ESA

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25 September 1989

Mr. George Balazs
NMFS
2570 Dole St
Honolulu, HI 96822

Dear George,

Received your note of 20th September. First, I wanted to say thanks again for visiting us and sharing your insights on the turtle project. I've thought a lot about our conversations and would like to talk more with you, ideally next month when I'm in Honolulu for the PFDF meeting (23d- 26th Oct).

In answer to your specific questions:

1) Becky's "attached sheet" for visitors is just his tally of the number of people who toured the facility during the previous month -- it is not an informational handout given to visitors -- simply a statement indicating how many people paid the gate fee, for internal accounting purposes only. It goes to me, then to the Chief, who includes a line on it in his monthly report to the Director.

2) A few years ago Mr. Kurata suggested fencing in one of the coves for turtle ranching, and the turtle project staff made a number of visits to a nearby cove to carry it out. The idea was quietly abandoned, though I'm not sure why. I'll try to find out.

3) Becky has been requesting his own compound and dissecting scopes for a long time. However, since the founding of the MMDC some 15 years ago, Becky has always had access to fairly good microscopes, and for the past two years we have had really excellent, research-grade Nikon compound and dissecting scopes. These are kept in a general equipment room with balances, centrifuges, oxygen meters, profile projector, copier, computers and printers. Becky has full access to these microscopes -- they are used almost on a daily basis by the clam and trochus project staffs but they are by no means continuously occupied. They are probably in actual use for about 10 hrs per week, at most. The microscopes are not considered the "property" of any project in particular. The microscope room is unlocked every day, all day, but Becky has for some reason chosen not to use it. It seems to be a case of his feeling that he needs "his own" equipment or else he will not use it. I don't consider this a sufficient justification to buy microscopes for his exclusive use. In any event, my understanding is that Becky had planned to use the microscopes for fish larval culture -- not for turtles. I have seen no record, for example, of any MMDC turtle mortalities having undergone pathological examination to determine their cause of death. To my knowledge this has never been brought up as a justification for buying microscopes for Becky's use.

SENT 10-5-89

I appreciate the additional information on the shell shop as well as the material from JTA. One thing I wanted to ask you but forgot: can you provide me with a (confidential) opinion on which specific laws, acts or agreements the headstarting project may be violating. I'm not interested in becoming the Lone Ranger out here, but I am disturbed by what's happening to the baby turtles and by USFWS's laissez-faire approach to the whole thing. As you pointed out last week, I do have (and feel) a responsibility, as manager, to take an active role in helping sort things out.

Thanks again for your efforts on our behalf. I'll put you on the mailing list for future monthly reports from MMDC.

Sincerely,

Gerald Heslinga
Manager

MARINE RESOURCES MANAGEMENT DIVISION
P.O. Box 251
Yap, FM 96943
Federated States of Micronesia
17 January 1991

Dear Mr. Balazs,

It was good to have talked with you even though the timing was not the best for either of us. I now wish I had more sleep for my wits were not fully with me.

A response to your letters is long overdue and I apologize for it taking so long. Below I've addressed most of the questions and issues you've raised. I'll try to keep the amount of writing and speculating to a minimum as they only make for a long day.

1. The region in question appears to be a bit smaller than what you originally thought. Elato sits 25 miles away from Olimarao and Satawal only 63 miles.

2. Tags X-544/545 returned from Elato: This turtle shows many signs of not having nested on Olimarao on 8-5-90. These signs are as follows;

A. X-544/545 was caught 21.5 hours after "nesting" close to the shore of Falipiy (an apparent attempt to nest?).
B. X-544/545 was reported "Laying eggs" on Elato island two days later on 8-7-90. I believe this information to be reliable.
C. Eggs for the 8-5-90 reported nesting were not counted nor was the nest monitored in any way.
D. We had some field problems with personnel not knowing whether a monitored turtle had laid eggs yet saying with certainty that it did so.

I wish Vincent Hachigalou were here to help clarify this situation. We'll talk about it when he returns from the Outer Islands and if there's any evidence pointing to a different assumption we'll let you know.

3. How did Steve Retalmwai know those tags were used in the Olimarao project?
I've come to believe that everyone on Satawal, Elato and Lamotrek knew just about everything that was happening on Olimarao. When people recovered tags they would radio us to find out what to do. We informed them that the tags were ours and hoped, for this reason, that the turtle would be released. Rarely is a turtle in Yap State caught which is not consumed. All of the three tagged turtles were in fact consumed.

4. Tag X-508 returned from Satawal: I just received word yesterday that this turtle definitely was nesting on the northern side of Satawal island. The two people watching her waited for her to finnish laying her eggs and then dug them up for consumption (if they bring the turtle back to the village with the eggs inside her, the eggs get divided amongst the people. If they dig the

eggs out of the ground they get to keep them for themselves).

Mike McCoy reported the capture of two nesting turtles on Satawal island during his stay there (Feb.-June, 1990). Both turtles appear to have nested on the eastern side of the island. Dates were listed as 16 Feb., 1990 and 24 April, 1990. He also mentions one hawksbill turtle being tagged with a single loop of monofilament line. He did not mention which flipper was "tagged".

5. Tags X-519/520 - behavior: I have no idea how this turtle reacted but shall ask Vincent when he returns.

6. Using hooks or lines to catch turtles: Turtle catching using hooks/harpoons is thought to have been introduced here by Japanese fisherman sometime before WWII. Hooks are commonly used on Satawal, Elato and Lamotrek and are now being used more regularly on Faraleup. Harpoons are sometimes used on Woleai. The remaining islands occasionally utilize these tools for catching turtles. Using ropes to catch mating turtles is a traditional practice.

I was surprised to hear we were going to use hooks to catch turtles and tried to discourage their use from the start. My problem was that I had little information to argue with except that the hooks cause pain and the wounds could get infected. My experiences here have shown me that inflicting pain on nonhuman organisms is of little concern to most of the people. If you have any specific information on the consequences of using hooks please let us know. This information would be incorporated into future education programs and passed along to those doing field work.

7. 512 hatchlings from 9 nests (mistakenly listed as 502 in preliminary report): The best way to deal with this is by setting up a table.

NEST	HATCH DATE	# HATCHLINGS	COMMENTS
1	6/14/90	99/100	no problems
2	6/21/90	25/?	ghost crabs attack nest
3	7/13/90	7/?	ghost crabs attack nest
4	7/14/90	15/129	spoiled eggs/ghost crab attack
5	7/16/90	6/?	other hatchlings escaped
6	7/20-22/90	96/108+	came up on two separate days
7	8/2-3/90	110/?	came up on two separate days
8	8/3/90	136/143	no problems
9	8/16/90	18/31+	other hatchlings escaped

8. 12 nests completely destroyed by ghost crabs: There were 15 monitored nests total that suffered from ghost crab predation. You can see from the table above that only 47 hatchlings were found in three of these nests. The rest of the nests appeared to have been completely destroyed.

I drew up a map of the islands and marked down the position of all monitored nests and noted a couple curious things. On Olimarao 3 of the 12 nests suffered from ghost crab predation. *These three nests were localized within a fairly small area.* All three were dug into once as were the other unattacked nests in adjacent areas. Fencing the nest did not seem to make any difference in whether or not the nest was attacked. Distance of the nest from the high tide mark seems not to make a difference either.

21 nests were monitored on Falipiy and 12 of these suffered from ghost crab predation. *Predation occurred on approximately 2/3 of the islands coast line. All fenced nests were affected by crab predatation.* Distance of the nest from the hightide mark again seems to be of no consequence.

I know so little about the biology of *Ocypodes* though I soon shall be writing away for information. It seems obvious that turtle eggs/hatchlings are not a main food item for these creatures yet are readily consumed if found. I have a feeling that in the specific areas where ghost crabs were found, our tampering with the nests increased the likelihood that these nests would be invaded. Most likely, we spread the scent of the nest to the top layers of sand by digging down into them. If there were ghost crabs in the area, they would then know where to go for food. I'm not quite sure how the fences fit in unless they provided support for the crab holes down into the nest. This may be related to the type of soil present.

We've gone over the other concerns listed in your 11/26/90 letter and share these with you. Many of the methods employed were based on local practices. It appears that the best way for dealing with these concerns is through education that is sensitive to the peoples current understanding of things. We're trying to acquire funds for a marine resources education program through which turtles, as a resource, will be addressed. The projects themselves act as an educational medium and certainly these and other concerns shall be addressed in future field works.

This about wraps it up for now. Andrew has a report to fit in so I guess this becomes part of a small package. I hope you had happy holidays and I look forward to corresponding with you again.

Sincerely,

Steven P. Kolinski

Steve Kolinski

MARINE RESOURCES MANAGEMENT DIVISION
P.O. Box 251
Yap, FM 96943
Federated States of Micronesia

21 January 1991

Dear George,

Just a quick note to send with Steve's letter. Sorry for the delay in replying to your letters - we're down three staff (almost half) at the moment which is keeping us busy.

I've enclosed a copy of a working paper on turtles - it's aimed at local leaders to try and prompt some awareness. Unfortunately I had to rush it as I wanted the new legislators to have it for their first session. If you have time, any comments, criticisms, etc, would be much appreciated. Mike McCoy had a quick read of it when he passed through last week.

Steve's in the process of working up and writing the stage I report, and also preparing the stage II field work. At the moment our stage II money still hasn't come through, so we're a bit handicapped (Yap State Legislature approves funds for projects, but then we have to fill out 'control documents' and send them off to Pohnpei for approval by the national government before getting any money. This year they introduced a new control document - three times longer than the former one - so as to "speed up their processing". As a consequence, it's taken three months longer to process - so far!).

Thanks for the Noumea meeting draft report, it was much appreciated. I wrote to Moses Nelson and asked him to keep us informed in future - we had received no information at all from him (not even notifying us that he went there!).

Steve has almost completed transcribing the data onto the data sheets you sent us, and will send them off when done. Thanks for sending the t-shirts, etc - we've yet to hear if they have reached the people yet. There has been no ship to the O.I. for nearly a month as it is waiting for USAID food to arrive (Satawal, Elato and Lamotrek were wiped out by a typhoon in late Nov./early Dec.

All the best for the new year. I'll try to keep you informed of what happens (or doesn't happen!) here.

Regards,

Andrew

Andrew Smith

OUTER ISLANDS TURTLE PROJECT: STAGE I

FINAL REPORT ON THE OLIMARAO ATOLL FIELDWORK

MARINE RESOURCES MANAGEMENT DIVISION
P.O. Box 251
Yap, FM 96943
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(Prepared by: Steven Kolinski)

March 1991

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INTRODUCTION

Turtles have been traditionally exploited in the Yap State region for as long as people have inhabited these islands. They play a subsistence role and form a part of the traditional culture. The underlying objective of the Yap State Marine Resources Management Division's (MRMD) work with turtles is to devise management controls which will allow future generations of these islands to also enjoy the traditional aspects of turtles. However, at the same time we recognize an international, as well as cultural, responsibility to ensure that turtles in this region are not hunted to low levels, or to extinction. For more information on the current situation of turtles in Yap State, see the *MRMD Working Paper On Turtles* (MRMD, 1991).

This project aimed to address the locally perceived decline in the number of turtles in the outer islands. The objectives were:

1. to tag adult turtles to determine their movements;
2. raise hatchlings through the period when they are highly susceptible to predation;
3. assess the current turtle catch rates for the outer islands;
4. to acquire, develop and provide appropriate educational materials on marine turtles; and
5. to provide realistic management suggestions to traditional leaders and government.

This report outlines the results from the 4.5 months of fieldwork at Olimarao Atoll. The fieldwork addressed the first two objectives listed above.

METHODS

The turtle project was carried out on the islands of Falipiy and Olimarao in Olimarao Atoll (approx. 145° 45' E, 8° 45' N) from April 24 through September 12, 1990 (see Appendix A). The field work team consisted of two MRMD staff (Steven Kolinski and Vincent Hachigluo) and two temporary assistants (Titus Ibelmar and William Yagiwemal). During the course of the fieldwork many others helped to support the team and the project.

The islands were mapped and divided into sections to simplify recording locations. The team was divided into two for the fieldwork, to enable both islands to be surveyed. Olimarao island is separated from Falipiy island by approximately 2.5 miles of lagoon.

Turtle searches were conducted each night, on both islands, from 1900 hours to 0600 hours, except when weather conditions prevented travel to Falipiy. Rounds of each island were carried out at hourly intervals. While searching for turtles, the use of flashlights was kept to a minimum.

Nesting Turtles

Once a turtle was located and had finished laying and covering her eggs, she would usually be flipped over for easier handling. The nest would be marked by placing a stake two hand-spans behind the center of the nest in a direction perpendicular to the coastline. Turtles were first checked for evidence of previous tags. If they were not currently tagged, one 1" (2.5 cm) inconel tag was applied to the trailing edge of each flipper, leaving a 1/4" (0.6 cm) space between the

curved tag end and the flipper edge. The tags applied to each turtle were usually consecutive numbers.

The relevant turtle data sheet (see Appendix B) would then be filled out. This included noting the following: the date; time; species; location; tide phase and level; nest location relative to the high tide mark (estimated); the curved carapace length (measured from the forward edge of the precentral scute at carapace midline to the posterior margin of the postcentrals, using a flexible 1.5 m measuring tape) and width (distance across the widest part of the shell, perpendicular to the longitudinal body axis, using the same flexible measuring tape); recording any damage; the presence of commensals; and a crawl diagram. When possible, the eggs were counted as they dropped from the turtle into the nest. Although discouraged, occasionally nests were dug up to count the number of eggs laid. The majority of turtles located on or near Falipiy were weighed using two 200 lb. capacity Hanson scales (model 8920) placed side by side.

False Crawl Turtles

When a turtle was located heading back towards the ocean it was immediately flipped over. If there was evidence of digging, a stick would be used to probe the area to determine whether or not the turtle had nested (this is a local practice). For those turtles which did not nest, all the above measurements and methods were applied, excluding those relating directly to the nest.

Non-Nesting Turtles

Whenever turtles were spotted mating or swimming close to shore, attempts were made to catch them. Turtles caught close to shore were held with a full nelson grip and were brought onto the beach for tagging and measuring. An 18 ft. (5.5 m) open fiberglass boat with a 30 hp. engine was used to catch mating turtles. The engine would be turned off when approximately 100 meters away from the mating pair. Two to four men would quietly swim from the boat up to the turtles and attempt to grab both the male and female turtles. The turtles were held using a full nelson grip until they could be lifted onto the boat.

Although discouraged, occasionally the local method of utilizing a hook and line were used to catch escorting male turtles. The line would be looped around one of the foreflippers and a man in the boat would then pull the turtle in. If a hook was used (rare), the hook would be jabbed into one of the turtle's shoulders and again a man in the boat would pull the turtle in.

Usually these turtles were brought to one of the two islands for tagging and measuring. These turtles were tagged and measured in the same manner as those found nesting. Other measurements included tail length from the plastron (posterior margin of plastron to tip of tail), tail length from the carapace (posterior margin of carapace to tip of tail) and tail length from the vent (mid-vent to tip of tail) using the flexible 1.5 m measuring tape. When possible, these turtles were also weighed. Other data collected included sex, depth of water (estimated), substrate and surface water condition (see Appendix B, Data Sheet B).

Nests

Nests were marked and labeled as soon as they were located. Approximately 30 days after a nest was laid, an open ended plastic mesh fence (1/2" mesh size; 1.2 cm) was placed around the nest. The bottom edge of the fence was dug in approximately 20 cm (8"). Fenced nests were then checked regularly.

If ghost crabs (*Ocypodes* sp.) were found to have entered the nest, they would be removed and killed. The nest would then be checked and any damaged or spoiled eggs would be removed. Sometimes a nest would be dug up (this was not encouraged) to determine the number of days to hatching. Many times when this was done hatchlings would be discovered. Eggs were not handled unless spoiled eggs were discovered and then only these would be removed and discarded.

When hatchlings were found in the enclosures, they were usually allowed to crawl down the beach to the water before being secured to be placed in special cages for raising.

Initially, attempts were made to dig up the nests after hatching, to determine the number of eggs that failed to hatch (see Appendix B, Data Sheet C). This was unsuccessful due to worker indifference, and so was discontinued.

Twenty hatchlings were selected at random and weighed (using a Ohrus model 8012 dial spring scale), then returned to the cages. For most nests, all hatchlings found were collected for cage raising, however, some hatchlings were allowed to go their natural course after hatching.

Hatchlings

Hatchlings were placed in one of the two cages. Cages were made out of reinforcing bar (# 4) and plastic mesh (1/2" mesh size; 1.2 cm) and measured 4' x 4' x 8' (1.2 m x 1.2 m x 2.4 m). The cages were divided into six separate sections. Bamboo and floats were added to the cages to make sure approximately one third remained above the water, and a plastic mesh top (1.3" mesh size; 3.3 cm) was added to keep the birds out. The cages were placed in shallow water close to the base camp on Olimarao.

Hatchlings were fed a diet of copra for their first two weeks in captivity. The copra was chewed and then thrown in the cages. After two weeks, the diet consisted of raw fish, cooked fish and copra. The fish was usually cut into small pieces and then thrown in. As the hatchlings grew larger (and for the more crowded cages), strings of fish would be hung in the water from hooks attached to the cage which helped to keep the hatchlings from biting each other.

The hatchlings were tagged approximately 12 to 26 days after being put in the cages. One 1/2" (1.2 cm) inconel tag was applied to the trailing edge of each foreflipper, leaving a 1/4 overhang of the length of the tag. The tagged hatchlings were weighed and measured (using SPI 30-140 calipers) once or twice a week after tagging. Measurements included standard straight-line carapace length and straight carapace width. Hatchlings were also checked for signs of dark pigmentation on their plastrons (see Appendix B, Data Sheet D).

Once all the small tags were used, the remaining hatchlings were marked by slicing a V shaped notch (approximately 3/4 scute length and 1/2 scute width) into the third marginal scute from the post central scutes on both sides of the carapace. These hatchlings were held two to eight days after notching before being released.

Hatchlings were kept for between one and 3.5 months. They were then released approximately 2.5 miles from the atoll in the open ocean. A number of large sticks were tied together to form a float and the hatchlings were released along side.

RESULTS

A total of 33 adult *Chelonia mydas* and one immature *Eretmochelys imbricata* were tagged during the 4.5 month field period. Six male and eight female green turtles, and the one hawksbill were located in the water and tagged. Fourteen females were tagged on Falipiy island and five females were tagged on Olimarao island. Three other males were caught in the water but were later consumed for food.

Mating

Mating/courting couples were observed on 22 separate occasions. The majority of these matings/courtings were observed at medium tide with calm to moderate surface water conditions. Twenty-one of these were sighted within the lagoon or over the reef. One mating group was found on the outside reef edge. All mating turtles were seen in shallow water (< 11 meters) and were generally over a sand substrate.

Two tagged female turtles were observed mating but could not be captured for identification. Fifteen of the 17 female turtles tagged before the second sighting of the tagged mating female had nested before the second sighting date, and one had false crawled. The remaining female was tagged 61 days prior to this date and was never reported as having been seen again.

Males

Nine adult male green turtles were captured and measured (see Table 1). Of these, four were mating, two were escorting non-mating females, two were escorting mating females and one was swimming close to shore.

The sizes of male green turtles ranged from 88 to 104 cm standard curved carapace length (CCL; n = 9, mean = 95.7 cm, SD. = 4.44), and 77.5 to 95 cm curved carapace width (CCW; n = 9, mean = 86.2 cm, SD = 5.15). Tail measurements for males ranged from 36 to 51 cm plastron to tip (n = 9, mean = 42.4 cm, SD = 4.60), 22 to 36 cm carapace to tip (n = 8, mean = 31.6 cm, SD = 4.53), and 7.5 to 12 cm vent to tip (n = 9, mean = 9.7 cm, SD = 1.39).

Body damage (in the form of scrapes, tears or missing bits) recorded included that to the carapace, left front flipper, right front flipper, left hind flipper and right hind flipper. Two of the nine males (22%) had one or more *Chelonobia* present on their carapace. Six of the nine males

Table 1: Morphometric data collected from male *Chelonia mydas* at Olimarao Atoll.

#	CCL (cm)	CCW (cm)	WEIGHT (kg)	TAIL P-T (cm)	TAIL C-T (cm)	TAIL V-T (cm)	ACTIVITY
*1	95	87	---	43.5	22	12	+ escorting
2	94	84	---	51	32	11	mating
3	97	85	---	39	33	10	swimming
4	94	88	---	36	35	10	mating
5	100	92	---	40.5	29	10	! escorting
6	88	77.5	77	41.5	35	7.5	mating
7	95	83	91	40	31	9.5	mating
*8	94	84	---	42	---	8	+ escorting
*9	104	95	---	48	36	9	! escorting

= order in which turtles were caught; + = escorting mating couple; ! = escorting non-mating female;
* = turtle was consumed (all other turtles were tagged)

were tagged and released; three were consumed. No tagged males were seen after tagging.

Females

Twenty-seven female green turtles were tagged and measured (see Table 2). The sizes of the female green turtles ranged from 93 to 117 cm standard curved carapace length (n = 27, mean = 104 cm, SD = 6.14), and 81.5 to 107 cm curved carapace width (n = 27, mean = 94 cm, SD = 6.59). Weights ranged from 97 to >181 kg (n = 23, mean = 139.7 kg, SD = 23.93). Tail length measurements for females ranged from 22 to 28 cm plastron to tip (n = 11, mean = 24.6 cm, SD = 2.20), 7.5 to 13 cm carapace to tip (n = 9, mean = 11.3 cm, SD = 1.92), and 4 to 9 cm vent to tip (n = 11, mean = 6.2 cm, SD = 1.33).

Percentages of female green turtles with body damage included: 44% - carapace; 33% - left front flipper; 4% - right front flipper; 26% - left hind flipper; 11% - right hind flipper; and 4% - head. 44% of the females had one or more *Chelonobia* attached on their carapace, and 4% had burrowing commensals present.

Two of the 27 female green turtles (7%) were not seen again at Olimarao Atoll after the initial tagging. One of these two was caught nesting on Satawal island and was consumed.

Twenty of the 27 nesting females (74%) returned to land more than once. Turtles returned to land anywhere from two to nine times. The highest number of nests recorded for any one turtle was six and the mean was 2.6 nests (n = 23, SD = 1.34). The average time between when a turtle nested and when we encountered it next was 12 days (n = 31, SD = 1.7; 12 singular occurrences were not included in this measure due to the turtles "disappearing" for 21 to 36 days).

Table 2. Morphometric data collected for female *Chelonia mydas* tagged at Olimarao Atoll.

#	CCL (cm)	CCW (cm)	WEIGHT RANGE (kg)	WEIGHT AVG. (kg)	TAIL P-T (cm)	TAIL C-T (cm)	TAIL V-T (cm)	ACTIVITY	# NEST
1	111	98	150	150	---	---	---	false crawl	3
2	95	85	95-101	97	28	12	9	false crawl	5
3	109	102	150-159	154	25	13	7	mating	4
4	106	99	-----	-----	---	---	---	nesting	3
5	104	94	-----	-----	22	---	5	mating	0
*6	93	81.5	100	100	24	11	6	mating	0
7	103	94	147-150	148.5	28	11	6	mating	1
8	94	83	111	111	22	7.5	4	mating	4
*9	99	86	113	113	23	---	6	swimming	1
10	117	107	>181	>181	---	---	---	false crawl	6
11	109	96	152	152	---	---	---	nesting	2
12	112.5	104	170-177	173.5	---	---	---	nesting	2
*13	107	93	134	134	---	---	---	nesting	3
14	97	89	-----	-----	---	---	---	nesting	3
15	108	90	154	154	---	---	---	false crawl	0
16	99	89	-----	-----	---	---	---	nesting	3
17	106	94.5	150-152	151	---	---	---	false crawl	2
18	102	90	126-127	126.7	23	9	7	false crawl	4
19	95.5	87	104-107	105	---	---	---	nesting	2
20	107	98.5	165-172	169	---	---	---	false crawl	3
21	103	98	141-150	145.5	25	13	5	nesting	2
22	102	92	141	141	24	13	7	mating	0
23	104	92	127-145	136	27	12	6	mating	1
24	100.5	93	132	132	---	---	---	false crawl	2
25	114	105	177	177	---	---	---	false crawl	2
26	105	98	136	136	---	---	---	false crawl	1
27	105	98	127	127	---	---	---	nesting	1

= order in which turtles were caught; * = nested on another island; #6=X-508/509; #9=X-519/520; #13=X-544/545 on

Ten of the 27 tagged females (37%) were found on more than one island. Six of these ten nestedboth Falipiy and Olimarao; two turtles false crawled on one island and nested on another within Olimarao Atoll and; one turtle false crawled on both Olimarao and Falipiy. One turtle nesting on Falipiy was later found nesting on Elato island, and one turtle nesting on Olimarao was later found nesting on Woletali island, Elato Atoll. One female caught mating in the lagoon of Olimarao Atoll was later caught nesting on the north side of Satawal island (see Table 3). The three tagged females caught nesting outside of Olimarao Atoll were consumed and their tags were recovered.

Table 3: Tag recoveries from *Chelonia mydas* tagged at Olimarao Atoll. All three turtles were consumed (see Table 2 for morphometric data).

TAG #	LAST DATE OLIMARAO	LAST ACTIVITY OLIMARAO	OTHER ISLAND	DISTANCE (km)	DATE	ACTIVITY
X-508/509	5/16/90	mating	Satawal	102	6/20/90	nesting
X-519/520	5/24/90	nesting	Woletali	40	6/12/90	nesting
X-544/545	8/5/90	swimming	Elato	40	8/7/90	nesting

A total of 152 turtle crawls were recorded for both islands. Seventy-one of these were false crawls (the turtle did not nest), 81 resulted in nesting. For 34 of the false crawls, and for 20 of the crawls resulting in nesting, the turtles were not observed. Forty-two false crawl tracks and 41 nesting tracks were located on Falipiy. Twenty-nine false crawl tracks and 40 nesting tracks were located on Olimarao (see Appendix C, maps A and B). Crawl activity was highest on the northern ends of both islands. Nesting activity remained highest on the northern beach of Olimarao island but was spread fairly evenly along the entire sandy coastline on Falipiy island.

Seventy-one percent of identified Olimarao island turtles came ashore during the spring tide phase while 29% came during the neap tide phase (n = 38). Twenty-one percent were found at high tide, 55% at medium tide and 24% at low tide (n = 38). Fifty-six percent of identified Falipiy turtles came ashore during the spring tide phase while 44% came during the neap tide phase (n = 60). Twenty-six percent were found at high tide, 57% at medium tide and 17% at low tide (n = 60). Turtles were only found on land between 19:00 to 06:10 hours.

Nests

A total of 81 nests were laid during the 4.5 month period. Forty-one were laid on Falipiy and 40 were laid on Olimarao. The average distance (estimated) inland from the high tide level was 9 m (range: 2 to 28 m).

The number of eggs deposited in a nest ranged from 58 to >143 eggs (n = 24, mean = 112 eggs, SD = 22.8). Eight of the nesting females had two or three of their egg clutches counted and there was no noticeable decrease in clutch size from one nest to the next. Known nest incubation periods ranged from 53 to 66 days (n = 9, mean = 57.9 days, SD = 5.01).

Predation On Nests

During the fieldwork 30 nests, as well as three nests laid before our arrival, were monitored. Of

these nests, 15 (45%) were attacked by ghost crabs (*Ocypodes* sp.); 12 (36%) of which were completely destroyed. The three nests which were not completely destroyed produced a total of only 47 hatchlings.

On Olimarao island, three of the 12 monitored nests (25%) suffered from ghost crab predation. These three nests were localized within a fairly small area. All three were dug into once by fieldworkers as were the other unattacked nests in adjacent areas. One of the three attacked nests was fenced; six of the nine unattacked nests were also fenced. Estimated nest distance from the high tide level ranged from 7 to 13 m (n = 3) for those nests attacked, 5 to 13 m (n = 5) for unattacked nests in the same or adjacent sections, and 5 to 7 m (n = 4) for the remaining unattacked nests.

Twelve of the 21 monitored nests (57%) on Falipiy suffered from ghost crab predation. Predation occurred within two small regions and along one large stretch of the islands coastline (combined, these areas cover approximately two-thirds of the islands coastline). Eleven of the 12 attacked nests were dug into one or more times by fieldworkers, as were four of the five unattacked nests in the same or adjacent sections. All fenced nests and four unfenced nests were attacked. The one attacked nest which was not dug by fieldworkers was also not fenced. Estimated nest distance from the high tide level ranged from 3.5 to 18 m (n = 12) for those nests attacked, 4 to 18 m (n = 5) for unattacked nests in the same or adjacent areas, and 10 to 18 m (n = 4) for the remaining unattacked nests.

Hatchlings

A total of 512 hatchlings were collected from nine nests: 131 (26%) of the hatchlings came from three nests on Falipiy, and 381 (74%) were collected from six nests on Olimarao. The number of hatchlings taken from any single nest ranged from 6 to 136 (see Table 4). Of the hatchlings collected, 442 were brought to Olimarao where 434 (85%) were raised in cages and 8 (1%) were raised in an open plastic float. A total of four hatchlings escaped into the water after having been counted and 66 (14%) were intentionally released at their nest sights.

The caged hatchlings actively swam for periods extending beyond two days. Their ability to dive the approximate one meter down to the cage bottom was readily apparent beginning with their first day of captivity. The hatchlings gradually showed a greater interest in feeding, and generally began to do so, on their second and third days of captivity.

One-hundred and ninety-eight of the 434 cage reared hatchlings (46%) were tagged 12 to 26 days after hatching and were monitored until their release. A total of 12 tagged hatchlings (6%) died in captivity two to 16 days after tags had been applied (mean = 9.5 days). These include three of 25 (12%) tagged 12 to 14 days after hatching; 0 of 31 tagged 15 to 17 days after hatching; 5 of 65 (8%) tagged 18 to 20 days after hatching; 3 of 16 (19%) tagged 21 days after hatching; 0 of 23 tagged 24 days after hatching and; 1 of 15 (7%) tagged 26 days after hatching. Twenty-three of the 198 (12%) tagged hatchlings were mixed up and nest identity could not be determined. None of these hatchlings died after tagging.

Table 4: Nest data for the nine nests from which a total of 512 hatchlings were collected.

NEST	ISLAND	# HATCHLINGS	# EGGS	COMMENTS
C3	Falipiy	99	101	no problems
C5	Falipiy	25	?	ghost crabs attack nest
C12	Falipiy	7	?	ghost crabs attack nest
C9	Olimarao	15	129	spoiled eggs ghost crabs attack nest
C15	Olimarao	6	?	other hatchlings escaped
C16	Olimarao	96	108+	hatched on two separate days
C23	Olimarao	110	?	hatched on two separated days
C22	Olimarao	136	143	no problems
C26	Olimarao	18	31+	other hatchlings escaped

One-hundred and fifty-eight of the 198 tagged hatchlings (78%) developed patches of pigmentation on their plastrons sometime within the period of their captivity. Percentages of plastron pigmentation varied from nest to nest. Forty-seven of the 244 untagged hatchlings (19%) died in captivity. The total hatchling survival rate was 87%.

As there were insufficient small tags, 189 hatchlings (43%) were notched two to eight days before being released. No data was kept on these turtles. In total, 186 tagged and 189 notched hatchlings were released approximately 2.5 miles away from the atoll in the open ocean (see Table 5).

Predation On Hatchlings

Two small reef blacktip sharks (*Carcharhinus melanopterus*) were observed feeding on three of the four hatchlings which had escaped after counting.

Immature Turtles

One immature *Eretmochelys imbricata* was found sleeping under a coral head in the lagoon and was tagged. Morphometric data collected for this turtle can be found in Table 6.

DISCUSSION

Results

The number of tagged turtles was below the number we had been told to expect by locals.

Table 5: Morphometric data collected from tagged hatchlings before release (23 hatchlings from nests C5, C9, C12 and C15 were mixed before tagging and could not be positively differentiated).

NEST	# HATCHLINGS	DAYS IN CAPTIVITY	MEAN WEIGHT (gm)	SDM	MEAN SCL (mm)	SDM	MEAN SCW (mm)	SDM
C3	27	37 (2)	46.7	7.58	63.5	4.98	55.8	4.21
C5	23	67 (2)	57.8	8.95	65.5	4.57	57.7	3.90
C9		39 (2)						
C12		38 (2)						
C15		35 (2)						
C16	53	29-31 (3)	50.5	5.25	61.1	2.78	52.7	2.73
	32	51-53 (9)	58.4	6.05	63.9	3.32	56.2	3.56
C22	51	38 (2)	52.8	3.11	61.9	1.57	52.7	2.78

SDM = standard deviation of the mean; SCL = standard carapace length; SCW = standard carapace width; (#) in "Days In Captivity" = number of days between last measurement and release

Table 6: Morphometric data collected the for immature *Eretmochelys imbricata* caught at Olimarao Atoll.

#	CCL (cm)	CCW (cm)	WEIGHT (kg)	TAIL P-T (cm)	TAIL C-T (cm)	TAIL V-T (cm)	ACTIVITY
1	40	37	---	6	---	2	sleeping

The 1990 nesting season appears to have been late for the region, as reports later received from Elato Atoll indicated larger numbers of turtles nesting. From comments by islanders it appears that the year's weather had been unusual (very windy), which may, in part, account for the late nestings.

The second sighting of the tagged female turtle seen mating could well have been that turtle which had previously been tagged 61 days earlier and which had never been noted as approaching land. If this was not the same turtle, then it was probably one of the turtles copulating after nesting, which is contrary to the information found in the current literature (Forsyth and Balazs, 1989). It's also possible that this turtle was tagged in another time or area. Since the turtle in question was never identified we can only assume that the first or third possibility is the more likely.

The number of turtles nesting on both islands in Olimarao Atoll, as well as the three that nested on Elato, Woletali and Satawal, may indicate that turtles might utilize a region as a nesting area, rather than nesting specifically on the islands from which they hatched, as is currently assumed (this possibility will need to be considered in any management scheme). However, it is also

possible that the methods employed had the effect of scaring the turtles away by interfering with their nesting cycles. The two turtles caught mating which were never seen again at Olimarao Atoll, and the number of turtles which "disappeared" for periods beyond what was expected, may add weight to either or both possibilities. It would have been better if the three tagged turtles caught outside of the fieldwork area had not been consumed, to see if they returned to the Olimarao area. The 20 nesting and 34 false crawls where the turtles were not identified also confuses the situation.

Ghost crabs were identified as a major predator on the eggs and hatching nests. Forty-five percent of the monitored nests fell victim to ghost crab predation. Of the few hatchlings recovered from three of these nests, most were scarred and a few were missing appendages.

We assume that turtle eggs and hatchlings are not a main food item of *Ocepodes* yet are readily consumed if found. It appears that in the specific areas where ghost crabs were found, our tampering with the nests increased the likelihood that these nests would be invaded. Most likely, we spread the scent of the nest to the top layers of sand by digging down into them. If there were ghost crabs in the area, they would know where to go for food. Distance of a nest from the high tide mark does not, in general, appear to have been a factor in whether a nest was attacked or not. Fences may have provided support for the burrows down into the nest. In soft sandy areas fences may have played a key role in a fence having been attacked.

Survival rates for hatchlings after hatching are considered to be very low (SPREP, 1990). This predation on the eggs only lowers the survival rates even further. This type of predation needs to be taken into consideration for any future nursery or management program.

The value of tagging hatchlings will not be known for sometime, if ever. It's highly probable that most of the small tags will be lost before these turtles reach a size where they can be located on reefs. Tagging large numbers of turtles does, however, increase the chance that a tag will be recovered. Notching carapaces seems a viable alternative, although verification of returns is very hard to establish.

The 87% survival rate for the raised hatchlings seems encouraging. The mean lag time between tagging and death being 9.5 days, it appears that tagging after a two week period had little to do with the death of hatchlings. This is also based on the comparison of 12 dead tagged hatchlings to 47 dead nontagged hatchlings (all other conditions in the cages were the same for all hatchlings). Although, because the direct cause of hatchling death is unknown, it is possible that the tagging of these 12 hatchlings led to infection which then led to death.

The practice of 'headstarting' hatchlings still remains questionable (Mortimer,1988). There are presently no data available in the literature to suggest long-term success in increasing turtle stocks. The public relations value in raising people's awareness of the turtle problem is an aspect of the 'headstart' program that cannot be discounted. The tagging of hatchlings may provide some data on 'headstarting', although answers, if any, remain many years away. If large numbers of tagged hatchlings return to the Olimarao region as mature turtles, the program may be considered successful, however, verification will be extremely difficult, if not impossible.

Comments

It is important to note that some of the fieldwork techniques had to be modified to adjust to local ways of doing things. Examples of such techniques include using a stick to probe for a nest, digging into unhatched nests, and using a hook or line to catch mating turtles. The people of these islands use such techniques as a way of obtaining what is to them a valuable food resource. It was and will be difficult to ask people to leave behind (for the duration of a project) known working methods in light of a new idea - conservation.

There were a number of problems experienced with this project, the most pressing being finances. Funding for the four workers was insufficient to cover the two islands. The team worked seven days a week with little rest. One extra employee would have allowed each person to take off every fifth night. The temporary workers were unable to adapt to working all night and resting during the day.

If we had been required to purchase tags and tag applicators, the duration of this project would have been cut by a third. George Balazs (NMFS Honolulu) provided the tags and tag applicators, as well as general advice and support, free of charge. Food, water and general support from Elato and Lamotrek kept us from starving. Again, funds were not sufficient enough to support this aspect of the project.

One of the field team (SK) had to depart early from the project site due to a severe illness in his family. The remaining three members successfully carried the project through with the help of others who were present on the island.

Future projects will require adequate funding and a more appropriate number of personnel. Fieldwork objectives will be more realistically set in light of the experiences gained from this project.

Proposed work

Stage II of the Outer Islands Turtle Project has received funding from the Yap State Legislature for FY1991 (Oct. 1990 to Sept. 1991). The objectives of stage II are similar to those for stage I. A brief (7 to 10 days) tagging trip is planned for Gaferut Island; and a 3.5 month tagging and nursery project similar to Olimarao is planned for Losiep and Iar island groups adjacent to Ulithi Atoll.

A proposal for funding for a Stage III Outer Islands Turtle Project for FY1992 will soon be sent out to potential funding sources. The proposed Stage III will continue the project at all sites used in the first two stages. In addition, the education/extension aspects will be further developed and implemented. The management recommendations will also be polished. The collection of turtle catch data sheets for all the outer islands will continue during FY1991, and hopefully during FY1992.

ACKNOWLEDGEMENTS

The fieldwork was carried out by Steve Kolinski, Vincent Hachigluo, Titus Ibelmar and William Yagiwemal. Data input and analysis was done by Steve and Vincent. The report was written by Steve, and reviewed and edited by Andrew Smith.
Special thanks to all the people of Elato and Lamotrek who gave permission to use Olimarao Atoll and fully supported the project. We are also greatful to George Balazs (NMFS) for his generous advice, support and assistance.

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Forsyth, Robert G., and Balazs, George H. 1989. "Species Profiles: Life Histories and Environmental Requirements of Coastal Vertebrates and Invertebrates Pacific Ocean Region; Report 1, Green Turtle, Chelonia mydas," Technical Report EL-89-10, prepared by National Marine Fisheries Service, National Oceanic and Atmospheric Administration, Honolulu, HI, for the US Army Engineer Waterways Experiment Station, Vicksburg, MS.

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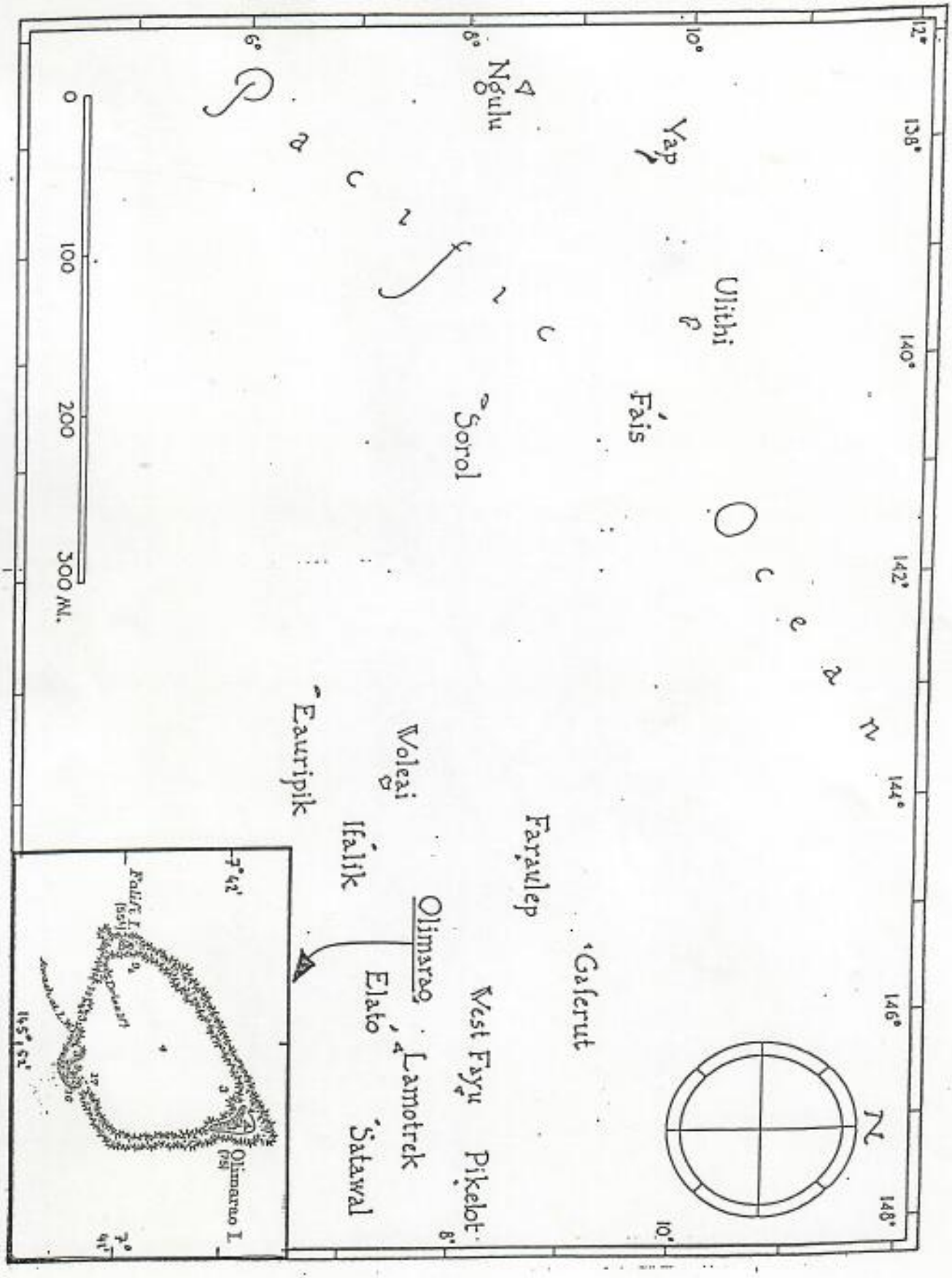
APPENDIX A

Map of Yap State and Olimarao Atoll



APPENDIX B

Data sheet #: A___

Tag #	
New	
Old	

YAP STATE TURTLE PROJECT
NON-NESTING TURTLES

Date: ___/___/_____ Time: _____am/pm

Location: _____

Depth: _____ Substrate: _____

Surface water condition: calm / moderate / rough

Tide level: low / med. / high Tide phase: spring / neap

Turtle activity: _____

Species: green / hawksbill / other: _____

Age/sex: juvenile / sub-adult / adult (male) / adult (female)

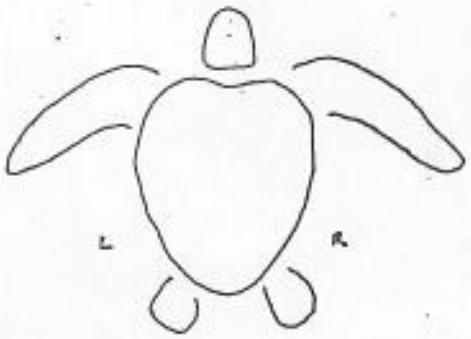
	carapace	
	curved	straight
length (cm)		
width (cm)		

Weight: _____lb/kg

Tail length (cm)
from plastron: _____
from carapace: _____
from vent: _____

Evidence of previous tags: yes / no

Commensals:
barnacles - Chelonobia...0
- burrowing....0
other - _____....0



Damage:
carapace.....0
LFF.....0
RFF.....0
LHF.....0
RHF.....0
tail.....0
head.....0

Comments:

Recorders:

Measured by	
Recorded by	

Data sheet #: B___

Tag #	
New	
Old	

YAP STATE TURTLE PROJECT
NESTING TURTLES

Date: ___/___/_____ Time: _____am/pm

Nest or False crawl

Location: _____

Tide level: low / med. / high Tide phase: spring / neap

Species: green / hawksbill / other: _____

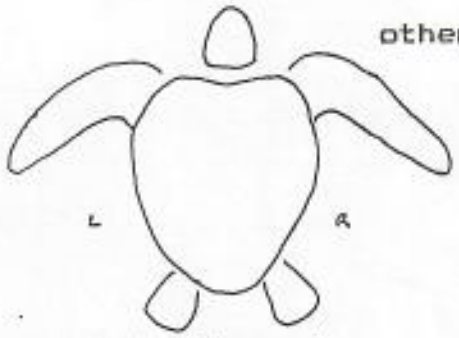
	carapace	
	curved	straight
length (cm)		
width (cm)		

Weight: _____lb/kg

Evidence of previous tag: yes / no

Commensals:
barnacles - Chelonobia...0
- burrowing....0
other - _____....0

Damage:
carapace.....0
LFF.....0
RFF.....0
LHF.....0
RHF.....0
tail.....0
head.....0



Distance nest dug from high tide mark: _____ft/m

Total number of eggs: _____

Fate of nest (see nest data sheet #: _____)
Incubation time: _____days Number of hatchlings: _____

Comments:

Crawl diagram (sketch here):

Recorders:	
Measured by	
Recorded by	

Data sheet #: C___

YAP STATE TURTLE PROJECT - NEST AND HATCHING DATA

Nest #:_____ Reference: Nesting data sheet #:_____
Turtle tag #:_____/_____

Date nest laid:____/___/_____
[if not fresh, estimate nest age:_____days]

Date nest hatched:____/___/_____ Time hatched:_____am/pm
Incubation period:_____days

Location of nest:_____

HATCHLING DATA:

Hatched eggs (H), from which hatchlings escaped from eggs:_____
Hatchlings escaped from nest (HN):.....:_____
Hatchlings dead in nest (DN):.....:_____
Unhatched eggs (UH):.....:_____
Turtles dead in pipped eggs (DPE):.....:_____
Turtles alive in pipped eggs (LPE):.....:_____
Infertile eggs with no obvious embryos (INF):.....:_____
Unhatched eggs with discernable embryos (DE):.....:_____
Deformed hatchlings alive in nest (DA):.....:_____
Deformed hatchlings dead in nest (DD):.....:_____

Survival % of hatchlings from nest (SP) = $\frac{HN}{H + UH}$ = ...:_____

Comments:

_____

Weight of 20 hatchlings selected at random from nest (living turtles only) - gm / oz.

1.____	6.____	11.____	16.____	Average weight:_____gm/oz
2.____	7.____	12.____	17.____	
3.____	8.____	13.____	18.____	
4.____	9.____	14.____	19.____	
5.____	10.___	15.____	20.____	

Disposition of hatchlings:
Number released:..._____
Number pen-reared:_____
Other:.....:_____

Recorders:

Excavated by:	
Measured by:	
Recorded by:	

Data sheet #: D____
Sheet # ___ of ___

YAP STATE TURTLE PROJECT
PEN-REARED HATCHLING TURTLES

Hatching date: ____/___/_____
Time: _____am/pm

Reference:
Nest data sheet #: _____
Nesting turtle
data sheet #: _____

Small tag #: _____RFF
_____LFF

Turtle pen number: _____

Release date: ____/____/_____ Release time: _____am/pm

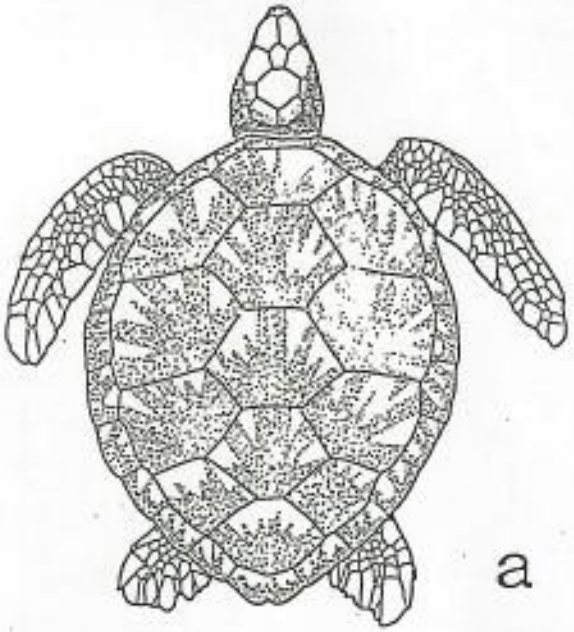
Release location: _____

Date	Wt (gm)	Std carap. lgth (mm) (straight)	carap. width (mm)	PP *	General remarks

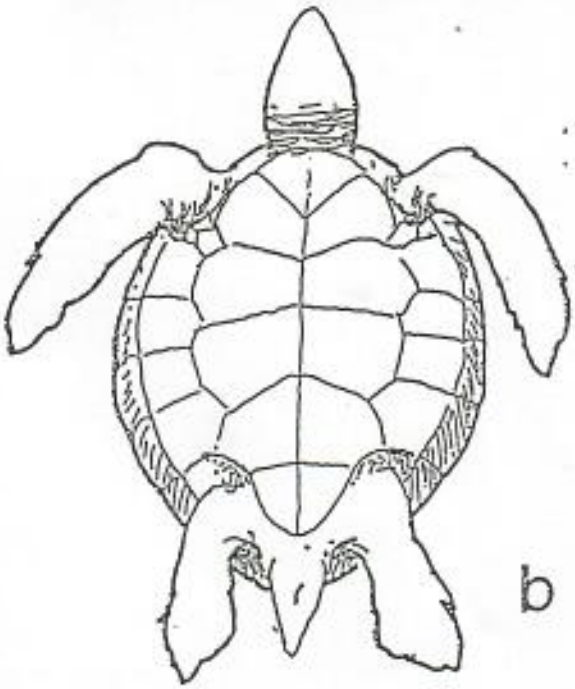
* PP = plastron pigmentation (y/n)

Recorders:

Measured by	
Recorded by	



a



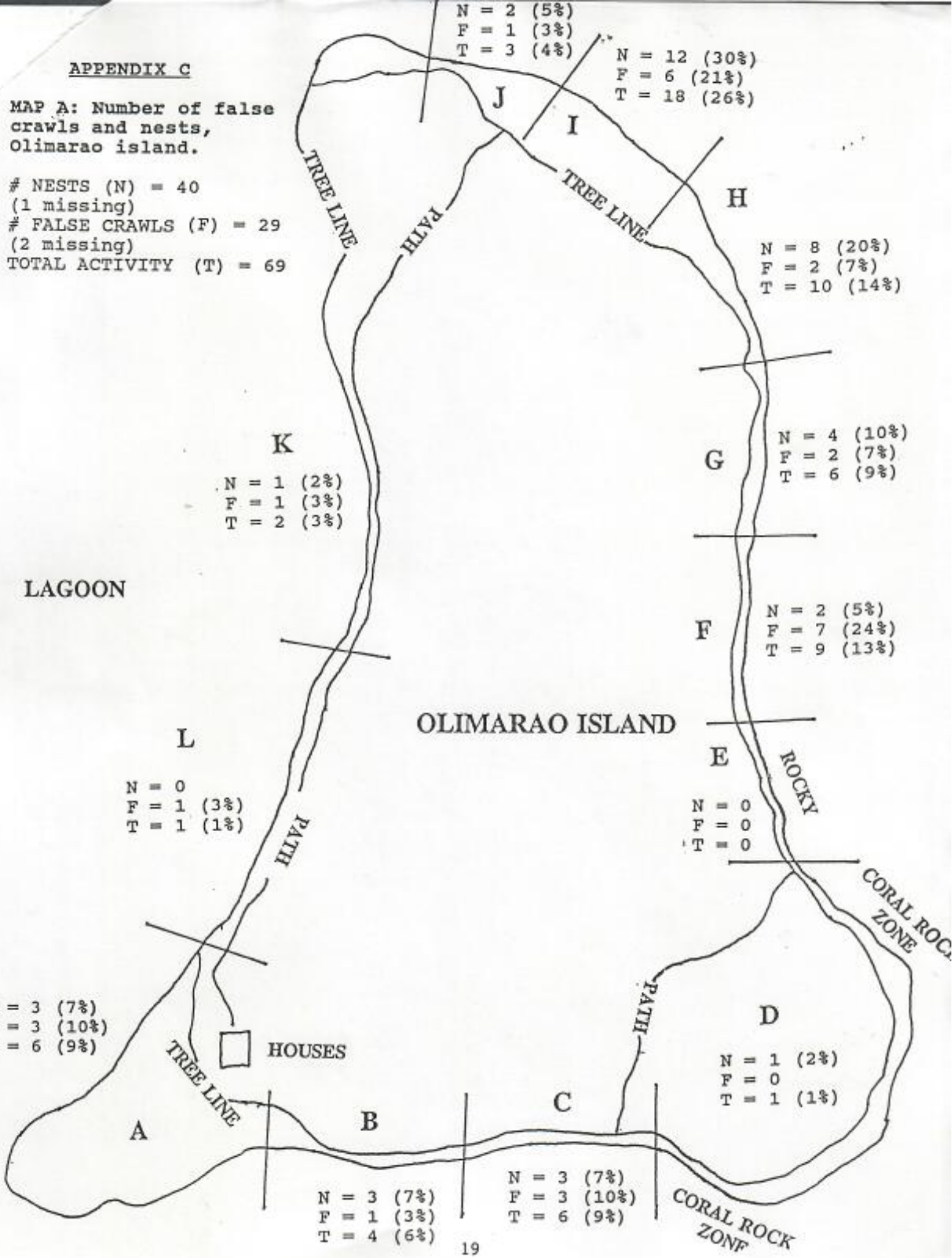
b

NOTES:

APPENDIX C

MAP A: Number of false crawls and nests, Olimarao island.

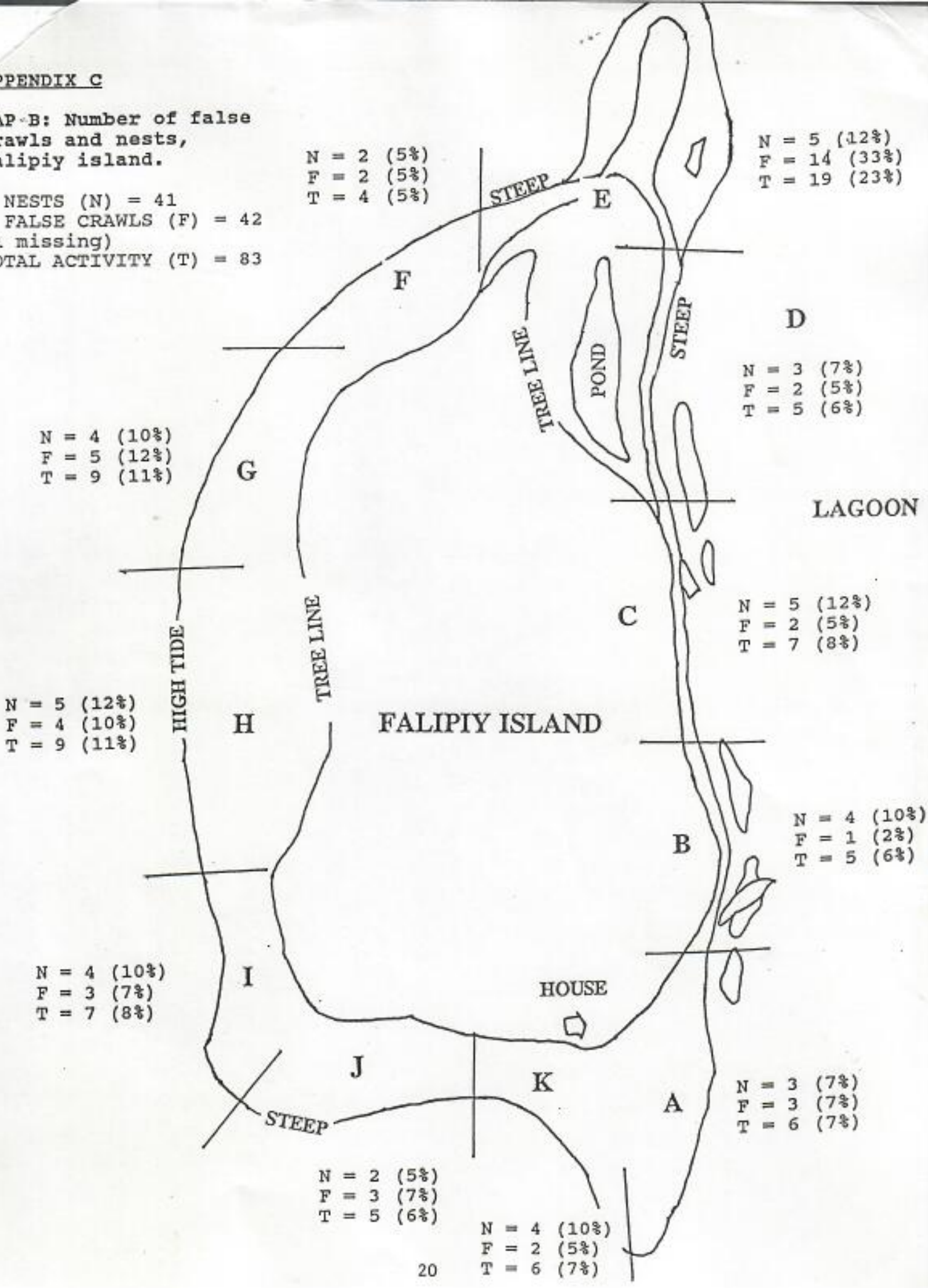
NESTS (N) = 40
(1 missing)
FALSE CRAWLS (F) = 29
(2 missing)
TOTAL ACTIVITY (T) = 69



APPENDIX C

MAP B: Number of false crawls and nests, Falipiy island.

NESTS (N) = 41
FALSE CRAWLS (F) = 42
(1 missing)
TOTAL ACTIVITY (T) = 83



MARINE RESOURCES MANAGEMENT DIVISION

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96943

9/26/90

George,

Here are 3 tag returns + copies of their data sheets; also the remaining tags + applicators.

Steve is working on the data now, putting it on computer. He's off on leave mid-October (I thought he'd just had 4 months vacation on Olimarao!), so I've asked him to get as much done before he leaves.

I'll be gone for a month (Nov.) between my contracts.

Would like to know what happened at the meeting in Noumea. We should know in a week or two whether or not this project got funding to continue at Ulithi.

Cheers,

Andrew.

P.S. What is the possibility of getting T-shirts for the 3 local guys who worked at Olimarao; they did a good

Job by themselves after Steve was evacuated?
They are all big guys.

A.

TAG RETURN INFORMATION - YAP STATE, F.S.M.

Tag #: X-508

Tagged at: Falipiy Is., Olimarao Atoll.

Tagging data sheet: A7/F.

Recaptured: Satawal Island. ?

Date: 20 June, 1990

Time: ?

Activity: ? [on land]

Caught by: Isidore Metewalur

Return address: Satawal Island, ?
Yap, FM 96943, F.S.M.

August [illegible]

TAG DATE FOUND: JUNE 20, 1990
PLACE FOUND: SATAWAL ISLAND

FOUND By & ADDRESS

ISIDORE METEWAL
SATAWAL ISLAND
YAP STATE FSM

X508

August 10, 1990

TAG DATE FOUND: JUNE 20, 1990
PLACE FOUND: SATAWAL ISLAND

FOUND BY & ADRESS

ISIDORE METEWALUR
SATAWAL ISLAND
YAP STATE FSM
96943

X508

Data sheet #: A'14F

Tag #	
New	X-508
	X-509
Old	

YAP STATE TURTLE PROJECT
NON-NESTING TURTLES

Date: 5/16/90 Time: 3:57 am/(pm)

Location: Sechical E., Tabiniy, 100m from shore - Inner lagoon

Depth: 20-30 ft Substrate: Hard, sand bottom

Surface water condition: calm / moderate / (rough)

Tide level: low / (med.) / high Tide phase: spring / (neap)

Turtle activity: Mating with male

Species: (green) / hawksbill / other: _____

Age/sex: juvenile / sub-adult / adult (male) / (adult (female))

	carapace	
	curved	straight
length (cm)	93	
width (cm)	81.5	

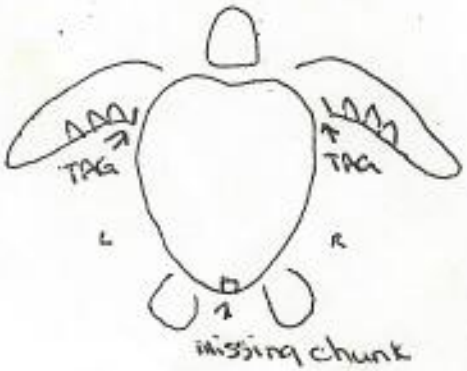
Weight: 220 (lb)/kg

Tail length (cm)
from plastron: 24
from carapace: 11
from vent: 6

Evidence of previous tags: yes / (no)

Commensals: none
barnacles - Chelonobia...0
- burrowing....0
other - _____....0

Damage:
carapace.....0
LFF.....0
RFF.....0
LHF.....0
RHF.....0
tail.....0
head.....0



Comments: Female mating, surrounded by 10 other males, one other male nodded but he broke the line. Female lured on boat and brought to Okaw for tagging, measuring and release.

* 7-12-90 TENTATIVELY CAPTURED ON SATAWAL ISLAND

Recorders:

Measured by	William
Recorded by	Steve

TAG RETURN INFORMATION - YAP STATE, F.S.M.

Tag #: X-519

Tagged at: Olimarao Is., Olimarao Atoll.

Tagging data sheet: A6/OL; B5/OL.

Recaptured: Woletali, Elato.

Date: 12 June, 1990

Time: 0400

Activity: nesting

Caught by: Al Chico

Return address: Elato Island,
Yap, FM 96943, F.S.M.

Place of Catch [illegible] Elote
Date: 6-12-90
TAG NO. X-519
Missing Tag- X-520
ACTIVITIES - [illegible]
(Turtle was [illegible]
Name of Person: [illegible]
Time: 4:00 Am

Place of catch: Woletali, Elato
Date: 6-12-90
TAG NO. X-519
Missing Tag - X-520
ACTIVITIES - Masewong
(Turtle was nesting)
Name of Person: Al Chico
Time: 4:00 Am

Data sheet #: A 6 (01)

Tag #	
New	X-519
	X-520
Old	

YAP STATE TURTLE PROJECT
NON-NESTING TURTLES

Date: 5/21/90 Time: 5:15 am (pm)

Location: Site 9, dimeao, 50 m from shore

Depth: 1 meter Substrate: H20, sand coral bottom

Surface water condition: (calm) / moderate / rough

Tide level: low / (med) / high Tide phase: spring / (neap)

Turtle activity: Swimming

Species: (green) / hawksbill / other: _____

Age/sex: juvenile / sub-adult / adult (male) / (adult (female))

	carapace	
	curved	straight
length (cm)	99	
width (cm)	86	

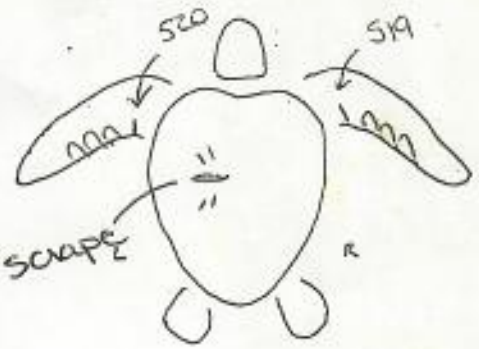
Weight: 250 (lb) / kg

Tail length (cm)
from plastron: 23
from carapace: 4
from vent: 6

Evidence of previous tags: yes / (no)

Commensals: none
barnacles - Chelonobia...0
- burrowing....0
other - _____....0

Damage:
carapace.....0
LFF.....0
RFF.....0
LHF.....0
RHF.....0
tail.....0
head.....0



Comments: Seen swimming slowly. chased with boat towards shore. Brought on shore tagged & measured. Sunny day, winds from NE.

Recorders:

Measured by	steve, will
Recorded by	vince

Data sheet #: B504

Tag #	
New	
Old	X-519
	X-520

YAP STATE TURTLE PROJECT
NESTING TURTLES

Date: 5/24/90 Time: 9:30 am/(pm)

(Nest) or False crawl

Location: Section A, Olonzogo

Tide level: low / med. / (high) Tide phase: (spring) / neap

Species: (green) / hawksbill / other: _____

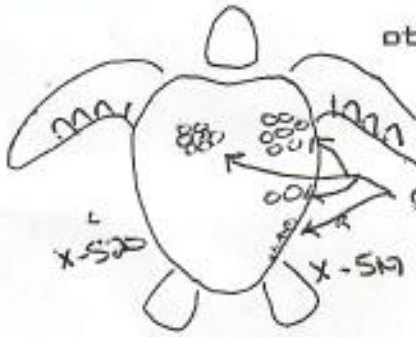
	carapace	
	curved	straight
length (cm)	99	
width (cm)	86	

Weight: N/A lb/kg

Evidence of previous tag: (yes) / no

Commensals:
barnacles - Chelonobia...0
- burrowing....0
other - _____....0

Damage: ?
carapace.....0
LFF.....0
RFF.....0
LHF.....0
RHF.....0
tail.....0
head.....0



All barnacles found on plastron

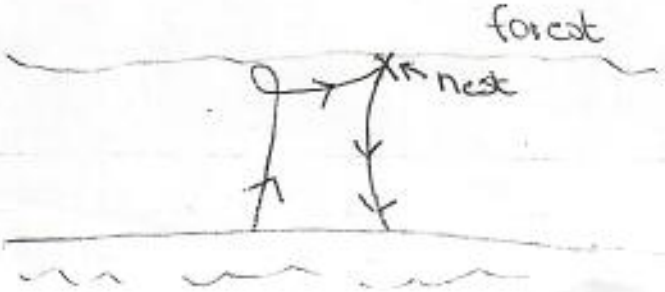
Distance nest dug from high tide mark: 20 (ft)/m

Total number of eggs: _____

Fate of nest (see nest data sheet #: _____)
Incubation time: _____days Number of hatchlings: _____

Comments: Clear sky & few clouds. NO MOON. wind coming from NE at ≤ 5 knots. Turtle apprehended on her way to the ocean. 7-ft PVC fence put around nest

Crawl diagram (sketch here):



Recorders:

Measured by	William
Recorded by	Vince

TAG RETURN INFORMATION - YAP STATE, F.S.M.

Tag #: X-544 & x-545

Tagged at: Falipiy Is., Olimarao Atoll.

Tagging data sheet: B15/F; B17/F; B18/F; B19/F; B27/F; B42/F; B44/F; B45/F; A17/F.

Recaptured: Elato (Lugulporow - north side of Elato Island).

Date: 7 August, 1990

Time: 2230

Activity: Laying eggs.

Caught by: Steven Retalmwai (M)
Stevena Ileibtaro (F)
Clara Lapisilug (F)

Return address: c/- Steven Retalmwai,
Outer Islands High School,
Falalop, Ulithi,
Yap, FM 96943, F.S.M.

TO MARINE RESOURCES DEP.
P.O. BAY 251
YAP FM 96943

FROM ELATO outer Islands of yap State.
WE LOCATED ONE TURTLE WITH NUMBERS: (X-544 & 545)
THE TURTLE THEY PUT THOSE NUMBERS ON IT IN
WELMERAW ISLAND DURRING THE MARINE-
RESOURCES PROJECT

CATCHERS:
1. STEVEN-RETACMWAI (M)
2. STEVENA-ILEIBYARO (F)
3. CLARA - LAPISILUG (F)

TIME:
10:30 SHARP PM.

PLACE:
LUGULPOROW (NORTH SIDE OF ELATO COAST.

DATE:
AUGUST, 7, 1990

WE FOUND THE TURTLE WHILE STROLLING AROUND THE ISLAND LOOKING FOR TURTLES. IT WAS LAYING EGGS WHEN WE FOUND IT.

RETURN ADDRESS:
FALALOP ULITHI CIHS POST OFFICE
YAP FM 96943
- STEVEN RETACMWAI

To Andy Tafelrichis


X-544


X-545

Data sheet #: B 151-1

Tag #	
New	X-544
	X-545
Old	

YAP STATE TURTLE PROJECT
NESTING TURTLES

Date: 6 / 12 / 90 Time: 10:15 am/(pm)

(Nest) or False crawl

Location: Section 11-Tanay

Tide level: low / med. / (high) Tide phase: (spring) / neap

Species: (green) / hawksbill / other: _____

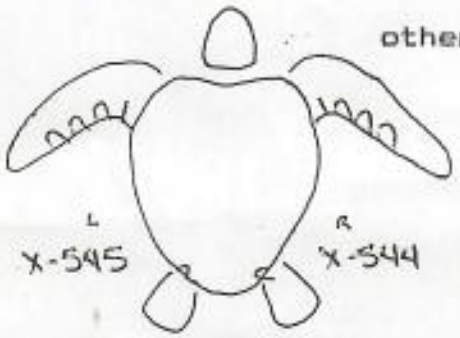
	carapace	
	curved	straight
length (cm)	107	
width (cm)	92	

Weight: 296 (lb)/kg

Evidence of previous tag: yes / (no)

Commensals: none
barnacles - Chelonobia...0
- burrowing....0
other - _____....0

Damage: none
carapace.....0
LFF.....0
RFF.....0
LHF.....0
RHF.....0
tail.....0
head.....0



Distance nest dug from high tide mark: 17 ft (m)

Total number of eggs: _____

Fate of nest (see nest data sheet #: _____)
Incubation time: _____ days Number of hatchlings: _____

Comments: DE winds, overcast sky. observed nesting. flipped and returned at 11:00 & 12:00 6/13/90. eggs were not seen. video taped.

Crawl diagram (sketch here):

Recorders:

Measured by	Tito/Jinge
Recorded by	Jinge

1120

Data sheet #: B17F

Tag #	
New	
Old	X-544
	X-545

YAP STATE TURTLE PROJECT
NESTING TURTLES

Date: 6 / 24 / 90 Time: 8:15 am/(pm)

(Nest) or (False crawl)

Location: Section G, ROAD

Tide level: (low) / med. / high Tide phase: (spring) / neap

Species: (green) / hawksbill / other: _____

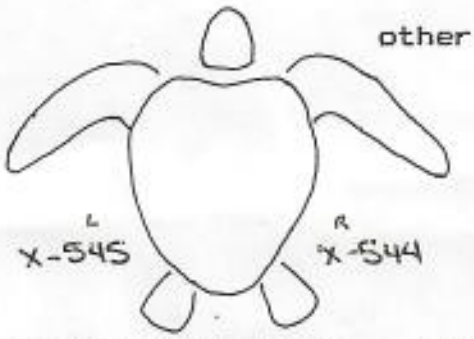
	carapace	
	curved	straight
length (cm)	107	
width (cm)	93	

Weight: N/A lb/kg

Evidence of previous tag: (yes) / no

Commensals: NONE
barnacles - Chelonobia...0
- burrowing....0
other - _____....0

Damage: NONE
carapace.....0
LFF.....0
RFF.....0
LHF.....0
RHF.....0
tail.....0
head.....0



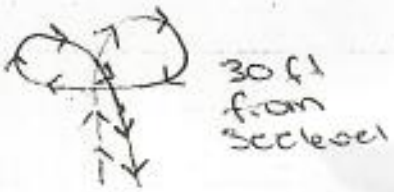
Distance nest dug from high tide mark: N/A ft/m

Total number of eggs: N/A

Fate of nest (see nest data sheet #: N/A)
Incubation time: N/A days Number of hatchlings: N/A

Comments: Clean Shell. Tipped. Measured and released between 10:00 & 10:35.

Crawl diagram (sketch here):



Recorders:

Measured by	William
Recorded by	Vince

Data sheet #: B12/F

Tag #	
New	
Old	X-544
	X-545

YAP STATE TURTLE PROJECT
NESTING TURTLES

Date: 6 / 25 / 90 Time: 8:21 am/pm

Nest or (False crawl)

Location: SEGTION E. TAMAG

Tide level: (low / med) / high Tide phase: (spring) / neap

Species: (green) / hawksbill / other: _____

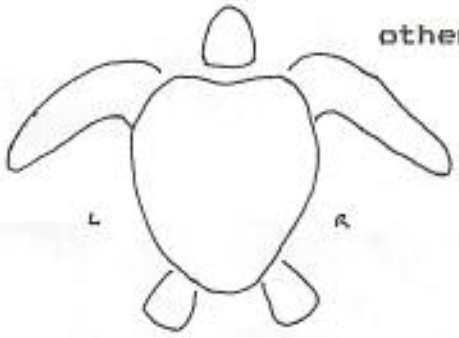
	carapace	
	curved	straight
length (cm)	106	
width (cm)	92	

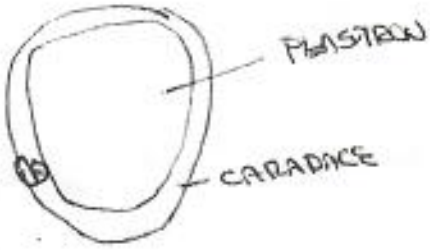
Weight: N/A lb/kg

Evidence of previous tag: (yes) / no

Commensals:
barnacles - Chelonobia...0
- burrowing....0
other - _____....0

Damage:
carapace.....0
LFF.....0
RFF.....0
LHF.....0
RHF.....0
tail.....0
head.....0





Distance nest dug from high tide mark: N/A ft/m

Total number of eggs: N/A

Fate of nest (see nest data sheet #: N/A)
Incubation time: N/A days Number of hatchlings: N/A

Comments: WINDS NW 340° @ 6-8 miles/hr CLEAR SKY. Turtle flipped and measured at 10:10 PM. Released - Did not need for light when we left

Crawl diagram (sketch here):

Recorders:

Measured by	TITUS
Recorded by	STEVE

Data sheet #: B19/F

Tag #	
New	
Old	X-544
	X-545

YAP STATE TURTLE PROJECT
NESTING TURTLES

Date: 6/25/90 Time: 11.43 am/(pm)

(Nest) or False crawl

Location: SECTION 6 - [illegible]

Tide level: low / med. / (high) Tide phase: (spring) / neap

Species: (green) / hawksbill / other: ____________

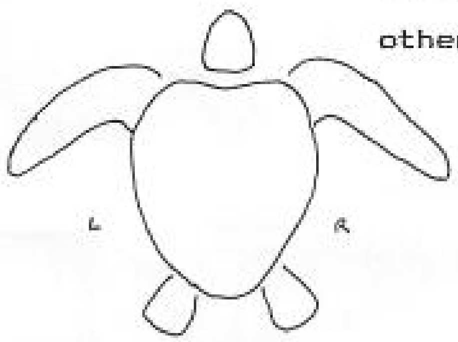
	carapace	
	curved	straight
length (cm)	N/A	
width (cm)	N/A	

Weight: N/A lb/kg

Evidence of previous tag: yes / no

Commensals: N/A
barnacles - Chelonobia...0
- burrowing....0
other - ____________....0

Damage: N/A
carapace......0
LFF...........0
RFF...........0
LHF...........0
RHF...........0
tail..........0
head..........0



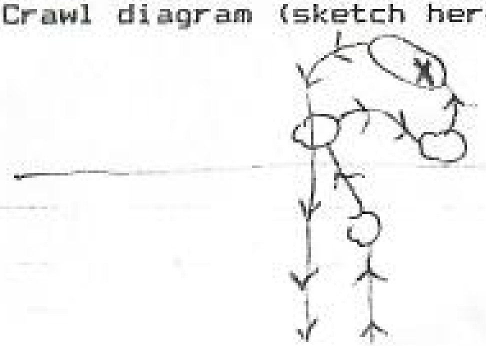
Distance nest dug from high tide mark: 16 ft/(m)

Total number of eggs: 99

Fate of nest (see nest data sheet #: __________)
Incubation time: ______ days Number of hatchlings: ______

Comments: ~~[illegible]~~ winds 8° NE ~6-12 miles/hr. Nested ~ 4:00AM 6/26/90. we checked her tags and then left her alone. Eggs found after she was still there. in morning she was gone. counted eggs at 7:08 AM.

Crawl diagram (sketch here):



Recorders:

Measured by	TITW
Recorded by	STEVE

Data sheet #: B 27 / F

Tag #	
New	
Old	X-544 (L)
	X-545 (L)

YAP STATE TURTLE PROJECT
NESTING TURTLES

Date: 7 / 9 / 90 Time: 12:30 (am)/pm

(Nest) or False crawl

Location: SECTION 5a - TAMIL

Tide level: low / med. / (high) Tide phase: (spring) / neap

Species: (green) / hawksbill / other: _____

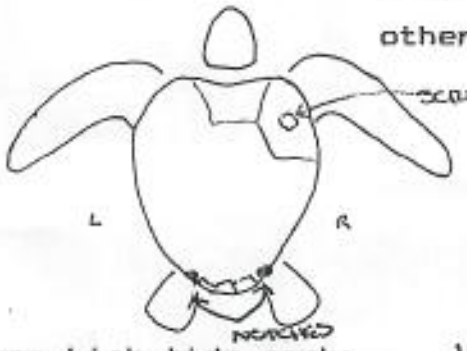
	carapace	
	curved	straight
length (cm)	107	
width (cm)	93	

Weight: N/A lb/kg

Evidence of previous tag: (yes) / no

Commensals:
barnacles - Chelonobia...0
- burrowing....0 ✓
other - _____....0

Damage:
carapace.....0 ✓
LFF.....0
RFF.....0
LHF.....0
RHF.....0
tail.....0
head.....0



Distance nest dug from high tide mark: 10 ft (m)

Total number of eggs: 112

Fate of nest (see nest data sheet #: _____)
Incubation time: _____ days Number of hatchlings: _____

Comments: DO WIND. OVERCAST. TURTLE TAGGED, EGGS COUNTED (DUG+ REPLACED)
RELEASED AT 6:30 PM. RELEASED.

Crawl diagram (sketch here):

Recorders:

Measured by	TITUS
Recorded by	STEVE

Data sheet #: B47/F

Tag #	
New	
Old	X-544
	X-545

YAP STATE TURTLE PROJECT
NESTING TURTLES

Date: 8 / 2 / 90 Time: 10:35 am (pm)

Nest or (False crawl)

Location: Section H.

Tide level: low / (med.) / high Tide phase: spring / neap

Species: (green) / hawksbill / other: _____

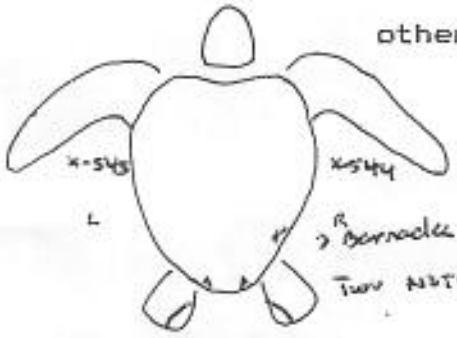
	carapace	
	curved	straight
length (cm)	106	
width (cm)	97	

Weight: _____ lb/kg

Evidence of previous tag: yes / no

Commensals:
barnacles - Chelonobia...0
- burrowing....✓
other - _____....0

Damage:
carapace.....✓
LFF.....0
RFF.....0
LHF.....✓
RHF.....✓
tail.....0
head.....0



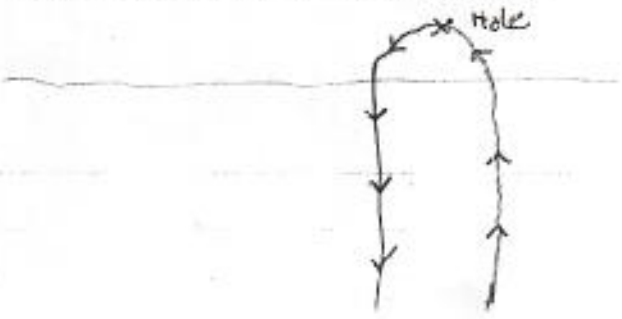
Distance nest dug from high tide mark: _____ ft/m

Total number of eggs: _____

Fate of nest (see nest data sheet #: _____)
Incubation time: _____ days Number of hatchlings: _____

Comments: Medium Tide, clear nite + moon 3/4 Quarter

Crawl diagram (sketch here):



Recorders:	
Measured by	Vince
Recorded by	Vince

Data sheet #: B44/F

Tag #	
New	
Old	X-544
	X-545

YAP STATE TURTLE PROJECT
NESTING TURTLES

Date: 8/4/90 Time: 9:30 am (pm)

Nest or (False crawl)

Location: Section H.

Tide level: low / (med) / high Tide phase: spring / neap

Species: (green) / hawksbill / other: _____

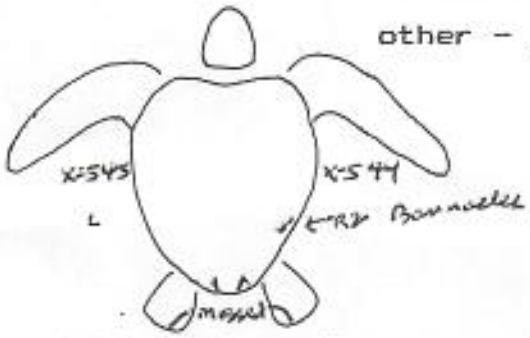
	carapace	
	curved	straight
length (cm)	101	
width (cm)	93	

Weight: _____ lb/kg

Evidence of previous tag: (yes) / no

Commensals:
barnacles - Chelonobia...0
- burrowing....8
other - _____....0

Damage:
carapace.....✓
LFF.....0
RFF.....0
LHF.....✓
RHF.....✓
tail.....0
head.....0



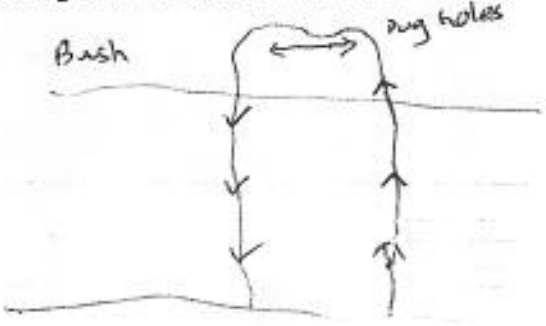
Distance nest dug from high tide mark: _____ ft/m

Total number of eggs: _____

Fate of nest (see nest data sheet #: _____)
Incubation time: _____ days Number of hatchlings: _____

Comments: ¾ Quarter moon, medium Tide, very clear sky ¼ wind from East.

Crawl diagram (sketch here):



Recorders:

Measured by	Camino
Recorded by	Vince

Data sheet #: B-45/F

Tag #	
New	
Old	X-544
	X-545

YAP STATE TURTLE PROJECT
NESTING TURTLES

Date: 8/5/90 Time: 7:00 (am)/pm

(Nest) or False crawl

Location: Section J,

Tide level: low / med. / (high) Tide phase: spring / neap

Species: (green) / hawksbill / other: _____

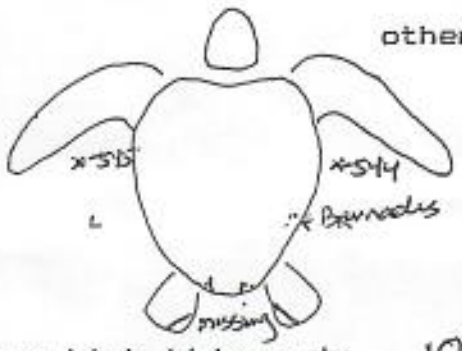
	carapace	
	curved	straight
length (cm)	107	
width (cm)	93	

Weight: _____ lb/kg

Evidence of previous tag: (yes) / no

Commensals:
barnacles - Chelonobia...0
- burrowing....0
other - _____....0

Damage:
carapace.....✓
LFF.....0
RFF.....0
LHF.....✓
RHF.....✓
tail.....0
head.....0



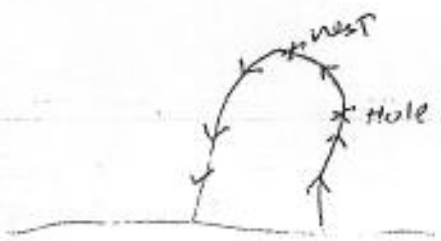
Distance nest dug from high tide mark: 10 ft/m

Total number of eggs: Not counted

Fate of nest (see nest data sheet #: _____)
Incubation time: _____ days Number of hatchlings: _____

Comments: Released at 10:00 maybe saw flashlights and it came up again & nested, same nite.

Crawl diagram (sketch here):



Recorders:	
Measured by	Carmine
Recorded by	Vince

Data sheet #: A17/F

Tag #	
New	
Old	X-544
	X-545

YAP STATE TURTLE PROJECT
NON-NESTING TURTLES

Date: 8 / 5 / 90 Time: 11:30 am (pm)

Location: Section A.

Depth: 5 Ft Substrate: _____

Surface water condition: (calm) / moderate / rough

Tide level: low / med. / (high) Tide phase: spring / neap

Turtle activity: Swim close to the beach & caught

Species: (green) / hawksbill / other: _____

Age/sex: juvenile / sub-adult / adult (male) / (adult (female))

	carapace	
	curved	straight
length (cm)	107	
width (cm)	93	

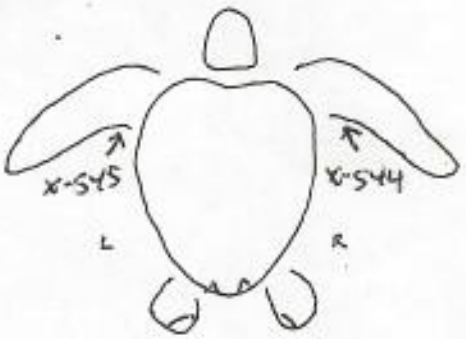
Weight: _____ lb/kg

Tail length (cm)
from plastron: _____
from carapace: _____
from vent: _____

Evidence of previous tags: (yes) / no

Commensals:
barnacles - Chelonobia...0
- burrowing....0
other - _____....0

Damage:
carapace.....0
LFF.....0
RFF.....0
LHF.....0
RHF.....0
tail.....0
head.....0



Comments: clear sky, wind from NW at high Tide, maybe patrol for male Turtle.

Recorders:

Measured by	Camino
Recorded by	Willy

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

December 13, 1990 F/SWC2:GHB:JJA
CHICO-7L.GHB

Mr. Al Chico
Elato Island
Yap, FM
Federated States of Micronesia 96943

Dear Mr. Chico:

I am writing to thank you for reporting the tagged sea turtle (X-519) you found at Woletali, Elato, on June 12, 1990. Your assistance in this research and conservation project is very much appreciated. The sea turtle was originally tagged at Olimarao Island, Olimarao Atoll, on May 21, 1990.

I have enclosed a T-shirt with a sea turtle logo as a small reward for reporting the tagged turtle to us.

Sincerely,

George H. Balazs
Zoologist and Leader,
Marine Turtle Research

cc: Dr. Andrew Smith
Marine Resources Management Division
Yap State Government

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

December 13, 1990 F/SWC2:GHB:JJA
METEW-7L.GHB

Mr. Isidore Metewalur
Satawal Island
Yap, FM
Federated States of Micronesia 96943

Dear Mr. Metewalur:

I am writing to thank you for reporting the tagged sea turtle (X-508) you found at Satawal Island on June 20, 1990. Your assistance in this research and conservation project is very much appreciated. The sea turtle was originally tagged at Falipiy Island, Olimarao Atoll, on May 16, 1990.

I have enclosed a T-shirt with a sea turtle logo as a small reward for reporting the tagged turtle to us.

Sincerely,

George H. Balazs
Zoologist and Leader,
Marine Turtle Research

cc: Dr. Andrew Smith
Marine Resources Management Division
Yap State Government

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

December 13, 1990 F/SWC2:GHB:JJA
RETAL-7L.GHB

Mr. Steven Retalmwai
Outer Islands High School
Falalop, Ulithi
Yap, FM
Federated States of Micronesia 96943

Dear Mr. Retalmwai:

I am writing to thank you for reporting the tagged sea turtle (X-544, X-545) you found at Elato Island on August 7, 1990. Your assistance in this research and conservation project is very much appreciated. The sea turtle was originally tagged at Falipiy Island, Olimarao Atoll, on June 12, 1990.

I have enclosed a T-shirt with a sea turtle logo as a small reward for reporting the tagged turtle to us.

Sincerely,

George H. Balazs
Zoologist and Leader,
Marine Turtle Research

cc: Dr. Andrew Smith
Marine Resources Management Division
Yap State Government

MARINE RESOURCES MANAGEMENT DIVISION

DEPARTMENT OF RESOURCES & DEVELOPMENT
YAP STATE GOVERNMENT
FEDERATED STATES OF MICRONESIA

PHONE: 2294
CABLE: GOV YAP
F A X: (691)350-4113
TELEX: 729-6856

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

10/31/90

Dear George,

Just received your letter with the certificates + buttons - thanks, they'll be much appreciated out there. We have a guy going out on the next ship (in about a week) so he'll drop them off and try + get some answers to your questions on the tag returns.

Steve's gone to Bali and should be back in about 3 weeks. I've enclosed his report on the fieldwork - unfortunately he didn't get to finish it before he left, so I did. Problem was I had alot of questions about it too! So don't read too much into this report. I'll ask him to reply to your letter as soon as he gets back.

My contract ends today, and I'm taking a month off before starting my next one (back in Yap Dec. 2.) for 12 more months. After that I don't know where I'll be going nor what I'll be doing! The work as an advisor here is slowly driving me crazy - lucky if I can concentrate on one project for ½ hour, before having to help with another.

I'll try and contact Peter Thomas in Sydney when I pass through there.

As I put in the report, we got funding for another year - $9,800 this time. We're planning to do a brief 7-10 days tagging at Rafeut

(this island is used once a year for turtle/bird collecting - the first (last year) year I saw 52 turtles caught in 7 days, this year I saw them get 18 in 10 days)
and a repeat of Olimarao on the other islands of Ulithi. We've got permission for both of these (a few hassles at first - mainly through misunderstandings and also due to traditional laws on Ulithi). I'll explain in more detail when I get back.

Hope your health is better. Bye for now.

Regards,

Andrew

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Hope your health is better. Bye for now.

Regards,

Andrew

c/o R&D Dept
Yap State Government
Yap, FSM 96943
28 July 1990

Dear George,

Heard from Andrew Smith that you had been in touch. I have been here in Yap for about a month now, working on a fishing project for the governor. I met Ray Clarke earlier in the month and perhaps you already know this. Anyway, I'll be winding up here by the end of the month and heading back to Kona. Not sure what the future holds; if this current project goes anywhere I may stay involved.

Enclosed is a synopsis of the turtle information from Satawal during the 6 months I was there. Not much this year. I had actually planned on staying longer, but this current task for the governor shortened the stay. (My family is still on Satawal but will be coming in on the next ship sometime in August.)

I received a letter from Trevor Daly of Greenpeace Australia regarding uses for their new RAINBOW WARRIOR in research projects. I passed it along to Andrew Smith who I understand has contacted Trevor about possible support for their projects in turtle tagging.

Too bad that Peace Corps Steve had to leave Olimarao early because of family problems, but he'll be back. Biggest news (to me) is that they found at least 5 mature females with definite markings on lower marginal scutes. This corresponds with how we marked hatchlings 18 years ago before releasing. I believe Gawel also followed the same procedure in 1974 and will be contacting him to see if he has any notes on which side, which scute, etc.. Steve unfortunately didn't get any photographs, but the number of mature females and the consistency with which he saw the abnormalities in the scutes is enough to at least give hope that they might have been "my" (or Gawel's) hatchlings. Do you know of any other head starting projects in the past 20 years, say in PNG, which might have marked in a similar fashion?

Other big news is that tagged turtles from Olimarao work this year have been captured on both Elato atoll and Satawal in the past several months. We thus might be dealing with a single nesting population in at least the area from Olimarao to Satawal. That would include the atolls of Olimarao, Namoniur, Elato, Lamotrek and the island of Satawal, and maybe more. You can see by my notes on turtles captured this year that there was one immature green speared on the reef, which is the first time I've ever actually seen one of this size (and actually I only saw the shell as it went into the pot fairly quickly). I don't know if the spearfishermen are getting more proficient (more desperate?) or the turtles more bold (stupid?) in their feeding habits...

Back in Kona by early September and will be in touch. What is going on with meeting in Fiji with the advisory group to S. Pacific turtle work (mentioned by Trevor Daly)?

Adios, Mike McCoy

MARINE TURTLE INFORMATION FROM SATAWAL ISLAND, FEB-JUNE 1990

16 Feb: one female green turtle caught in water in early AM after nesting on eastern side of Satawal island. Brought to village and consumed.

12 Mar: four female green turtles returned to Satawal via canoe from W. Fayu. and consumed. Canoes had been on W. Fayu for 13 days and had consumed two additional female green turtles there.

24 April: one female green turtle caught while nesting on eastern side of Satawal island. Brought to village and consumed.

28 April: one immature olive ridley (sex unknown) caught while floating in water near tuna schools about 6 miles SW of Satawal island. Kept on island and raised until released by accident on 22 May.

28 April: one hawksbill (sex unknown) speared on Satawal reef and consumed.

9 May: Five greeen turtles, four females one male brought to Satawal via canoe from Pikelot. 13 days total on island, had caught one other male and eaten during time on Pikelot.

19 May: one olive ridley captured near tuna schools and floating log about 6 miles SW of Satawal. Kept on island and raised as pet. No information on final disposition as of late June, 1990. Have photographs.

22 May: one immature green turtle, about 24 inches carapace length, speared on NE reef at Satawal. Consumed on island. (Very rare to find green turtles this small around the island).

26 May: one hawksbill captured on reef at Satawal. "Tagged" with one loop of monofilament line through flipper and released.

6 June: two green turtles, both female, returned to Satawal via canoe from Pikelot. 12 days total on island.

Marine Resources Management Division
P.O. Box 251
Yap, FM 96943
Federated States of Micronesia

30 July, 1990

Dr George Balazs,
Southwest Fisheries Center Honolulu Lab,
National Marine Fisheries Service,
2570 Dole St,
Honolulu, Hawaii 96822-2396.

Dear George,

I received your FAX last week, my apologies for not letting you know how things were going, but until last Wednesday I wasn't sure how things were going either! Relayed radio messages weren't too reliable. I don't know if Steve was able to telephone you in Honolulu on his way back to the States, but just in case he couldn't, I'll fill you in on what's happened.

Steve was evacuated by the Peace Corps as his father is critically ill with cancer and not expected to live very long. He got back to Yap last Wednesday and flew out to the States Friday. The other three guys are still there continuing the work and will be returning on the next field trip ship which leaves late August and is due back September 10 (the ship has been in dry dock in Japan for the last month, then in September will go to the Philippines for more repairs - so we have to pull them out next trip).

From the brief conversation I had with Steve before he left, I gather they had tagged only 27. Of those one has been caught nesting again in Elato, and we have heard, unofficially, that another two have been caught by Satawalese, but we don't know if it was on Satawal or West Fayu; Mike McCoy is trying to find out the details (he's here on Yap for a couple of months). Steve said they'd been raising hatchlings, but he didn't give me any numbers (he left all the data sheets and journals out there).

This project has come up with a few interesting things so far. Steve said they had "at least" five turtles nesting with obviously notched marginal scutes. Unfortunately he didn't take any photos of them. Mike said that they sound similar to his notches, but he was going to check with Mike Gawel as well to see if and how he marked any. Do you know of any other hatchling notching that has occurred from where these turtles may have come? Needless to say Mike McCoy is "rather excited"!

The turtle that was caught in Elato was nesting, having already nested in Olimarao. I don't know how long between nestings though. I'll send the tag along with copies of all our data sheets when they come in. Steve said that quite a number of the tagged turtles were nesting on both the islands in Olimarao (opposite sides of the lagoon, about 1[?] mile apart). We're waiting to see where the Satawalese caught their's - if they were laying on West Fayu

then it would seem that the Olimarao-Elato-Lamotrek-West Fayu area (at least) may constitute a "nesting region" for turtles, rather than returning to nest at specific islands.

The other thing which Steve said was that very large numbers of eggs were being eaten by the ghost crabs. One nest that they put a wire cage around, with top to the cage, caught 135 ghost crabs after two days. Another nest he dug up, as there were a lot of crab holes next to it, had had all the eggs eaten.

At the moment that's about as much as I was able to find out from Steve before he left. He's been given two weeks leave by the PC, but may be allowed more. He said he is definitely coming back. I'll be leaving for a month, for a conference in Japan and then a holiday, from August 22 to September 21. By the time I get back Steve and the also the data sheets should be here and we'll start working the notes up.

I'm still persevering with trying to collect some catch data for all the outer islands: about 1/3 of the islands are religiously filling out the forms, the rest require a bit more prompting. I'll try to keep it going as long as possible, at least until the end of next year. I'm enclosing (unofficially) a copy of an internal memo I wrote to our Legislature concerning a bill that was introduced on turtles. It was very rushed, but I was able to get Mike to check the draft. I'd like your comments, suggestions, criticisms, etc, if I could please? No rush for it now, I think Legislature will be sitting on it for quite a while.

My apologies for the lack of specific information about the turtle tagging, but I'm a bit in the dark myself! I'll be interested to know what comes out of the SPREP meeting.

Regards,

Andrew Smith

MARINE RESOURCES MANAGEMENT DIVISION
Department of Resources and Development
P.O. Box 251
Colonia, Yap, FM 96943
Federated States of Micronesia

March 5, 1990

Dr George Balazs,
National Marine Fisheries Service.
2570 Dole St.,
Honolulu, HI 96822-2396.

Dear Dr Balazs,

Thanks again for the tags, applicators and information. The latest date we have for the Field Trip Ship to leave is around the 10th - 13th of April.

We'll aim to raise around 200 hatchlings, but I agree we should keep it to a minimum. As for tagging hatchlings, it would be good PR value to tag some with small tags. One of the things people always talk about concerning previous turtle work is Mike McCoy's marking the hatchlings. This morning we met with the Council of Outer Islands Chiefs - they also asked about [illegible] possible, could you send some small tags, with relevant instructions? Another question the Chiefs had was what happens when tags are sent to you? I think they wanted to know if there is a reward, as there is with tagged tuna?

Our Outer Island workers came back last week after meetings in Lamotrek/Elato (owners of Olimarao). The estimates of turtles that nest on the two small islands (combined) in the atoll are up to 20 a week in a good season, to about 10-15 per week in an average season (these were the agreed estimates of the men who've spent most time at Olimarao). Would it be possible for you to send us another 50 to 100 tags? I'd rather the team have too many tags out there than not enough (there's also the problem of resupplying them from here - the ship is often unreliable). I'll ensure any unused ones are returned as soon as they return. As there are two islands to cover (although they won't both be worked every night) would it be possible to get another applicator? I'm also worried about their not having a back-up pair.

I'll send a message out to Mike McCoy at Satawal about the old tags and applicators to see what he can find out. My apologies about this quick letter and all its 'wants'! We really appreciate your assistance.

Sincerely,

Andrew Smith

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

February 12, 1990 F/SWC2:GHB

Dr. Andrew Smith
Marine Resources Management Division
P.O. Box 251
Yap, FM 96943
Federated States of Micronesia

Dear Andrew,

Many thanks for your letter of January 31st providing much helpful and interesting information about the forthcoming sea turtle conservation and research project at Olimarao Atoll. I was delighted to learn that funding has now been finalized.

I recognize that you are in somewhat of a difficult situation with regard to the headstarting part of the project. About all I can say, as words of advice, is that you should strive to hold and raise as few hatchlings as possible. I concur with most everything Mike said on this subject in his letter of December 9th. However, I know that if this element were removed, your funding and other support from higher quarters would likely evaporate. Would 200-300 hatchlings, raised to about 15-20 cm carapace length, be sufficient? You wouldn't want to grow the turtles to a size where they are no longer "pelagic" (>25-35 cm). All of these options for captive rearing are filled with unknowns, regardless of which path is followed. Are we doing more harm than good? No one knows. Hence the viewpoint,--let the turtles follow their natural developmental route without human intervention, except for those situations where predation on eggs and/or hatchlings is substantial and can't be controlled. When that occurs, only undertake a "hatchery" operation, and release the hatchlings on the same night as hatched. Headstarting, as you realize is still highly experimental even after all these years. It "looks" good, and in some ways "sounds" good, but does it really do any good for building up a population? If it does (I stress "if"), it will take decades to determine. The article I sent you by Jeanne Mortimer, and the Florida Bureau of Marine Research, summarize very nicely the dilemma on sea turtle headstarting.

Your question about marking small turtles can be partly answered by my publication enclosed on the use of tiny metal flipper tags. In spite of the encouraging results, I hesitate to recommend that you do this at Olimarao. However, if you feel it would be of interest, I can easily also supply you with the tags. The problem here may be that the turtles you rear will be too large for the small tags, and too small for the large (Inconel) tags,

when they are ready to be released. With regard to clipping or notching marginal scutes, my own experiences and literature review indicate this to be of no value.

With this letter I am sending 150 tags (X-501 to X-650), an applicator, and some instructional notes and illustrations. It is important that each adult turtle receive at least two tags, and that each tag "lock" completely (tip folds fully over after passing through the hole). For this to occur, the applicator must be squeezed together with substantial force at the final point. "Squeeze and hold" for a second or two to allow the alloy to bend into final proper position. Any tags that are ruined (not applied) should be recorded as such and, ideally, returned to me at some later date. If it appears that more tags may be needed as the study progresses, just let me know and I'll send another hundred, or whatever is needed (at no charge).

In closing I should mention that in 1980 I sent Mike McCoy 14 Inconel tags (3337-3350) and an applicator for use at West Fayu/Satawal. I'm not sure if any of these tags were put on turtles, or whatever happened to them. Mike lost track of them after he left, and no data ever showed up. If you are able to locate these tags and/or the applicator, please return them to me and only use the ones that are being sent now. The old style applicators will not seal the new tags properly, and I prefer that only "X"-prefix tags be used in your region.

Please don't hesitate to contact me if more questions arise. Our FAX number is (808)942-2062, although I don't know if you have this space-age luxury at present. Good luck and best regards. I'm really excited about what your project may uncover. That tag recovery in southern Taiwan from Oroluk is indeed true. The letters, photos and map from the Taiwan source are displayed prominently here in my office. Mike Gawel has copies of everything that were used for a note in Marine Turtle Newsletter.

Sincerely,

George. H. Balazs
Zoologist and Leader, Hawaiian Sea Turtle Recovery Team

Enclosures

MARINE RESOURCES MANAGEMENT DIVISION
P.O. Box 251
Yap, FM 96943
Federated States of Micronesia

31 January, 1990

Dr George H. Balazs,
National Marine Fisheries Service,
Southwest Fisheries Center Honolulu Laboratory,
2570 Dole St.,
Honolulu, Hawaii 96822-2396.

Dear Dr Balazs,

Thank you very much for replying to our request for information for our turtle project. My apologies for having the wrong address on your letter, however, it was the only one we could find in our files.

I've enclosed a number of photocopies to give you an idea of what we've done so far and are planning. I've enclosed Mike McCoy's letter to us, and my reply to it; a letter to the Chiefs of Elato and Lamotrek (owners of Olimarao Atoll) outlining the project (permission has been obtained and two workers chosen); a turtle catch data sheet which was sent to all islands (we have someone going out on this Friday's ship to check if there are any problems with them); a Yap State Development Budget request to continue the project next year (FY91); and finally, a copy of our MRMD Newsletter which I'm trying to use as an educational tool, the next issue will have some information about turtles (let me know if you'd like to be on the mailing list for future newsletters?).

Last week we finally received F.S.M. approval for our project funding - $6,900. Yesterday I talked with Mike Gawel by phone, and he mentioned that there may be a remote possibility of SPC providing some extra funding, and wanted to know if we would be able to gear up for another island at short notice. Our problem is lack of staff as well as things like boats, etc. With Mike McCoy heading for Satawal, he may be interested to do something at West Fayu again - Mike Gawel was going to talk to him.

As far as tags are concerned, we would greatly appreciate being able to use your tags and applicators. I think it would be much better for returns if there is a centralized system. It also simplifies the hassles with obtaining permits, and also tags! From talking with Lamotrek and Elato men who have spent time at Olimarao (hunting turtles and making copra), they say that in a good season they get from 3 to 5 turtles a night (perhaps that's

a very good season!?). I've also suggested to those guys who'll be doing the work that they try to tag as many males and mating females as possible. They will be out there for at least 4 months, doing the turtle tagging continuously. From the above I'll leave it up to you to 'guesstimate' how many tags you think they'll need. I've asked the guy going out this Friday to double check estimates while he's out there. If your estimates of the number of tags required is higher than you would normally provide free, let me know as we are willing to help with the costs.

What is your advise as far as head starting goes (see my letter to Mike McCoy)? I'm not sure how many hatchlings to try and raise, nor for how long. Personally, I think the main value in the head starting will be through its PR value, not biological, but the former is possibly of greater importance in encouraging conservation and management. Another question, is it worth while marking hatchlings before release? If so, how is it best done (I've seen a leather hole punch used on the marginal scute)?

One update from what I wrote to Mike: apparently the old TT turtle laws still apply to Yap State. I've written a memo to our AG's Office for a summary of all laws applicable to here. Mike Gawel has asked me to review them in light of my experiences in the outer islands (for the last two years I've been doing a traditional fisheries study in all Yap's outer islands - through the Yap Institute of Natural Science).

My apologies for all these questions and extra work for you, but we certainly appreciate your advise and assistance! I look forward to hearing from you.

Sincerely,

Andrew Smith

Andrew Smith
M.R.M.D. Advisor

P.O. BOX 4329
KAILUA-KONA, HAWAII
96745
9 DECEMBER 1989

Andrew Smith
Marine Resources Management Division
PO Box 251
Yap, FSM

Dear Andrew,

Thanks very much for your letter of 14 November which just arrived in Western Samoa a day or two ago. We are leaving here in a few days (hence the Hawaii address above) so will mail one copy of this from Apia, another from Hawaii just to cover the bases. I hope you'll get a chance to share this letter with Margie F. (and Sebastian Anefal).

I've heard of your work in Yap through the usual grapevine, and am very interested in what you've turned up in your recording of traditional fishing practices. I'm also happy to hear there is a renewed interest in turtle work in Yap, and hope this letter will be of some assistance.

First of all, you probably realize I've done very little "hands on" work on marine turtles for some time. My efforts in the recent past have been mainly to collect data from other sources, and to keep abreast of developments in research generally. My membership in the "Marine Turtle Specialists Group" of IUCN helps tremendously in the latter. I attended a special meeting of the group in Japan during Jly, 1988 where the focus was on hawksbill utilization by the Japanese "bekko" industry. More recently I was at the Parks conference in Vanuatu where I had hoped to see Margie and Sebastian. We drafted a "regional turtle conservation strategy" which is now in the hands of the South Pacific Regional Environment Program at SPC where they are looking for funding.

I sent copies of the latter to Margie, and if you haven't seen it I hope you can get a copy (mine is all packed away and aboard a ship somewhere). We had a number of people who are well versed in marine turtle conservation at the meeting

and the "conservation strategy" includes some important points on work priorities.

I had hoped to get some support for Micronesian turtle work while in Vanuatu, and talked to a few people at the Parks conference about it (such is the real utility of those kinds of conferences). But so far nothing has turned up and I have no idea if it will before we arrive in Micronesia. There is a fund administered by New Zealand which comes from the interest gained from the French "Rainbow Warrior" incident payment. I had planned to apply to them but the timing of their review of submitted projects and the bureaucracy involved doesn't give me much hope. My hope was to get funds to hire some people for data collecting (census, sex ratios, numbers taken, etc.) to compare with the figures from the early 1970's and beyond. Tagging of mature turtles is the most important thing to get started in my opinion, and then integrate this activity with education.

You'll notice I've left out nurseries and raising of hatchlings in my plans. There is a reason for this and what I've learned in the past few years might help explain.

When I first started working with marine turtles in 1970, I read as much as I could about what was known of their life history. I sought out experts in the US during a vacation there and talked with graduate students who were at the time still probing the basics. Now, almost 20 years later there is not much more known, except that the passage of time has enabled us to observe more and come to some important conclusions. This has in turn helped me to sort out the current Micronesian situation in my own mind. Here are some of the most important items, along with implications I feel are important for anyone attempting to work in marine turtle conservation:

When things got going in 1970 as I said nobody could say much about life expectancy or age at sexual maturity. All kinds of numbers were thrown around, but the best guesses I heard were 8 to 9 years to sexual maturity, based on the sizes of captive turtles being raised at various zoos and marine parks. But by 1979 nobody had been able to induce mating or nesting in these artificial surroundings, and to this day "farming" is still "ranching". Lately work in Australia of which you might be familiar has shed some light on age at sexual maturity. Colin Limpus told me of laparascope work which places maturity in female green

turtles at from 20 to 28 years. This is in addition to his observations of individuals over the past 18 or 20 years on the Great Barrier Reef which points to a life span of 30-50 years and greater.

There has also been some work done on sex determination in turtles which shows that like some other reptiles, temperatures in the nest mainly determine sex. Cool temperatures (as in nests dug in the brush or shade) result in mostly males whereas warmer temperatures create mostly females from the clutch.

There are some fairly far-reaching implications here. First of all, hatchlings which have been released at various sites around the Pacific (including those we raised at W. Fayu in 1972 and 1974) have never been shown to have increased the wild populations anywhere. With green turtles it may be too early to tell, but one thing is certain: if artifically raised hatchlings survived, an imbalance has probably been created by well-meaning researchers who dug up nests, placed them in styrofoam containers under artificial shade and then raised and released them. In addition to this problem, hatching in artificial nests has always raised the problem of "imprinting" on the beach and the ability of the turtles to find their way back to the beach at maturity.

I'm afraid that given these now-known facts, the idea of raising hatchlings for anything other than publicity or cultural-social reasons (such as raising peoples' awareness of the plight of marine turtles) is just not what should be done.

In your plans for Olimarao for example, if your workers locate every nest and artificially raise every hatchling, then they could be contributing to a serious disruption in the life cycle for those turtles. It could conceivably do more harm than good.

We were lucky at W. Fayu in that we never discovered every nest and there were always those that got away. Just the fact that we were physically present and discouraged the taking of eggs for food must have helped somewhat. But for now, if you are going to encourage the raising of hatchlings it should be done for only a few, perhaps just a couple of nests, for the reasons noted above. The men should mark the other nests and monitor them so that when the turtles do come up, the hatchlings can be given a better chance in making it to the water by the killing of the ghost crabs and

so forth. We used to club the crabs then throw them into the water a ways down the beach from where the turtles were entering to entice the small black-tipped reef sharks and others away from the turtles as they entered the water. You can also throw stones into the water just prior to the hatchlings arrival so as to scare off the sharks; it won't deter the hatchlings at all.

This may not sound like much, but it now appears preferable to taking the chance of wiping out the entire year's hatchlings by artificial rearing.

For the past 20 or 30 years the existance of local laws, which I know are not really enforced, have inculcated certain ideas in peoples' minds. They expected us to "manage" marine turtles in the Western sense in the same way we manage fisheries. That is, imposing minimum size limits and allowing the highly vulnerable breeding population to be exploited. Its now fairly clear that what needs protection are the breeding populations. This is bad news for the outer islanders who rely on the mature breeding populations for food, but it can be mitigated somewhat as described below.

Again referring to your planned work, one of the ways to encourage conservation and at the same time contribute to future success would be to work on an "experiment" with the outer island workers to see just how many times females nest during a particular season. I assure you that most people have any idea of this, because the female is always captured at the first opportunity. By tagging early in the season and monitoring the beach throughout the project I think the workers will be surprised to see that a female nests two, three or even four times. If this can be proven with a number of turtles, then the implications for times of harvesting mature turtles should be fairly clear.

Although by virtue of their terrestrial nesting habits females are the easiest to tag, an attempt should be made to tag males as well. There are a couple of methods of enticing males to a point where they can be captured close to shore, and your outer island workers should know these procedures. Of course morphometric records should be kept on all turtles, captured, tagged, eaten or whatever.

Another point. Your workers should know that eggs produced during the nesting season are not necessarily the result of mating from that season. It now appears that egg

development is carried out over a longer period of time and that mating in one season results in the sperm being carried in the female and resulting in offspring in later years. Since knowledge from other areas of the world points to cyclical nesting on a 3 to 4 year return cycle, it would be worthwhile to try and capture a mating female in the water and tag her to see if she nests at all during the time she is present at the atoll. This would require a large canoe or boat at least. I have no idea what if anything you are planning to give your crew in the way of transportation while they're on the island.

This brings me to another point, the 'seasons'. The current law contains some closure in December, I believe. This existed in the old Trust Territory code and I have no idea where it came from. (I think we all agree its irrelevant in the outer island context.) The time for the harvesting of turtles has or had more to do with prevailing winds and the ability of canoes to sail to such places as Pikelot, Gaferut and Olimarao. My hunch is that nesting takes place year-round, perhaps somewhat reduced in the winter, and its only the rough trade-wind months that prohibit outer islanders from taking advantage of this and the resultant knowledge of year-round nesting becoming a part of local lore.

I know you don't have much financial support now, but an entire year on a nesting beach somewhere should be a future goal.

Another important goal should be tagging to try and determine migration of mature turtles. Its ludicrous to try and work on management on the Micronesian end, traditionally or otherwise, when we don't know where the turtles go. You may have heard that there have been only two confirmed tag returns from Micronesia in all the years people have been doing it on and off. One was <u>from</u> one of the northern islands of PNG that was found in Kosrae, and another was an Oroluk turtle that supposedly ended up in Taiwan.

I have my own thoughts on migrations. When I first started out I thought that north-south routes were impractical because of the currents existing between Micronesia and PNG. PNG certainly provides the greatest amount of grazing potential for animals that nest in the Carolines. Since one doesn't see many mature turtles in places like Truk or Ponape, it is doubtful that all of the nesting populations

from the coral islands spend their time grazing in the high islands within Micronesia. When the purse seiners started tagging logs with radio beacons and tracking them, I saw and realized that its not hard for a log to drift and eventually make its way either north or south. A turtle could do the same with a minimal amount of energy expended. This is not to say that turtles follow the logs, because there are only a few caught in purse seines. They could however take advantage of the same anomalies in the currents to be carried north or south.

The turtle captured in Kosrae was from Mussau Island or one of the smaller ones near Mussau. The place is now Seventh Day Adventist, and they don't eat turtle meat. People who are familiar with the situation there say that there has been an increase in the turtle population since their conversion to that religion, but I don't know the amount of time involved.

As far as work in the outer islands now is concerned, I assume the files are still intact (I know the people are) to give you some background in planning. The Peace Corps disaster at Ulithi in 1973-74 in assigning a fairly incompetent and less than sensitive volunteer to a project that was not designed at all didn't help matters in the early years. The turtle islands of Ulithi remain as one of the major nesting areas in the Carolines, but I assume that cultural and political problems preclude work there. Still, census figures and knowledge of the numbers of turtles taken to Mogmog would be another piece of the puzzle.

So, where does this leave the work on Olimarao? Well, from a prioritization-of-tasks point of view, I think that **tagging is the first priority**, (after fund raising of course). Tagging early in the work and noting repetitive nesting is part of this. Protection of nests and allowing the maximum number of hatchlings to reach the water in the natural manner would be the next most important. Raising of hatchlings is still for show, and to inculcate a sense of conservation work into your local workers.

As far as education goes, I think the entire exercise can be looked upon as one of education. Depending on how you choose your local workers, they can act as conduits of information back to the people and chiefs. The presentation of a report by them to the Council of Tamol or other suitable meetings which includes some basic knowledge of turtle life history that was proven by the project might go

a long way towards encouraging the desired attitudes or encouraging the legislature to increase funding.

For example, an experiment to tag females early and determine how many times they nest during the season could show people its better to take the turtles later in the year instead of April or May. Carefully marking nests and determining the days to hatching would also be a revelation to most outer islanders (who dig up nests when they can and have no real idea of the days or months it takes). The tagging and release of a mating female early in the project and then seeing if she shows up on the nesting beach might also provide some insights. I found that sitting around on the beach at night discussing these unknowns with my crew was one of the things that encouraged them to work and try and find some of the answers.

As for my own personal plans, they are totally up in the air. I had hoped to get something positive from New Zealand funding but that is not to be. I have no idea how we will be getting to Satawal, via field trip from Yap or the back door from Truk on a chartered boat which is the usual (cheaper and quicker) way we've used in the past. In any case I'll have my ham radio with me on Satawal and might be able to keep in touch if you know anyone with a similar setup in Yap.

Before closing this letter which has gotten longer than I planned, I want to make a few more points. Earlier this year I heard from Mike Gawel that one of the Trukese senators in the FSM Congress was trying to repeal the laws regarding turtles and make it legal for people to take the turtles. Since I don't think he would have differentiated between the "traditional" taking of turtles and the field trip ship having a party, I wrote a long letter which has gone unanswered.

In the letter I pointed out most of the biological considerations I've gone over here. I also told him that because of the longevity of turtles and the historical chronology of Micronesia, some conclusions might be drawn on the current status of populations.

You probably learned that during the Japanese time inter-island voyaging was officially discouraged and people even punished for attempting such voyages. This would have resulted in an increase in the turtle populations generally in the Carolines as there assumably would have been fewer

turtles taken. This is of course in addition to all of the cultural and other reasons that limited the numbers of turtles harvested at that time.

During World War II voyaging was curtailed even more. And it probably wasn't until the late 1940's and early 1950's that there were canoes and people making regular voyages again. Its thus entirely possible that the numbers of turtles captured during the late 1960's and 1970's and even up into the 80's are the result of undisturbed nesting during the Japanese time, during World War II and right up to the 1950's. The population decreases owing to motorboats, improved sails, regular field trip ship visits to turtle islands and so forth since the 1960's thus probably won't be felt for another 5 or 10 years at the earliest.

This chronology may or may not be accurate. Still, given the biological realities I think it points to the problem we have now defined and with which we are dealing. We have a relatively long-living animal with a highly vulnerable nesting area. The most difficult pill to swallow is that whatever we do now probably won't be seen for another generation. And as your work in traditional beliefs have told you, folks in the outer islands haven't been used to worrying so much about the future.

I apologize if this has gotten a bit long and out of hand, but it is the best way for me to put across these thoughts, short of being there and talking with you. I hope we have a chance to cross paths when I get to Micronesia, and wish you the best of luck in the undertaking. If you need any help or assistance from me, you'll know where I am (after February, I hope).

Saila,

Mike A. McCoy

MARINE RESOURCES MANAGEMENT DIVISION
Department of Resources and Development
P.O. Box 251
Colonia, Yap, FM 96943
Federated States of Micronesia

9 January, 1990

Mike McCoy,
P.O. Box 4329,
Kailua-Kona,
Hawaii, 96745.

Dear Mike,

Thanks for the letter, it came at a good time - we'd received very little response to the letters we'd sent out. Recently, however, we've received replies from MMDC in Palau (they couldn't offer much information or assistance) and another from the 'Sea Turtle Center' in Navada City, California (they sent some educational material developed for Mexico/Central America, and offered their resources to help in any way they can).

One letter we sent out, to Dr George Balazs in Hawaii, keeps coming back telling us the addresses are wrong (we've tried two so far!). We have sent it to an ex-MRMD PCV who is in Hawaii to try and track him down. I've also enclosed a copy of our letter to him for you to see - perhaps you may be able to locate him for us also, and fill him in on our current plans/ideas.

I was glad to see what you wrote concerning nurseries as it supported my own mis-givings - e.g. the original proposal by the PCV didn't mention tagging at all. I spent a lot of time talking with Col Limpus when I was doing my PhD, as I was collecting turtle reproductives from turtles caught by Aborigines to compare with his laparoscope work. I also spent a season (late 1970s) doing turtle tagging in the Torres Strait for Applied Ecology. I slightly altered the thrust of this turtle project from the original proposal. At the moment we still have no funds - we're waiting for Pohnpei to approve the project and release the funds! Hopefully that will happen in the next couple of weeks.

Our tentative field work plan is as follows:

- Go out about April (providing we can get tags, etc by then) to Olimarao. There'll be one of our O.I. staff (from Elato) and one PCV running it; will also employ two guys temporarily from Elato/Lamotrek for the field work (there will probably also be a couple of families staying there to make copra at that time). They'll return to Yap about August.
- Map the island(s), reef and lagoon; divide into sectors to record where turtles are found.

- Double tag all nesting females.
- Tag as many males as possible.
- Try to tag mating females; check if they nest.
- Collect morphometric data on all tagged turtles; weigh some/all nesting turtles.
- Mark all nests.
- Place plastic netting around and above nest when they are almost due to hatch.
- Regularly check for hatchlings; count; 'escort' down the beach (keep to a minimum the number taken by crabs, birds, sharks, etc).
- From every [4th ??] nest that hatches, collect all hatchlings, once they reach and enter the water, to raise in pens.
- Raise collected hatchlings in pens; release at [?] carapace size/at [?] months/or if any problems.
- Dig up nests that have hatched and count the number of hatched egg shells (cf with the number that were observed to hatch) and the number of unhatched/dead eggs.
- Collect environmental data: temperature; rainfall; humidity; cloud cover; etc.

Any comments and/or suggestions on the above would be greatly appreciated. Our main problem at the moment is to locate a source for turtle tags - find out which material is currently favored (plastic vs metal) and acquire them before April; its looking more and more difficult, none of the replies have mentioned tag suppliers, etc. Any thing you may be able to find out for us on that would be a great help! Another thing on tagging, do we require US Federal Government permission to tag greens and [if any should turn up] hawksbills? I'm having trouble sorting out what laws are in affect here at the moment (more on that later). Two problems with the above plan: one, how many nests should we attempt to raise (you didn't say in your letter, but I assumed from reading between the lines that when you did the nursery before, you collected the eggs, as opposed to the hatchlings? Due to what I'd heard/read while in Australia, on the possibility of imprinting in hatchlings, I had already planned to only collect hatchlings for raising, after reaching the water)? Second, for how long should we attempt to raise them?

As far as education goes, the next MRMD newsletter will start covering the turtle situation. As I said before the 'Sea Turtle Center' offered to help us, so we'll try and hit them for as much educational stuff as possible!

We sent out on the last field trip (late Dec.) some catch record sheets for turtles (I've enclosed some for you). We went through the chairman of the Council of Tamol and got his support. I'll see how they go; at least its a start on getting the other islands involved, and hopefully get some indication of the amount currently being caught. We'll try it for a year, sending out

fresh sheets every second trip.

I'm in the process of writing a development budget project for FY91 to continue the turtle work, hopefully extending it to Ulithi's "turtle islands". The 'grapevine' seems to indicate there shouldn't be too many problems as long as the right channels are followed; the powers that be seem in favor of turtle work. The problem will be getting any funding at all! MRMD rarely gets development funds as "we don't make no money!!" And the operational budgets are to be cut down for next year. Outside funding will probably be the only way to go. The proposal will emphasize more tagging, education and possibly developing some regulations (hopefully including some modified traditional rules). I haven't been able to find out much about your reference to the PCV problem at Ulithi in 1973-74. Our PCV checked up at the PC office but couldn't find out much. Our records here at MRMD are in a "wee bit of a mess" having changed offices and also our secretary has been away on sick leave for a year. I'd appreciate it if you could fill me in on some of the details; it'll help with 'negotiations'.

As far as laws go with turtles in Yap State, I checked with the AG's office about a year ago, and the TT law on turtle seasons apparently no longer applies to the State; it appears that the only law here regards turtles is that they are not to be sold in the stores, although this occasionally occurs (though most are sold privately!). It seems that no one really knows what the laws are, nor bother to enforce them. I'm also in the process of tracking down what other regulations (e.g. F.S.M.; old TT) may apply to Yap State.

What are the latest ideas on marking hatchlings when released? Is it worth it? I thought of possibly clipping a certain scute on some that are being raised, and check for infections, etc, before releasing.

I haven't been able to get a copy of the "regional turtle conservation strategy" yet, as soon as Margie gets back on island I'll check with her. She left for a week or two on Guam, then the same on Hawaii - you may be able to track her down via Ed Petteys at the Forest Service, if this letter gets to Hawaii on time.

My apologies for such a lot of questions, I'm sure you've got much more enjoyable things to do in Hawaii than answer questions! Thanks again for your letter, it has certainly helped us. All the best for the new year/decade!

Saila!

Andrew

Andrew Smith

MARINE RESOURCES MANAGEMENT DIVISION

DEPARTMENT OF RESOURCES & DEVELOPMENT
YAP STATE GOVERNMENT
FEDERATED STATES OF MICRONESIA

PHONE: 2294
CABLE: GOV YAP
F A X: (691)350-4113
TELEX: 729-6856

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

TO: Chiefs of Lamotrek and Elato

FROM: Andrew Smith, Turtle Project Director; MRMD.

DATE: December 6, 1989

Subj: Outer Islands Turtle Nursery Project.

This memo is to follow up our radio message of late November, to let you know some more about the project. This financial year (FY 1990) the Yap State Legislature provided the Marine Resources Management Division $6,900 for an Outer Island Turtle Project.

Currently we are in the planning stage of setting up the project. We are hoping to carry out the field work on Olimarao from about April 1990 to August 1990. We are still awaiting a reply from you as to whether we can work at Olimarao. The Chairman of the Council of Tamol has been notified of the project.

PROJECT DESCRIPTION:

For centuries the meat and eggs of turtles have provided a major alternative to fish as a source of protein for the people of the Outer Islands of Yap State. Historically, catching turtles was a difficult task making the capture of one a cause for celebration. In recent years, the population of turtles have decreased for a variety of reasons, and the introduction of modern equipment has made capturing turtles relatively easy. Even so, the catching of a turtle is still uncommon and therefore accompanied by celebration. The reason for this does not stem from difficulty in capturing the turtle but in finding one. The relative ease of hunting turtles afforded by modern technology has by far been the greatest cause of the decline in turtle populations.

The current population decline needs to be reversed if the following generations are going to have a chance to include turtle meat in their diet. While minimum size limits and a ban on taking eggs are important means of resource management, other means exist to attempt to increase the number of turtles in the future. By raising newly hatched turtles for approximately three to four months, the survivorship to this age can be increased to around 90% as opposed to the estimated 2% survival in the natural environment. The extremely high natural mortality is caused by predation on the extremely vulnerable hatchlings. By raising a turtle to a size where they can escape most natural predators, and then releasing them to the open ocean, the number of hatchlings that live to adulthood and reproduce should be greatly increasedon the number that would naturally survive. This project is an inexpensive and practical means by which turtle resources can be maintained and hopefully increased.

OBJECTIVE:

This project aims to maintain and possibly increase the population of adult green turtles by (1) tagging adult turtles to determine movements, (2) by raising hatchlings through the period when they are highly susceptable to predation, and (3) by educating the Outer Island people about the need for conservation in order to ensure the existence of a turtle population in the future.

COST/BENEFIT:

The people working on this project will receive some payment for their effort, but most benefit will be more indirect. The beneficiaries will be the people on the neighboring Islands to Olimarao Atoll, that is Elato, Lamotrek and Satawal. Most benefits will accrue in the future through and increase in turtle numbers.

PROJECT IMPLEMENTATION SCHEDULE

Project timetabe:	N	D	J	F	M	A	M	J	J	A	S
Plan details; order equipment	X	X	X	X							
Design turtle pens			X	X	X						
Hire assistant/training			X	X	X	X					
O.I field trip						X	X	X	X	X	
Report preparation										X	X

The project director will be Dr Andrew Smith; he will be assisted by Vincent Hachiglou; 2 other O.I. assistants (to be appointed by the chiefs) and Steve Kolinski (PCV).

Shoud you have any questions, please contact Andrew Smith or Vincent Hachiglou at Marine Resources Management Division.

Andrew Smith

Andrew Smith

(M.R.M.D. Marine Biology Advisor)

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Plan details; order equipment	X	X	X	X							
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Hire assistant/training			X	X	X	X					
O.I field trip						X	X	X	X	X	
Report preparation										X	X

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Shoud you have any questions, please contact Andrew Smith or Vincent Hachiglou at Marine Resources Management Division.

Andrew Smith

Andrew Smith

(M.R.M.D. Marine Biology Advisor)

MARINE RESOURCES MANAGEMENT DIVISION

DEPARTMENT OF RESOURCES & DEVELOPMENT
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COLONIA, YAP
W.CAROLINE ISLANDS
96943

TO: Chief

FROM: Andrew Smith, Turtle Project Director, M.R.M.D.

DATE: December 6, 1989

Subj: Turtle Catch Data Sheets.

This financial year (FY90) the Yap State Legislature has provided the Marine Resources Management Division funds for an Outer Island turtle project.

As part of this project we are trying to find out how many turtles are caught in the outer islands, in one year. We are sending the attached catch data sheets to all of the outer islands. We would greatly appreciate it if you could appoint someone to fill out the form each time a turtle is caught. Perhaps it would be easiest if the forms are kept in the main canoe house. Every second/other field trip we will send out new forms for you to fill out, and please give the FTO the old forms.

The Chairman of the Council of Tamol has approved of M.R.M.D. collecting this information.

Should you have any questions or problems, please send a radio message to either Andrew Smith or Vincent Hachiglou at M.R.M.D.

Thank you for your assistance.

Andrew Smith

Andrew Smith

(M.R.M.D. Marine Biology ADvisor)

MARINE RESOURCES MANAGEMENT DIVISION

INFORMATION FOR TURTLE CATCH DATA SHEETS:

1. #- Number each turtle, 1, 2, 3...etc (see example).

2. Date- Write the date the turtle was caught. Underneath that, in parentheses, write the date the turtle was killed- (12/6/89) in example.

3. Sex-- Write the sex of the turtle: M= male; F=female; ?= cannot tell.

4. No. Eggs- If it has white eggs, count them and write down the number, if it has yellow eggs, write down Y.

5. Size- Look at it and see how big it is. If it is small, write S; if it is medium size, write M; write L for large; and V.L for very large. Just estimate the size, medium would be about the size of making a circle with your arms, touching fingers together.

6. How it was caught- Write down the method used to catch the turtle: masewong; geowong; touwong; gaserawong. If another method was used, write it in your words.

7. Place of catch- If it was caught on the beach, write B; if it was caught in the lagoon, write I; if it was caught outside the lagoon, write O. Also write the side of the island/lagoon/ reef it was caught, for example, N=north, NE= north east, E= east, and etc.

8. Activity- Write down what the turtle was doing when caught: nesting; swimming; sleeping; mating.

(THANK YOU FOR YOUR HELP OR HAISA HACHIGCHIG)

MARINE RESOURCES MANAGEMENT DIVISION
TURTLE CATCH DATA - OUTER ISLANDS OF YAP STATE

NAME OF RECORDER: _____ ISLAND: _____

#	Date	Sex	No. Eggs	Size	How It Was Caught	Place of Catch	Activity
1	12/5/89 (12/6/89)	F	113	L	masewong	b;NE	nesting

WRITE ANY COMMENTS HERE:

YAP STATE GOVERNMENT
FEDERATED STATES OF MICRONESIA
DEVELOPMENTAL BUDGET REQUEST

FILE

Fiscal YEAR 1991

A. Organization, Project/Program Information & Analysis:

1. Department/Office/Agency: Resources & Development
   Implementing Activity/Unit: Marine Resources Management Division

   Plan References (Indicate chapter and page(s))

2. Project/ProgramTitle: Outer Islands Turtle Project II.
   Project/Program Status: On-Going: [xx] New: [ ]
   Project/Program Location: Outer Islands/Ulithi (some Yap mainland)
   Project/Program Start Date: October, 1990 Project Completion Date: Sept. 1991
   Project/Program Manager: MRMD Advisor/ MRMD Chief.

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3. Project/Program Scope & Objective(s): Background: In many parts of the world, the green turtle is only a memory. In Yap State turtles play both a cultural and subsistence role. However, if the current harvest rates continue to accelerate, there will be very few turtles left here. This project proposal aims to build on the gains of the FY90 Outer Islands Turtle (Nursery) Project by extending the tagging and educational programs. In addition, we aim to collect more quantitative data on turtle catch and distribution.
   Objectives: The objectives of the second stage of the study are:
   1. To tag turtles on Ulithi's Losiep/Iar Island group;
   2. To assist hatchlings during the early stages of their lives;
   3. To assess the current turtle catch rates (in both the outer islands and Yap mainland);
   4. Develop/acquire and provide appropriate educational materials to aid in turtle management;
   5. To provide realistic management suggestions to traditional leaders and government.

   Project Design: The two key aspects of this project are the field work (especially tagging) and the educational program. Tagging is essential as we need to know if the turtles caught around mainland Yap and the outer islands also nest within Yap State. Education is the key to maintaining turtle populations as man is their main predator. Both of these aspects will be carried out according to the methods developed during the FY90 project.

4. Project/Program Implementation Plan & Schedule:

The turtle project will be implemented in the following way:

Project Activity	O N D J F M A M J J A S
Planning; finalise permission	xxxxx
Visit all O.I. (quest.; survey)	xxx
Hire and train 2 assistants	xxxxxxx
Education program	xxxxxxxxxxxxxxxxx
Tagging; field work Ulithi	xxxxxxxxx
Report prep.; management suggestions	xxx

The project directors will be the MRMD Advisor and the Chief. The field work will be carried out by one MRMD OI staff member with two temporary assistants hired for the project. The Advisor and the PCV (from FY90 project) will carry out the training. The project directors will ensure that the project stays on schedule and within budget.

5. Project/Program Cost/ Benefit Assessment:

The people working on this project will receive payment for their efforts, however, most benefits will be more indirect. The greatest benefit will accrue to the future generations of Yap State, who will be able to see and, hopefully, taste turtles.

6. Estimated Annual Maintenance & Operation Costs:

Maintenance of boats, motors and other equipment will be covered by MRMD's Operational budget.

REVENUE FUND SOURCES:

	ACTL 89	BDGT 90	COMT LEV.	NEWLY 91	GOV LY 91	YSL LV 91	EST FY92	EST FY93
Sec 211a2								
Sec 221(b)								
Sec 216a2								
Sec 216a3								
Sec 214b								
GF Loci Rev								
GF Reimb								
FSM Funds								
Fed Grants								
Foreign Aid								
Special Rev.								
Other Srcs								
TOTAL:		6,900		9,803				

C. COMPREHENSIVE EXPENDITURE BUDGET:

	ACTL 89	BDGT 90	COMT LEV	NEWLY 91	GOV LY 91	YSL LV 91	EST FY92	EST FY93
FTE								
Personnel								
Travel		500		983				
Fixed Asset								
POL		360		400				
CSM Goods		2,040		2,220				
Contr Svcs		4,000		6,200				
TOTAL:		6,900		9,803				

C1. Expenditure Budget By Source:

	ACTL 89	BDGT 90	COMT LEV.	NEWLY 91	GOV LY 91	YSL LV 91	EST FY92	EST FY93
FTE								
Personnel								
Travel		500		983				
Fixed Asset								
POL		360		400				
CSM Goods		2,040		2,220				
Contr Svcs		4,000		6,200				
TOTAL		6,900		9,803				

C2. Expenditure Budget By Source:

	ACTL 89	BDGT 90	COMT LEV.	NEWLY 91	GOV LY 91	YSL LY 91	EST FY92	EST FY93
FTE								
Personnel								
Travel								
Fixed Asset								
POL								
CSM Goods								
Contr Svcs								
TOTAL								

D. PERSONNEL BUDGET:

Position (Consolidated)	Status	Fiscal Year 1990 FTE	Fiscal Year 1990 Pers. Cost	Fiscal Year 1991 FTE	Fiscal Year 1991 Pers. Cost	Gov. Budget	Appr
Personnel Benefit(4%)							
OverTime Compensation							
Other Differentials							
[illegible] Subtotal Requirement:			0		0		

E. TRAVEL BUDGET, FY-91:

Position	#Trip	Duration	Fare	PerDiem	Car Rental	TOTAL: 983 Trvl Cost
MRMD Advisor	1	20days	400	-		400
MRMD Mar. Tech.	1	20days	400	-		400
MRMD Mar. Tech.	1	2 days	8	-		8
2 x Assistants	1	2x2days	2x8	-		16
MRMD Advisor/PCV	1	7days	54	105		159

F. OTHER EXPENDITURE BUDGETS, FY-91.

F1. FIXED ASSETS BUDGET:

Item/Type	U/Cost	Quantity	TOTAL: 0 Eqpmt Cost

F2. CONSUMABLE GOODS BUDGET:

Object Class	Itemized Goods	TOTAL: 2,620 Consmbl Cost
Printing/Publications	Report & education materials	550
Supplies/Materials	Tagging supplies;wire;field work equ.	1,300
Freight		300
Communication/Postage		70
Rental		
Repair & Maintenance		
Other Consumable Goods		
Petrol, Oil, Lubricants (POL)	Gas and oil (5 drums)	400

F3. CONTRACTUAL SVCS. BUDGET:

	Itemized Services	TOTAL: 6,200 Contr Cost
Per Diem/Subsistence Allowances	Compensation in lieu of perdiem for 5 months field work (3 x $1000)	3,000
Medical Referral		-
[illegible]		
[illegible]	2 x Assistants for 8 months	3,200

...RATIVE JUSTIFICATIONS:

1. Personnel Total Budget: $ 0

Nil; MRMD staff only.

G2. Travel Total Budget: $ 983

One round trip to all the outer islands for 2 MRMD staff will be needed to carry out a survey/questionnaire of turtle knowledge and usage, and to find out what aspects of turtles/turtle usage, etc, need to be concentrated on in the education program.

One round trip to Ulithi for 1 MRMD staff and 2 assistants (on Micro Spirit).

One round trip to Ulithi for Advisor and/or PCV to check on field work progress (Micro Spirit/PMA- 1 way on each). (PerDiem: 1x7 days x $15 = $105)

G3. Fixed Assets Total Budget: $ 0

Nil.

G4. Consumable Goods Total Budget: $ 2,220 (less POL)

This amount is the minimum needed to carry out the field work and the education program. It includes the cost of purchasing tags and tagging equipment; also the cost of developing, printing/producing and distributing the educational materials.

POL $ 400 Number of Vehicles 0 Number of Boats 1 Others

G5. Contractual Services Total Budget: $ 6,200

2 assistants for 8 months @ $50/wk = $3,200

Compensation, in lieu of perdiem, for 5 months field work

3 men x $1,000 = $3,000

Other General Comments:

In the past a number of turtle projects have been proposed by MRMD, but rarely funded. However, with the funding in FY90 of the Outer Islands Turtle (Nursery) Project, the Government has shown its concern for the turtle problem. Because of this, MRMD has been able to write to outside agencies to request assistance. As other agencies require proposals to be submitted at different times to Yap State, we are unable at this time to say that supplemental funding can be obtained, but as the Government has shown interest in the work (FY90) then it will help considerably as we request funds from outside.

ATTACHMENT 1

[This Resolution (No. 7) indicates the importance of carrying out turtle conservation and management programs.]

FULL TEXT OF THE RESOLUTIONS ADOPTED BY THE FOURTH SOUTH PACIFIC CONFERENCE ON NATURE CONSERVATION AND PROTECTED AREAS

held in Port Vila, Vanuatu,
4-12 September 1989

Resolution Number 7

SPREP REGIONAL MARINE TURTLE CONSERVATION AND MANAGEMENT PROGRAMME

The Fourth South Pacific Conference on Nature Conservation and Protected Areas:

recognizing that six of the seven species of marine turtles found in the world today are found in the South Pacific Region and that they are of cultural, economic and nutritional value for the coastal peoples of the region;

accepting that the long-term survival of migratory species such as marine turtles requires international and regional cooperative efforts;

concerned that marine turtles are threatened worldwide by variety of causes including commercial exploitation, habitat destruction, pollution, and incidental catches in fisheries;

noting that all species of marine turtles are currently listed on Appendix I of the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES);

noting the recommendation contained in paragraph 79 of the Report of the Second Intergovernmental Meeting of the South Pacific Regional Environment Programme (SPREP) held in Noumea, New Caledonia in 1988 that a regional marine turtle management project be developed;

having reviewed the draft regional marine turtle conservation and management programme prepared by the technical session of this conference.

adopts the regional marine turtle conservation and management programme for implementation within the framework of the South Pacific Regional Environment Programme;

requests that aid agencies provide funding and support for the implementation of the regional marine turtle conservation and management programme;

recommends that the next Intergovernmental meeting of the South Pacific Regional Environment Programme (SPREP) endorse the regional marine turtle conservation and management programme;

urges that the UNEP East Asian Seas Programme note the regional marine turtle conservation and management programme developed by this conference with consideration given to the adoption of a similar programme, and to inter-regional co-operation between SPREP and the East Asian Seas Region on the subject.

M.R.M.D. NEWSLETTER

MARINE RESOURCES MANAGEMENT DIVISION
Department of Resources and Development
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Federated States of Micronesia
Phone: 350-2294

Vol.1 No.1, Jan. 1989

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This is the first newsletter from the Marine Resources Management Division. The purpose of this and future newsletters is to let people know what MRMD is all about, what projects we are doing, to provide general information about the marine environment, and to answer any questions you may have.

At the moment we have very little money to produce many copies, but we are looking for outside funds to help us out.

This issue will let you know what MRMD's work involves; who the staff are; and what major projects we are working on at the moment.

In future issues (about every two months) we will look at each of our projects and explain what we are doing and why. We will also write about problems with the marine environment that Yap State faces, or might face in the future. Hopefully, you readers will have questions that you would like to ask us - if so, please contact our secretary or Andrew, during work hours.

Who works at MRMD?

At the moment we have four permanent staff, one Australian marine biology advisor, two Peace Corps Volunteer biologists, and two temporary workers.

The permanent staff are: John Iou (Chief); Mercy Isaac (Secretary - currently on extended sick leave); Paul Paatmag (Fisheries Specialist); and Joe Fanafal (Marine Technician). Dr Andrew Smith is the marine biology advisor; Sean Baker and Steve Kolinski are the PCV's; and Vincent Hachiglou and George Philsngag are temporary Marine Technician Aides. Temporary staff are hired on a project-need basis.

What is the Difference Between MRMD and YFA?

MRMD (Dept of R & D) and YFA were created for the purpose of development, management and conservation of Yap's marine resources. MRMD is primarily responsible for conservation, assessment and management of marine resources, whereas YFA is primarily responsible for the development of commercial fisheries and

related activities.

What Does MRMD Do?

MRMD's primary objective of assessing, managing and conserving Yap's marine resources is achieved through carrying out basic marine biology studies, stock assessment, fisheries development, aquaculture, marine environmental protection, and collecting and recording traditional marine knowledge.

For the second Five-Year plan, MRMD's goals have been identified according to priority. Those with a high priority are:

* Monitor Yap's marine resources, through surveys and stock assessments, in order to identify new or changing resources.

* Develop and implement a marine resources coastal management plan for Yap State.

* Conduct short-term research in specific areas of fisheries development and conservation, prioritizing those that are expected to have good economic potential and those that help preserve endangered species and habitats.

* Develop, acquire, and distribute educational materials concerning marine resources management and conservation.

* Develop regulations on the use and conservation of marine resources, based on the proposed marine resources management plan.

Those goals with a lower priority are:

* Assist the private sector in the development of aquaculture projects.

* Develop support facilities for marine research.

* Codify traditional marine management laws, as specified in the Yap State Constitution.

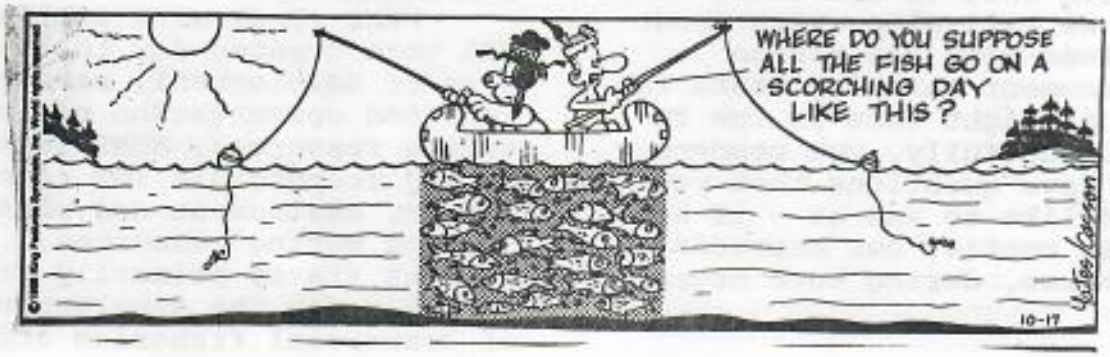
MRMD Projects:

At the moment we have funds for only one project - which is a turtle nursery in the outer islands, on Olimarao Atoll. It will involve tagging adult turtles and raising hatchlings for a few months. We'll let you know more about this project in our next newsletter.

With what operational funds we have we are carrying out a number of other projects and surveys:

* Developing a marine resources coastal management plan.

* Setting up and carrying out a number of surveys, such as: estimating the amount of



fish that is bought/sold in Yap; estimating village consumption of fish; crown-of-thorns starfish survey; monitoring the proposed harbour dredging project and the proposed mangrove dump site; checking Trochus shell levels each year; monitoring the clams that MRMD has introduced (Please don't steal these clams as they are needed for breeding. The Government, Councils of Pilung and Tamol, and all village chiefs concerned, have all said they are not to be taken).

* A number of permanent monitoring sites are being set up; some to check for any changes in the reef/corals; and others to monitor seawater quality (with EPA).

* Producing this newsletter.

Other projects we hope to set-up soon are a marine education program; and possibly develop a reef handbook - however, at the moment we don't have enough money or staff to do these.

Two more projects that we are also hoping to do, but will need outside funding for, are a depletion experiment to determine reef standing stock of fish; and a fish fry survey to determine when and where larval fish are around Yap.

In future newsletters we will give more details on these projects. If any of you have ideas for other projects you think MRMD should look at, please contact us about them.

What's Happening Elsewhere in the Pacific?

(Below are some news items from around the Pacific to do with the marine environment)

Study: Reefs dying

By HENRY J. EVANS JR.
Daily News Staff

The coral reefs of Guam and the Commonwealth of the Northern Mariana Islands are dying and, in a few cases, large areas already are dead primarily because of development.

Those are the most recent findings of a study done by the University of Guam Marine Lab according to its director, Robert Richmond.

Richmond and Gerry Davis, head fisheries biologist with the Department of Agriculture, Division of Aquatic and Wildlife Resources, presented the data at a press conference yesterday at UOG.

Richmond said the data is the result of a three year study and was first made public last week during the Association of Pacific Island Legislatures in Pohnpei.

Davis said it is important to preserve coral reefs as one of Guam's natural resources.

"What we're finding is that the type of reproduction that these organisms partake in is very sensitive to pollutants in the water.

"And right now, even in the last three years, we're seeing such a tremendous change in the trends of development, things are accelerating so quickly, that we're beginning to get very concerned with the effects on the marine environment and what that means in terms of reefs in the long term," Richmond said.

(From page 3...)

According to Richmond, Guam's reefs slowly are being killed by the effects of pollutants contained in runoff from various island sources, sediment from erosion and development-related construction and increased fecal coliform bacterial counts in area waters.

Fecal coliform is a bacteria found in the large intestine of humans and certain other animals. Its presence can indicate fecal pollution.

"Corals are fairly slow growing and a large coral head, 3- to 4-feet in diameter, can be hundreds of years old," Richmond said.

Richmond said that a few reef areas in Guam's southern waters are 100 percent dead while other areas have from 30 to 40 percent of the reef area killed.

With the recent knowledge gained about coral, Richmond said areas could be reseeded and new growth could occur in three to 10 years.

But, Richmond added, reseeding isn't the answer. "When we study it we find out that it is very costly in terms of resources and manpower and that the time, effort and money would be much better spent in preservation," Richmond said.

Richmond said now that the research is done, it is time to bring the information to the public and to legislators so that developers can be made aware.

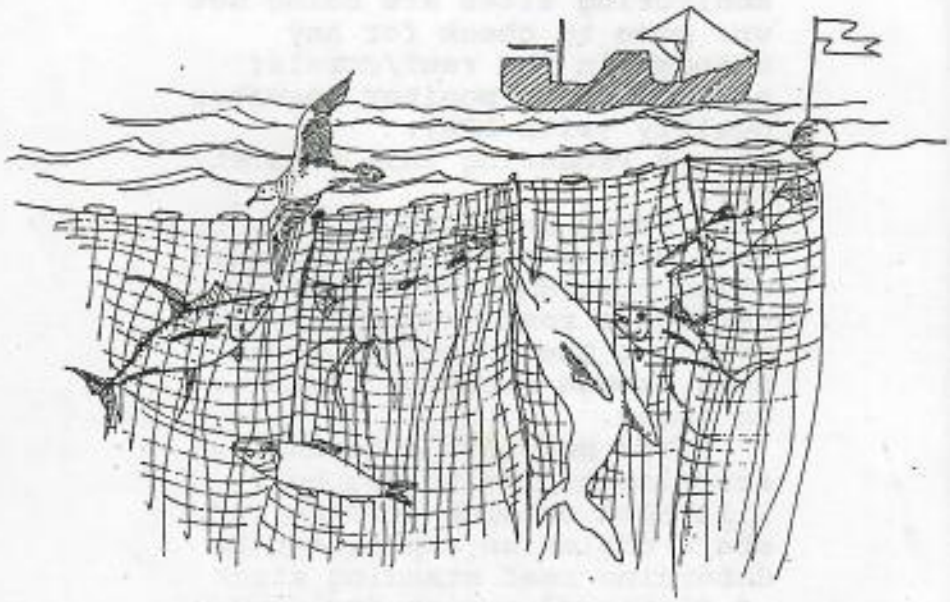
Davis said it is important not to take an anti-development position by using the research in creating policy and procedure to maximize the benefits of Guam's resources.

(Source: P.D.N. 12/13/89)

S.P.C. ADOPTS DRIFTNET RESOLUTION

At the South Pacific Conference in Guam in October, the Conference adopted a resolution on driftnet fishing. Grave concern was expressed for the deleterious effects pelagic driftnet fishing activities were having on the region and an immediate ban was called for.

(Source: F.A.A. 10/18/89)



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This has been our first newsletter - hopefully we can improve it in future issues, but to do so we need to know what you would like to hear about. Please feel free to tell us your comments, questions and ideas!

MRMD phone #: 350-2294.

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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

January 8, 1990 F/SWC2:GHB

Mr. Andrew Smith
Department of Resources
and Development
P. O. Box 251
Colonia, Yap, Federated States
of Micronesia 96943

Dear Andrew,

Thank you for your letter of November 16, 1989. I regret this delay in responding to your important questions, however, as you must now realize, the address you used was changed 5 years ago. Our correct address appears in this letterhead, along with my telephone and FAX numbers.

I was not previously aware of your currently funded turtle project which will include field work at Olimarao Atoll. The tagging of adults at nesting beaches can yield important information needed for conservation and sound management. Even a modest effort of careful tagging can provide some firm ideas of how many turtles are in the breeding population. In addition, tremendous potential exists for documenting long-range migrations which will help to determine the whereabouts of resident foraging areas. For example, several years ago I supplied tags and advice for a small study-effort (in collaboration with Mike Gawel) at Oroluk Atoll. From this work, it was determined that very few green turtles nest there at present, and that at least part of the population may reside in, and migrate from, the South China Sea. One of the tagged turtles was recaptured alive and healthy at the southern tip of Taiwan.

It is with the above in mind that I suggest, in answer to your first question, that your highest priority involve tagging and censusing turtles ashore for as many consecutive nights as possible throughout the nesting season. As you have suggested, the "turtle nursery" (often termed "headstarting") component of your project is the most risky and questionable in terms of biological soundness. Several articles on headstarting have been enclosed, along with other publications I felt might be helpful.

The tags that I have successfully used since 1977 were custom-made of Inconel alloy 625 by the National Band and Tag Company of Newport, Kentucky. The return address inscription is the University of Hawaii, due to both practical and historical

reasons. As in the case of work done at Oroluk, I would be happy to make these tags (and applicators) in reasonable numbers available to you at no cost.

I have enclosed several items with regard to your questions about educational materials and management plans for sea turtles. I strongly recommend that you also write for literature to:

Sylvia Spring, Australian National Parks and Wildlife Service, P.O. Box 830, Civic Square, Act 2608, Australia

and

Peter Thomas, Environmental Program (SPREP), South Pacific Commission, B.P. D5, Noumea Cedex, New Caledonia.

I appreciate having the opportunity to establish contact with you, and assist in whatever way possible and appropriate.

Sincerely,

George H. Balazs
Zoologist and Leader, Hawaiian
Sea Turtle Recovery Team

Enclosures

MARINE RESOURCES MANAGEMENT DIVISION
Department of Resources and Development
P.O. Box 251
Colonia, Yap, FM 96943
Federated States of Micronesia

November 16, 1989

Dr George Balazs,
National Marine Fisheries Service,

Dear Dr Balazs,

I'm writing to ask your advice on our turtle project. This financial year (FY1990) the Yap State Legislature has given our division funds to carry out a "turtle nursery" project in the outer islands. The original project was proposed by a Peace Corp Volunteer, who has since left, and was under-budgeted.

Our present plan involves (a) tagging of green turtles, (b) raising hatchlings for approximately 2-3 months, and (c) an education program for (initially) outer islanders. We have only been given $6,900 to achieve the above aims, including the employment of people to carry out the work. We're planning the tagging/nursery for this summer (April to August) on uninhabited Olimarao Atoll (approx. 145 45'E, 8 45'N). The work will be carried out by one of our outer island contract staff, one PCV, 2 outer island men (the latter for the field work only), and I will be overseeing the project. I have had limited experience with turtle tagging - I spent one 'season' with the Australian Applied Ecology Turtle Project in the Torres Strait (1979/80); and while working with Aborigines in NE Australia (1984-87) I collected specimens of turtle reproductives from captured turtles for Dr Col Limpus' (QNPWS) work in Australia.

The main advice and information we require concerns:

(a) What should our highest priority be considering the funds available (the money is essentially tied to a nursery style project. Personally, I feel the biological results of such a limited project will be minimal, but the PR and management education value very high. The project was requested by the outer island chiefs).

(b)What is the latest preferred tag material, and from where can they be obtained?

(c) What educational materials about turtles have been produced which may be relevant to Yap?

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Charmaine

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I have only recently started working full time at MRMD, although I have been working in the outer islands here for the last two years on a different project. My main job at MRMD will

be to develop a marine resources coastal management plan for Yap State. Turtle management will be one aspect of that plan. Do you know of references for other areas (where turtles are consumed) where turtle management plans have been implemented, if so, would you be able to send them to me please?

My apologies for such a long list of 'wants', but access to literature and expert advice is difficult in Yap. Thank you for your time.

Yours sincerely,

Andrew Smith

(Andrew Smith)

Charmaine