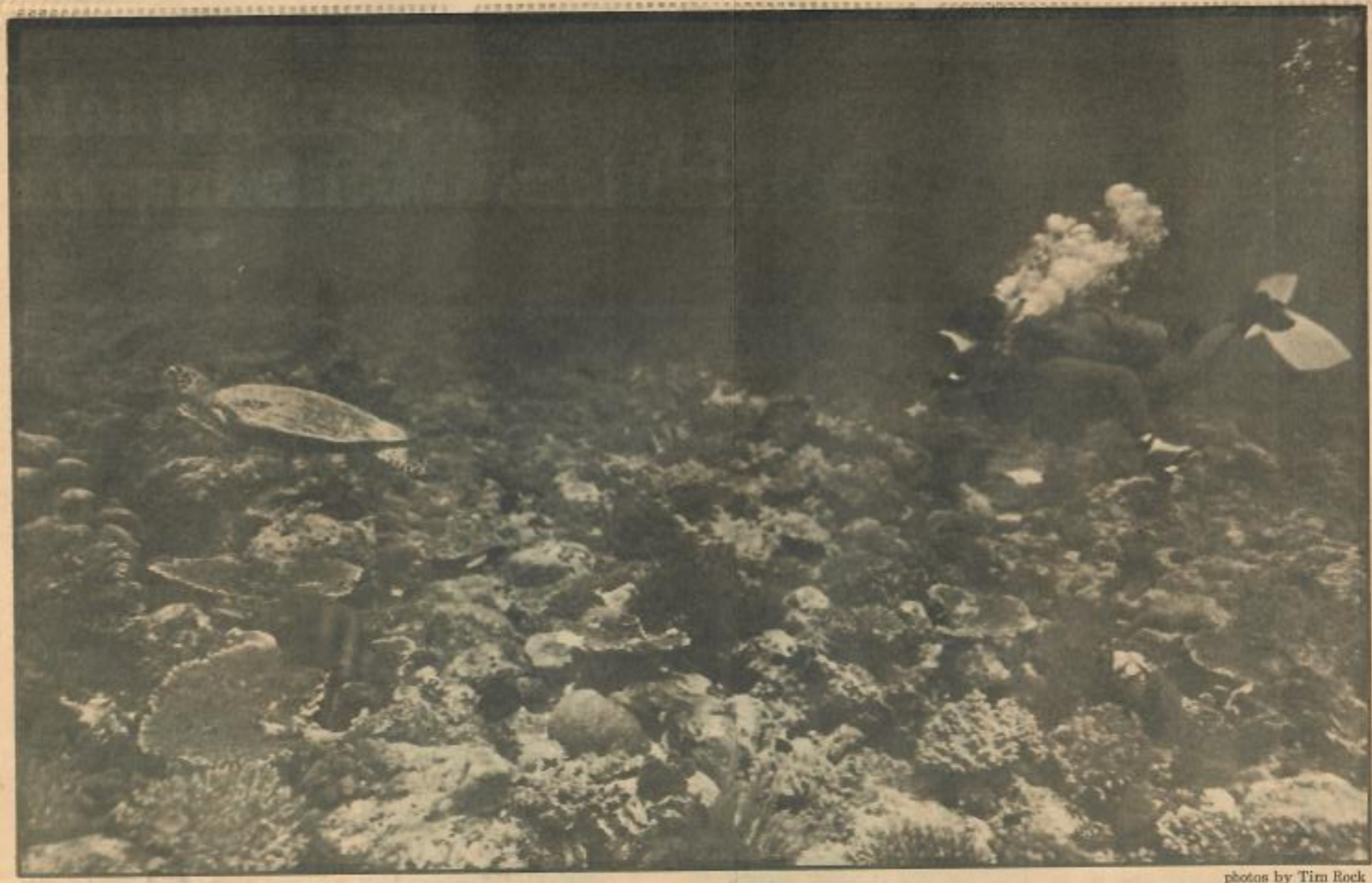
Left: Becky Madraisau inspects holding tanks of young hawksbills at the MMDC. Above: Baby hawksbill sits atop tank cover. Center: Newly born hawksbills try their young flippers.

A Stock in the Future



photos by Tim Rock

Above and left: Natural instincts tell the baby hawksbills to head for the safety of the sea. No matter what direction Madraisau pointed them, they would eventually turn and head for the ocean.



photos by Tim Rock

Madraisau is a strong proponent of conservation, enforcement of protective laws and education of the young to allow them to appreciate their country's resources. The funding for his ongoing project comes from a Japanese group known as the Nippon Turtle Shell Association. It is interested in the farming aspects of raising the hawksbill, he says, and the eventuality of developing a 50 per cent release — 50 per cent slaughter arrangement. But now, farming is still on a proposal basis and bolstering the Rock Island wild hawksbill population is the main goal at the MMDC.

A few days after visiting the turtle project, I was scuba diving in Palau along an outer reef area known as Rebotel. I was the first in my group to slip over the side of the boat. Floating down along the gently sloping coral I spotted the familiar form of a large hawksbill. A Palauan friend once told me that if I wanted to get close to a turtle, I had to look like a turtle. I've never been sure whether he was pulling my leg or not, but the method seems to work.

Tucking my elbows in at my side and slowly fanning my arms, I moved slowly toward the reptile. This one had been around for a while.

Top: At Palau's Blue Corner, a diver watches a turtle graze on algae. Above: A victim of a predator, but still around to tell about it, this hawksbill has lost a flipper and part of its shell from a crescent-shaped bite. Bottom photos: This turtle was taken near Tol island in Truk. In these remote islands, subsistence living is the rule and turtle meat helps supplant the fish and vegetable diet.

His head and flippers were scarred and barnacles grew in various places. A coating of algae graced his huge carapice. He watched me calmly, perhaps in awe or amusement, as I approached his resting place. I guess I was about six feet away when I stopped to observe him. His wrinkled neck craned a little from the shell and his sleepy eyes blinked as we watched each other.

I finally exhaled a telltale stream of bubbles and the spell was broken. He rose slowly, gracefully and with a powerful stroke from his huge front flippers he began to soar. He headed up the reef slope as the sun spilled rays through the blue water, silhouetting his rise. As he was beginning to disappear from sight, he turned and began to soar. He headed back my way like marine hang glider forming a high arc over my head. He seemed to hang motionless for a moment and then, with quick strokes he shot down over the edge of a coral wall disappearing into the depths.

It is Madraisau's hope that this turtle and others for generations to come will grace the abundant reefs of Palau.

MICRONESIAN MARICULTURE DEMONSTRATION CENTER
POST OFFICE BOX 359
KOROR STATE
REPUBLIC OF PALAU, 96940

July 28, 1986

George H. Balazs
NMFS-SFCH
2570 Dole Street
Honolulu, Hawaii 96822-2396

Dear Dr. Balazs,

This is a reply to your letter dated June 30. I believe I can answer most of your questions about my report.

I went back through the 1984 raw data- as opposed to the year end report I used to write the report. There were 20 not 10 nests with eggs. This gives an average of 101 eggs per nest in 1984. I believe the confusion was caused by the fact that only 10 of the 20 nests hatched. That year had a high percentage of nests which were not fertalized at all or had few eggs fertalized. We have no ideas as to why. It has not happened since.

As to our survival rate; We released 1381 6-8 month juveniles out of those 3037 hatchlings. The mortalities are highest from 3 to10 weeks of age. I think overcrowding may be a factor. Our new equipment from the Japan Tortoise Shell Association has arrived. This shipment includes new fiberglass rearing tanks which should help alleviate the overcrowding problem. We also average about 10 hatchlings a month "missing" We believe the animals are taken by visitors as possible pets, or released by children to see them swim away. Security is being tightened so our numbers of missing animals is diminishing.

I am begining to standardize that taking and recording of project data. New data on growth and mortality within one hatching will be kept. Experimentation with feeding patterns and space requirements is planned. Hopefully a comprehensive study of the head starting program will be availablewithin the next few years.

This brings me to my last topic. I am interested in going to graduate school and continuing my studies of sea turtles. Could I please ask you to recommend a graduate school or professor where this may be possible. Better yet do you know of any way I could use the MMDC pragram as a thesis project?

Thank-you once again for your time and interest.

sincerely,

Elisabeth Broughton

Elisabeth Broughton

Elisabeth Broughton
MMDC
PO Box 359
Koror, Belau 96940
Sept 20, 1986

Lewis D Consiglieri
Protected Species Program
Western Pacific Programs Office F/SWR1
National Marine Fisheries Service
2570 Dole Street
Honolulu, Hawaii

Dear Mr. Consiglieri,

Please forgive the inordinate amount of time which has passed before I was able to reply to your letter dated July 25, 1986. I have been stateside with a family emergency and just received the letter.

Belau has two distinct turtle populations. What facts I do have are as follows.

The green turtle population nests on the beaches of the southwest islands (Tobi, Sonsorol, and Helens Reef) Although the greens nest all year round; a peak in laying occurs in the summer months, especially August. We have no data on the number of nests or the size of the adult turtle population present in the SW island colony. Due to the 350 mile distance from Tobi to Koror and the increase in foreign commercial fishing in the area, the SW island's green turtle population is subject to heavy commercial poaching. Green turtles feed in conspicuous numbers inside the barrier reef surrounding the main islands of Belau. They are common in the lagoon patch reefs, grass flats, sand areas fringing the mangrove swamps. I do not know if these animals are part of the population which nests in the SW islands. Greens are not known to nest in the main island area. Greens from the SW islands have been tagged in the past but no tags have been returned.

The Belau hawksbill turtle population nests on the small beaches of the uninhabited rock islands south of Koror and on the beaches of Peleliu, Angaur, and Kayangel. The hawksbills nest all year round in fairly consistant numbers. The MMDC headstart program removes nests from the rock island area. In 1985 we found 57 nests, in 1984 we found 71 nests, and in1983 we found 81 nests. I would guesstimate these nests represent 60% of the nests layed in Belau per year. The adult hawksbills feed on the outward edges of the barrier reefs and drop offs. Juviniles can be found amoung the patch reefs inside the lagoon area.

There have been no recent survays of the size of the Belau turtle populations. It is possible to rent a small airplane to conduct an aerial survay if you find you need more comprehensive data.

As for the turtles abandoning habitats due to human disterbances, I know of no permanant displacements. Increased use of the rock islands for recreational purposes has detered some hawksbill nesting. Lights or fires on the beach at night will scare a female hawksbill looking for a nesting site back into the water. So far none of the recreational beaches seem to be completely abandoned. Increased use of power boats has driven the hawksbills from the main channels. They seem to be disturbed by the engine noise. The turtles feed all over the reef system surrounding the main islands. Thus any dredging or construction will affect turtles in the general vicinity. As long as the above alterations are done in moderation, I cannot see them harming the overall population. To date poaching has had a far greater impact on Belau's turtles than any construction or dredging.

If I can help you with any arrangements for your upcoming visit to Belau please do not hesitate to write. Did you know we have dormitory space at the MMDC lab? I look forward to meeting you and answering any further questions you may have.

Sincerely,

Elisabeth Broughton

Elisabeth Broughton, PCV

REEF

HAWKSBILL NESTING SITES

GREEN FEEDING AREAS (ALSO JUV. HAWKSBILL)

HAWKSBILL FEEDING AREAS

This map is not too official but it should give you an idea of the areas involved

The rock islands are the most important feeding and laying areas

To: David Carr
102 West Third Avenue
Tallahassee, Florida 32303

From: Marc L. Spaulding
Dept. Sociology
U.O.G. Station
Mangilao, Guam 96923

Re: Hawksbill Turtle Farm, Koror, Palau

While on University of Guam business in Palau, I happened to learn of a mariculture project in the city of Koror. The project, although supported by modest funding, is well organized and large enough in size to be of interest to the C.C.C. Perhaps information sharing between C.C.C. and MMDC (Micronesian Mariculture Demonstration Center) would be beneficial to both organizations.

The MMDC project is about two years old, and include the farming of:

1. Hawksbill turtle
2. Giant clams, and
3. Reef fish which are native to Palauan waters.

The turtle farming project was begun with $28,000 donated by the Japanese Turtle Shell Association. As you know, turtle shell is highly valued in Japan and I believe that the "seed" money for the farm home in Koror is to help ensure a constant supply of Hawksbill turtle shell for jewelry, combs, and the like.

Hawksbill turtle shell products are readily available on both the islands of Palau and Yap here in the Micronesia. One of the major reasons that the killing of Hawksbill turtles continues in the outlying islands is that there is no enforcement mechanism for the fines and sentences to be imposed on would-be poachers. The simple fact of the matter is, that here in Palau anybody who wants to can catch Hawksbill turtle. Furthermore, the government has no boat to patrol the nesting grounds in the southern Rock Islands where it is relatively easy to get turtle.

The following is a summary of the information I was able to obtain about the farming project in Palau.

Project Director: Becky B. Madraisau, MMDC
P.O. Box 359
Koror, Palau 96940

-Although Becky has no formal training in biology/ecology he seems very energetic and quite capable.
-He stated that his major goal is the "conservation" of the Hawksbill turtle.

Project Data:

1. Over 1500 Hawksbill turtles have been released in the last two years
2. Currently there are 375 turtles being raised in tanks. Turtles vary in size from the hatchling stage up to about 4-5 inches carapace.
3. Turtles are returned to the sea when their carapace reaches 20 cm.
4. The released turtles are tagged with a small plastic tag in the rear flipper. I was unable to obtain any information regarding tag returns from Mr. Madraisau.
5. Turtles are fed a diet of sardines which Becky catches himself.

I hope that the above information is of some use to you in your efforts at turtle conservation. If there is anything I can do to assist those efforts, please feel free to call me.

ON

M. L. Spalding

THE MMDC BULLETIN

NEWSLETTER OF THE MICRONESIAN MARICULTURE DEMONSTRATION CENTER
P. O. BOX 359, KOROR STATE, REPUBLIC OF PALAU 96940

September 1987 V.2.5

Hawksbill Turtle Hatchling Recovered

Hawksbill turtles are highly valued for their edible meat and beautiful shells, which are often fashioned into jewelery. The extensive trade in tortoise shell creates a large demand for hawksbills throughout their range in tropical waters. These turtles are listed as "Endangered" under the CITES Convention as well as the U.S. Endangered Species Act.

Each year the MMDC Hawksbill Turtle Project staff hatches and raises several hundred specimens to about six months of age. The young turtles are then tagged and released into the wild. The objective of this work is stock enhancement - to help reverse the apparent trend of this species toward extinction. The leader of the MMDC Turtle Project is Mr. Beketaut **Madraisau**.

What happens to the "headstarted" turtles after being released? Usually it is a mystery. On 3 July 1987, however, a hawksbill turtle bearing MMDC tag # 278 on its rear flipper was captured alive and well at Tumon Bay, Guam, by Mr. and Mrs. Agapito **Terlaje** of Asan. The turtle had been released 15 months earlier (12 March 1986) from Ngermeyaus Beach, Palau. Between release and capture it had nearly doubled in carapace length (17.5 cm to 34.3 cm) and traveled a distance of more than 1300 kilometers (806 miles). After being carefully measured and photographed by Guam Conservation Officer Mr. Robert D. **Anderson**, the Palauan turtle was liberated once again. This incident provides evidence that some hawksbill turtles can survive, grow and travel great distances after being hatched and raised in captivity.

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Shipment of the 6,000 clams to Yap was completed in January 1987. The clams were placed in shallow, subtidal nurseries, protected by plastic cages sent from the MMDC. After six months on the reef at Yap the clams were inventoried by MRD personnel. Survival was 5,770 out of 6,000 (96.2%), and mean growth rate was 5.7 mm per month, ranging from 2.3 to 8.1. mm per month (Table 1). Following the inventory the mesh lids were removed from the cages and MRD staff began transplanting the clams to growout sites in the villages of Yap. MRD's objective, which is now close to completion, is to establish demonstration-scale clam nurseries in each of the approximately 40 villages of Yap, including the outer islands. MRD has trained residents of each village in clam nursery culture methods, and responsibility for care and surveillance of the clams rests directly with the villages. (Source: PFDF Project 59A Quarterly Report, June 1987)

Table 1. Mean growth of maricultured *Tridacna derasa* transplanted from Palau to Yap.

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MMDC Manager Mr. Gerald **Heslinga** was in Hawaii this month to take part in an organizational meeting of the newly-established Center for Tropical and Subtropical Aquaculture. One of four regional centers in the US, the Honolulu-based CTSA is an outgrowth of the National Aquaculture Act of 1980, the Agriculture and Food Act of 1980 and the Food Security Act of 1985. The CTSA will be jointly adminstered by the University of Hawaii and the Oceanic Institute, and will be responsible for disbursing some $750,000 each year in grants for aquaculture development in Hawaii and the the US Insular Pacific. The emphasis of CTSA-funded projects will be on applied aquaculture research, with significant private-sector input. Mr. Heslinga was invited to serve a two-year term on the CTSA Technical Committee, the main functions of which are to recommend aquaculture R&D priorities for the region, to review project proposals submitted to the center, and to prepare an annual work plan and accomplishment report.

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ISLANDER (GUAM) AUGUST 3, 1986

Carving the meat on Satawal

taking steps on their own

Turtles

By JILLETTE LEON-GUERRERO GUEST
and
TIM ROCK

The decline of the turtle population in the Pacific is of particular concern to atoll residents. Turtles are hunted for their meat here and meat is not always in abundant supply on these isolated isles. In recent years, poaching of these animals by foreign fishing vessels has decimated the population worldwide, putting the hawksbill and five other species of sea turtles on the endangered list.

Large foreign fihing vessels, most notably from Taiwan, fish the islanders' waters and hunt turtles at the traditional hunting grounds. The larger vessels able to stay months in the area claim a much larger catch than the island hunters. Atoll residents slaughter only what they can carry in their relatively smaller canoes.

Islanders make annual voyages to unpopulated islands that are known to be breeding grounds. The turtles hunted for the celebration mentioned on the previous pages and pictured above were found on Pig island in the Outer Carolines.

Pig Island is traditionally claimed by the Satawalese who journey to the island during the summer months when the sea is normally calm.

Other islanders wishing to visit the island gain permission from the chief of Satawal although Truk Island also lays claim to it.

Pig is approximately a half mile in diameter. The island has no lagoon and no anchorage.

The only source of water on the island is from two 55-gallon drums used to collect rainwater. Mountain apples and wild taro grow there providing turtle hunters with food and drink.

In recent years, the Satawalese have become increasingly concerned with the conservation of their natural food resources.

Living as they do, the Satawalese keep an ecological balance with their environment.

The chiefs, whose word is law, are responsible for the conservation of the island's resources and have the authority to prohibit harvesting of anything.

A ban on tuba drinking was in effect while the "Isatis" (see page 5) was visiting the island. The chiefs decided that during previous breadfruit seasons too many men were falling out of the trees drunk. This prompted them to put a halt to cutting tuba during the breadfruit season.

The same goes for fishing and hunting. Turtles can only be slaughtered when a chief is present. Hunters have been known to wait over a week for the arrival of a chief to kill a turtle.

While turtle eggs are a favorite delicacy, now that islanders know that turtles are struggling for survival few are collected. When they are collected, they are reserved for the children and the very old.

This pracitce stems from a turtle hatcheries program instigated in the islands in the mid-70s. Education was thought to be the key and advice for promoting the survival of turtles has been heeded by hunters.

Similar to Ducks Unlimited on the mainland where duck hunters are in the forefront of duck propagation, turtle hunters in the islands are assuming a similar role. In addition, a turtle rearing program has been introduced by biologists in Palau.

The journey from Satawal to Pig Island is done in outrigger canoes which must carry the hunters and their supply of food and water. This leaves a limited amount of room for their catch.

While they are concerned, they feel powerless in the fight against the raping of their resources by foreign fishing vessels. The demise of these resources would prompt the death of certain aspects of their culture and rob the world of one of the few natural existences still practiced by man.

1-12-85

Dear George,

It's another busy term for me at Lewis & Clark. I'm quite pleased with my classes and thrilled with the fact that I've finally got a term off from Chemistry.

My trip to D.C. was one of mixed emotions. I did receive a grant to cover almost all of my expenses, which was nice! I found Emily to be kind, on the ball, and very busy. Most of my time was spent reading and re-reading trade reports from Tokyo, Nagasaki & Osaka. It was unclear as to the final outcome of my time spent at the Center until the last few days. It was then that Emily did spend some time with me. It seemed as if she was impatient with my work, but as of then I was still unsure as to what she actually wanted. An outline was worked up and I brought all of the information home with me.

Christmas break proved to be

super busy. Work kept me at the store 10-12 hours a day, so by the time I got home I was beat. Needless to say, I did not have much time to spend working on the paper.

So, here I am with all of the information and only a few hours here + there to work on the paper.

Graduation in the spring is drawing near and the job search is on. I've decided to hold off on grad school; at least until I've got my feet on the ground. I'm planning on sending out resumes to aquariums on the West coast and larger corporations including 3M, Purina. I'm kind of worried that a B.S. will not be good enough to get me a job. Obviously, I'm not in search of something for forever, but it would be nice to at least be working in

the field of biology.

I've received word from MMDC in Palau and the news isn't good. Apparently the living areas designed for visiting researchers have been turned over to the Palauans. Jerry Heslinga did not sound very optimistic. Have you received word of anything from MMDC?

Thanks for the articles on the genetics studies. They were interesting.

Hope your holidays were filled with love + good cheer!

Take care,

Claudia

box 1290
Lewis & Clark College
Portland, Oregon
97219

THE MMDC BULLETIN

NEWSLETTER OF THE MICRONESIAN MARICULTURE DEMONSTRATION CENTER
P. O. BOX 359, KOROR STATE, REPUBLIC OF PALAU 96940

September 1987 V.2.5

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THE MMDC BULLETIN

NEWSLETTER OF THE MICRONESIAN MARICULTURE DEMONSTRATION CENTER
P. O. BOX 359, KOROR STATE, REPUBLIC OF PALAU 96940

December 1986 V.1.1

The Micronesian Mariculture Demonstration Center is a Palau Government facility dedicated to promoting the cost-effective cultivation of economically important aquatic species. Founded in 1973, the MMDC serves the communities of Palau and Micronesia by conducting applied research on the biology of high-priority species, by developing the technology to culture these species in captivity, and by transferring this technology - both locally and internationally - through demonstration, training, and seed distribution. These activities are supported primarily by grants from the governments of the United States and Japan.

In addition to promoting aquaculture research and development, the MMDC serves as a regional center for marine science education and as a base for visiting international scientists. For the past 5 years the MMDC, in cooperation with the Koror State Government and the Palau Department of Education, has offered a summer course in marine biology for local high school students. The MMDC is also a very popular tourist attraction, both for international visitors and local residents.

Recent research projects carried out at the MMDC include studies on the behavioral ecology of the chambered nautilus, the chemistry of Palau's marine lakes, the physiological ecology of seagrass beds, the symbiotic association of algae with their giant clam hosts, and the growth, reproduction and conservation of commercial trochus shells.

Long-term projects currently underway at the MMDC include a hawksbill turtle hatchery, a freshwater shrimp hatchery and a giant clam hatchery. So far more than 1,400 juvenile turtles have been hatched at the center and released into the wild. The turtle project is presently being expanded with grants from the Japan Tortoise Shell Association and the Government of Japan.

Palau's giant clam hatchery is the first and largest of its kind in the world. It has been instrumental in developing the technology for mass cultivation of this rare and valuable food commodity. The work has been funded by a 3-year, $240,000 grant from the Pacific Fisheries Development Foundation (NMFS/NOAA). To date the project has resulted in the production of 700,000 seed clams and more than 20 tons of biomass . Some 35 technicians from around the Pacific Basin have been trained, and the MMDC has served as a model for the initiation of clam culture programs in 12 Pacific nation-states: Palau, Yap, Saipan, Truk, Pohnpei, Kosrae, the Marshalls, Hawaii, the Philippines, American Samoa, the Cook Islands and Australia.

MMDC Receives D.O.I. Grants

The U.S. Department of the Interior's Office of Territorial and International Affairs has awarded 2 grants totalling $143,000 to the MMDC for FY 1987 programs. One grant will allow the MMDC to upgrade the physical plant and to implement a preventive-maintenance program for office, laboratory and dormitory facilities. Air conditioners in the library, dormitories and equipment rooms are being replaced, as are the large appliances - stoves, refrigerators, washers and dryers - in the dormitories and apartments. Laboratory boats and trucks are also being repaired or replaced. These improvements will enhance the revenue-generating capacity of the MMDC's Visiting Scientist Program, earnings from which are used for maintenance. The ongoing mariculture projects will benefit by the installation of a new security fence around the perimeter of the facility and by the replacement of aging seawater pumps and aerators.

A second D.O.I. grant has permitted the MMDC to hire **Mr. Gerald Heslinga** as laboratory manager and **Mr. Thomas Watson** as leader of the giant clam project. Both recently completed multi-year contracts with the Pacific Fisheries Development Foundation.

Sea Grant Assists Integrated Farm Project

A private farmer and pond owner in the village of Oikuul is reactivating the culture of freshwater shrimp (*Macrobrachium*) in Palau, thanks to the involvement of Sea Grant Hawaii and the MMDC.

Earlier this year **Mr. Besure Kanai**, who raises vegetables and pigs at his 8-acre farm, requested extension services - training and shrimp postlarvae - that would enable him to produce and market shrimp from his 14 freshwater ponds. In November, Sea Grant dispatched shrimp hatchery expert **Mr. Howard Deese** to Palau for a 2-week consultancy. Mr. Deese collaborated with **Mr. Obi Orak, Mr. Gus Naruo and Mr. Lorenzo Katosang** in renovating the MMDC *Macrobrachium* hatchery. Postlarvae are now being produced for stocking the Oikuul ponds.

In December, Sea Grant extension agent **Mr. Mark Brooks** visited Palau for 2 weeks, offering technical assistance to Mr. Kanai, Mr. Orak and **Ms. Nancy Wong**. The Oikuul farmsite presents an excellent opportunity to integrate agriculture with aquaculture, using livestock wastes to fertilize ponds. Integration makes good economic sense to rural farmers because it can dramatically reduce the cost of conventional inputs like feeds and fertilizers.

Hawksbill Headstarting in Palau

The hawksbill sea turtle, *Eretmochelys imbricata*, is an endangered species listed on Appendix I of CITES - the Convention on International Trade in Endangered Species of Wild Fauna and Flora. The MMDC is one of many laboratories around the world operating "headstarting" programs for marine turtles. These programs are based on the hypothesis that husbandry and subsequent release of young turtles enhances the net replacement rate of wild populations. The Palau effort is supported by grants from the Japan Tortoise Shell Association and the Government of Japan, through its JICA (Japan International Cooperation Agency) program.

Palau's hawksbill population lays eggs year-round on the small beaches of the rock islands south of Koror. Nests and nesting females are totally protected by law in Palau, but enforcement is problematical. The result is that hawksbill nests are almost always raided by poachers, who consider the newly laid eggs a delicacy.

Any eggs located by the MMDC turtle project staff are transferred from their natural nests to an incubating room at the laboratory. The eggs are transported, incubated and hatched in styrofoam boxes filled with sand from the natal beach. Upon hatching, the young turtles are placed in concrete raceways which are flushed with a continous flow of sea water.

The hatching rate averages 51%, including apparently infertile eggs. The hatchlings are raised to an age of 6-8 months on a diet of locally-caught sardines. Prior to release they are tagged on the right rear flipper with a 2-piece tag of yellow plastic (25 x 5 mm). Each tag is numbered on the upper portion and reads "MMDC PALAU - JAPAN" on the lower. Measurements of the length and width across the carapace as well as any unusual marks are recorded at the time of tagging.

So far 7,255 eggs have been collected, 3,500 turtles hatched, and 1,423 juveniles released. The current survival rate from hatching to 6 months is about 60%. Tagging began in mid-1983. To date, 309 juveniles have been tagged. Any information on these tagged animals or their tags can be sent to **Mr. Beketaut Madraisau**, the MMDC turtle project leader. (Modified from **Broughton**, 1986).

Recent Reports

Broughton, E. 1986. Hawksbill headstarting in Palau. Marine Turtle Newsletter 38:4.

Heslinga, G. A., Orak, O. and M. Ngiramengior. 1984. Coral reef sanctuaries for trochus shells. Marine Fisheries Review 46: 73-80.

Heslinga, G. A., Perron, F. E. and O. Orak. 1984. Mass culture of giant clams (f. Tridacnidae) in Palau. Aquaculture 39: 197-215.

Lopez, M. and G. A. Heslinga. 1985. Effect of desiccation on *Tridacna derasa*: implications for long-distance transport. Aquaculture 49: 363-367.

January 27, 1986 F/SWC2

Mr. Becky B. Madraisau
MMDC
P. O. Box 359
Koror State
Republic of Palau 96940

Dear Becky,

I am eager to learn how your hawkbill conservation project has been progressing since I last corresponded with you some months ago. Enclosed are several recent publications that I thought you would find interesting. One of them describes the successes we obtained in the experimental use of small metal flipper tags on hatchling green turtles.

I would really appreciate hearing from you. Please let me know if there is any way I can be of assistance.

Sincerely,

George H. Balazs
Zoologist

Enclosure

cc: Balazs
HL

U.S. DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
Southwest Fisheries Center
Honolulu Laboratory
P. O. Box 3830
Honolulu, Hawaii 96812

March 26, 1986 F/SWC2:GHB

Ms. Elisabeth Brougton
P. O. Box 359
Koror State
Republic of Palau 96940

Dear Elisabeth,

Dr. Archie Carr at the University of Florida recently sent me a copy of the letter you wrote to him mentioning your work as a Peace Corps Volunteer in the Palau hawksbill headstart program. Both Dr. Carr and I are members of the IUCN Marine Turtle Specialist Group, a meeting of which we just attended last week in Waverly, Georgia. Our Group is very much interested in learning more about the status of the Palau project. We are willing and able to provide assistance in whatever way that may be necessary and appropriate. It would therefore be greatly appreciated if you would write at your earliest convenience providing us with a summary of current project activities, including future plans.

I have enclosed several publications on sea turtles that you may not presently have in your collection. I look forward to hearing from you.

Sincerely,

George H. Balazs
Zoologist

Enclosures

cc: Dr. Archie Carr
Dr. Karen Bjorndal

19 hours ahead

Tel. 266

MMDC Box 359
Koror, Palau
Caroline Islands 96940

4 August, 1983

Mr. George Balazs
National Marine Fisheries Service
Honolulu Laboratory
P.O. Box 3830
Honolulu, Hawaii 96812

Dear George,

Thank you for your letter of 13 July and the very valuable reprint set. I really admire the work you have been doing on turtles.

My own work involves mariculture of commercially important molluscs. Right now I am raising trochus and giant clams, with support from the Pacific Tuna Development Foundation.

There is a hawksbill headstarting project underway in Palau, and it is under the direction of Mr. Becky Madraisau, a Palauan mariculture technician. Eggs are collected from beaches in nature, brought back to the laboratory for incubation, and the hatchlings are reared in a flow through raceway for about 6 months before being released. Until recently none of the turtles were being tagged, but this year a group from the Japanese Tortoise Shell Association sent a small number of plastic tags for testing. Tagging is not yet an integral part of the program, though.

There are two things that concern me about the project. One is that our staff has very limited expertise in this area, and is largely unaware of the activities of other workers in the field. However. it is extremely unlikely that the government of Palau would appropriate funds for the hiring of a prof essional turtle biologist to head the project.

The second problem is that the Japanese Tortoise Shell Association has approached the government of Palau with a proposal to start a commercial turtle farm here. They have already donated $10,000 to the MMDC and appear intent on starting a farming venture. It seems clear that the local government views this as a positive development and will welcome the investment. Whatever effects the commercialization of the headstaring program will have on the resource seem to be of minimal concern at the moment.

I hope you will treat this information as confidential. You undoubtedly understand that in developing countries, many or most decisions regarding resource use are politically and economically motivated. I think that in this case the Japanese turtle people will gain control of the resource simply because they are making the highest bid.

My intent in sending a notice to the Marine Turtle Newsletter was to attract the attention of professionals like you who might be in a position to come to Palau and evaluate the situation. Little or no work has been done on hawksbills here and I think the situation would be much improved if a serious biologist spent some time out here. It would then at least be possible to present the government with a status of the resource report and to suggest alternatives to commercial turtle farming. At present they don't seem to have much choice other than to accept the Japanese proposal.

I enclose two proposals regarding the commercial farming concept in Palau. These are my only copies and I would ask that you return them when you are finished.

Sincerely,

Gerald Heslinga

Gerald Heslinga

4 Palau policemen accused of Rock Island poaching

Koror High Chief seeks customary fines

By ROMAN YANO
For the Daily News

KOROR, Palau — Four members of the Palau National Police force were found Tuesday night illegally fishing in a well-known conservation area in the Rock Islands, according to state government officials.

Chief of the detective division Capt. Besure Kanai, Lt. Isechal Elewel, Det. Sakai Ngirchokebai and police officer Johanes Ding were found by six Koror Public Works employees fishing in Ngerumekaol — a fish spawning ground , government officials said.

Palau's Rock Islands, loated in the southern half of the archipelago, are a cluster of scenic lagoon islands renowned for their lush natual beauty and rich, varied marine life.

According to one of the men who claims to have found the police officers, the six workers were assigned by Koror state mayor and High Chief Yutaka Gibbons to patrol the spawning area since this was the season for the fish run in Ngerumekaol.

The workers said they saw the four police officers fishing in the area around 8:30 p.m. and reported their findings to Gibbons.

According to local customs and public laws, all fishing is prohibited in Ngerumekaol — a place known for spawning "Red Snapper" a fish considered a part of the island regular diet.

State officials said the Koror state government will take action against the police officers for the violation and a fine is expected to be levied against the men but the amount of the fine has not been established. Officials said a meeting of village chiefs has been called to discuss and determine the fine.

MICRONESIAN MARICULTURE DEMONSTRATION CENTER
POST OFFICE BOX 359
KOROR STATE
REPUBLIC OF PALAU, 96940

May 28, 1986

George H. Balazs
National Marine Fisheries Service
South west Fisheries Service
PO Box 3830
Honolulu, Hawaii 96812

Dear Dr. Balazs,

Thank-you for your publications and interest in the Palau headstart program Forgive my delay in responding but I have been off island on vacation.

Enclosed is a short report I have written summerizing the evolution of the project since its start in 1982. It also includes a data summary and future plans. Much raw data is available, unfortunately records have not been kept consistantly for the duration of the project.

We would welcome any comments, suggestions, or assistance you could offer. Should you have any further questions please do not hesitate to write.

Sincerely,

Elisabeth C Broughton

Elisabeth Broughton

Background

The Hawksbill turtle (Eretmochelys imbricata) conservation and headstart program was commenced in 1982 at the Micronesian Mariculture Demonstration Center. Mr. Becky Madraisau is the project leader. Although MMDC is supported by the Marine Resources Division of the Government of Palau the turtle project receives its funding from the Japan Tortoise Shell Association. Hawksbill turtles can be taken in Palauan waters; however, national laws set protected seasons and minimum size requirements. Nests and nesting females are totally protected. Unfortunately, these statutes are currently not enforced. The project's goals are: to protect turtle nests by removing them from the reach of local egg collectors, and to suppliment the adult population by increasing hatchling survival rates thru headstarting. Palau has a steady population of Hawksbills which nest throughout the year; hence is an excellent location for this conservation effort.

Methods

T Turtle nests are located by patroling the numerous small beaches of the rock islands south of Koror. An outboard motorboat is used. It travels well in shallow water and can be easily beached if turtle tracks are spotted. Trips are made in the early morning two or three times a month. Originally, fifty percent of the nests found were counted but left in place on the beach. The other fifty percent were placed in styrofoam coolers and transported to the lab. Those left in nature after having been disturbed were found to have poor hatching rates and a high incidence of spoilage. These nests were also still subject to being removed by poachers. Currently, all newly laid nests found are removed to the laboratory. Styrofoam coolers with holes punched in the bottom and lid are lined with fine mesh then filled with a two inch layer of sand. Eggs are placed in adjacent rows. A second layer of eggs is started directly ontop of the first if necessary. A second two inch layer of sand covers the eggs and the whole is transported back to the lab by boat. Nests which are several days old (or older) when found are left undisturbed for a month before being removed to the lab. This ensures the eggs will not be handled during the critical stages of development. Eggs moved during the time interval of 3 days to one month after hatching suffer high mortality.

Eggs are incubated undisturbed in the styrofoam containers used for transportation. The incubating room is non-air-conditioned with open windows. Temperature is moderated by lighting 60 watt light bulbs under the containers should the weather turns cool. Sand is remoisted as necessary. Dehydration has been a problem in the past.

Upon hatching the turtles are removed to a dry, sand bottomed one thousand liter tub until the yolk sac has diminished. Unhatched eggs are left for several days then are checked for fertalization and development stages. Hatchlings are next moved to a seventy five by five by three foot run. The run is outdoors but covered from direct exposure by a translucent roofed shed. The run is divided into three by five by three foot sections by preforated fiberglass sheets. It has a constant flow of fresh seawater. The tank bottom is syphoned as necessary.

Turtles are fed once a day in the morning. Chopped tuna was originally used but this was found to excessively foul the tank water. There was also a danger of high mercury levels in the fish. Sardines (Harengula ovalis) and hardy heads (Allanetta woodwardi) are now used as feed. These are caught using throw nets. Gathering trips are combined with egg collecting trips as the schools are usually found in the shallow water before the beaches. The sardines are refrigerated or frozen until needed. Adult turtles are fed whole sardines. The fish are chopped into one half inch sections for the juvenile turtles. Hatchlings are fed by suspending headless sardines at the water's surface from wires. This eliminates death by starvation of hatchlings who are too buoyant to dive to retrieve fish from the bottom of the run. Approximately once a month the shells of all the turtles are scrubbed to remove algae and other paracites which may inhibit growth.

There are problems with the juvenile turtles biting each other. The joint of the front flipper and neck, and flipper extremities are commonly chewed areas. A turtle being noticeably damaged is removed to a separate section until healed. Once the biting has started it will continue until the flipper is chewed to a stump unless the animal is removed. A second way this is combated is keeping low numbers of animals in separate sections.

Turtles are kept in the hatchery until they are about twenty cm. carapace length or six to eight months. The animals are tagged with a one inch, yellow plastic, tag in the right rear flipper. Across the curve measurements are taken of carapace length and width and any deformities are noted. The animals are either taken back to the rock islands for release or let go from the MMDC seawall.

Future

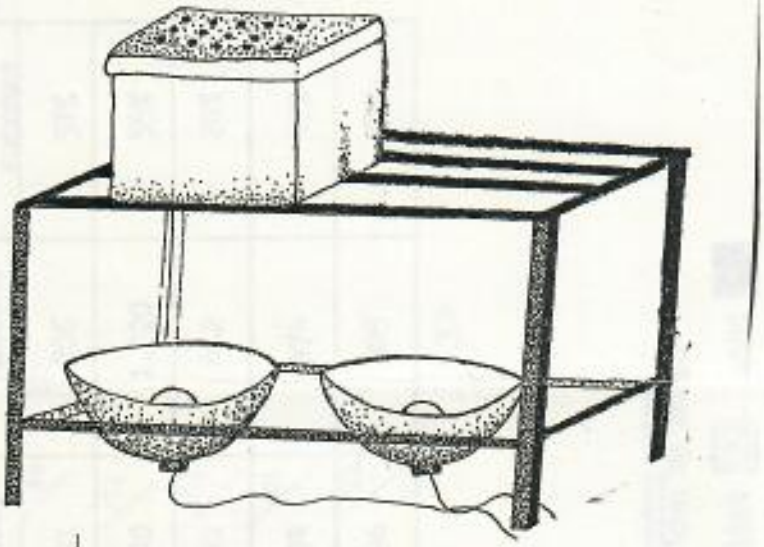
The high numbers of empty nests are discouraging. A publicity campaign to inform the public of the long term results of poaching is planned. Many do not know it is illegal to take turtle eggs. Pressure is being put on the government to enforce the existing conservation laws. More frequent boat trips and possibly nightime trips are being planned to beat poachers to the nests.

Our adult turtles have been observed mating in captivity so attempts are underway to entice the females to nest. One run has an artificial beach constructed in one end and is occupied by a female observed to have mated. Future plans include renovation of a fish pond into a holding tank with nesting beach.

The tagging started in June of 1983. To date 278 ~~2178~~ juveniles have been tagged. No tags have been returned. A small article about the project containing the tag description and MMDC address will be submited to the Marine Turtle Newsletter. Currently only headstarted turtles are tagged but the tagging of nesting females and adult population should begin in the near future.

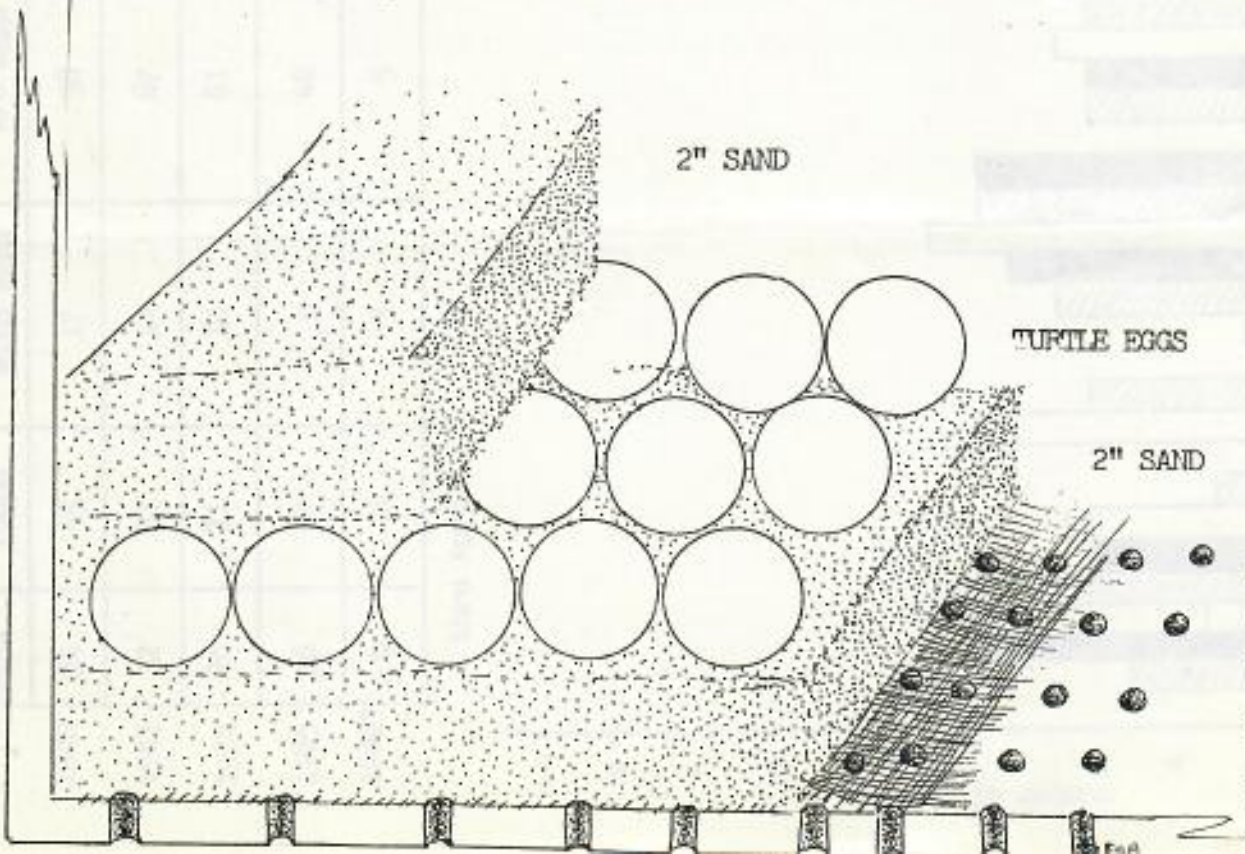
An equipment grant from the government of Japan will soon increase the capacity of the hatchery threefold. New equipment will enable accurate monitering of incubation temperatures, will allow the taking of weight data and will facilitate the changeover from across the curve to straight length carapace measurements. Turtle experts from Japan will evaluate the current program and offer suggestions for improvement. Eventually, plans call for the fencing off of a small cove near the laboratory. Fifty percent of the hatchlings produced by the lab would be released to continue the conservation effort and fifty percent would be raised to marketable size in the cove for

sale to Japan. A successful program here could lead to the establishment of similar farms elsewhere, possibly relieving some of the tortoise shell industry pressure on the Hawksbill population worldwide.



INCUBATION ROOM ARRANGEMENT

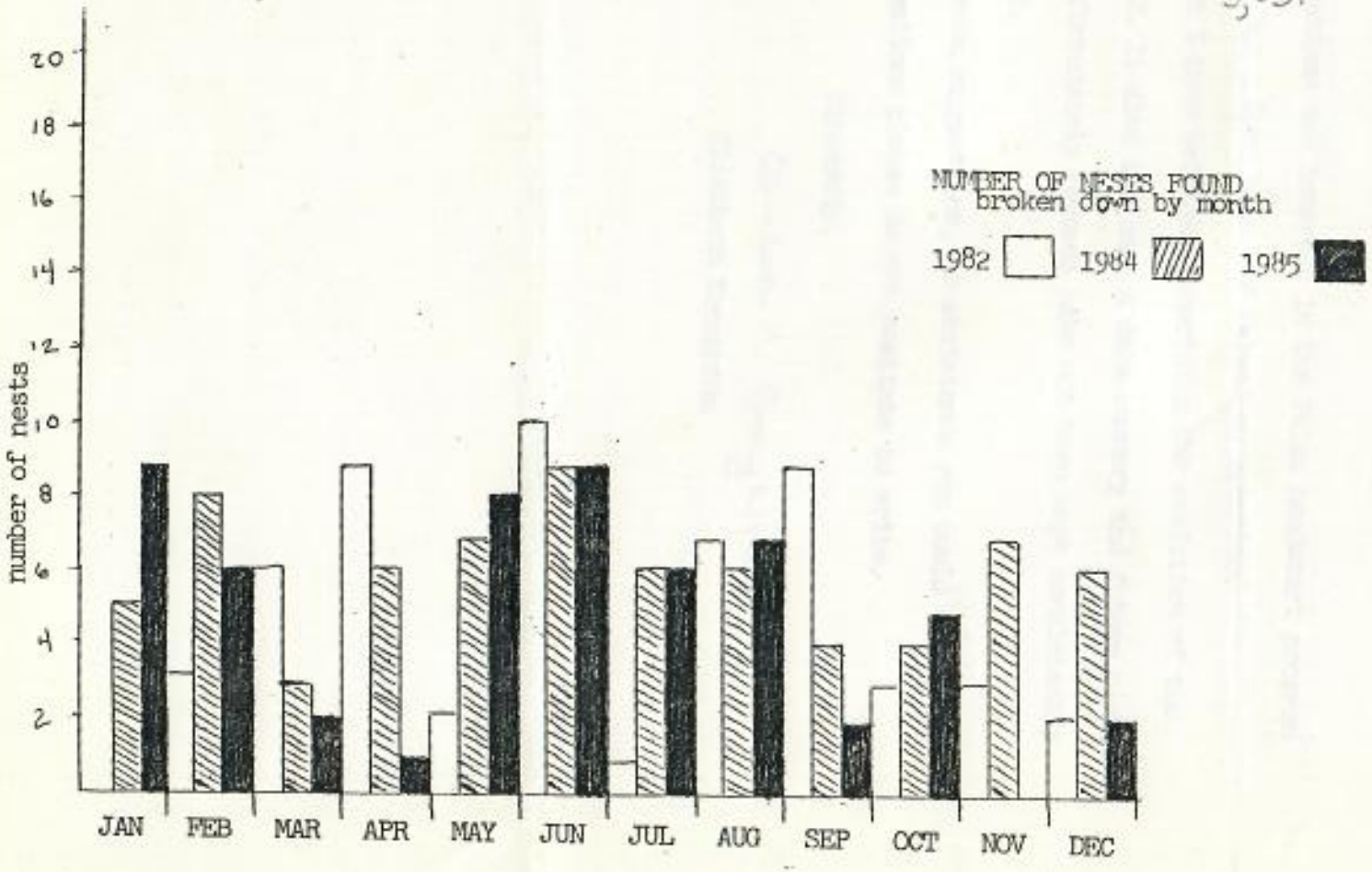
ARRANGEMENT OF STYROFOAM COOLERS
USED FOR TRANSPORTATION AND INCUBATION



	# boat trips	# nests found	# nests with eggs	# nests w/o eggs	ave.# nest per trip	# of eggs planted	# eggs hatched	% hatching success
1982	24	55	17	38	2.3	1,491 (88)	826	57%
1983	32	81	14	67	2.5	1,840 (131)	1,020	55%
1984	26	71	10	61	2.7	2,031 (203)	412	20%
1985	26	57	9	48	2.2	994 (110)	474	47%
1986*	9	8	3	5	0.9	396 (132)	305	77%
							3,037	

6-8 months % survival ?

* thru April



EAB 5/86