

Regional Director, Bureau of Sport Fisheries
and Wildlife, Portland, Oregon

July 6, 1968

Wildlife Administrator, Kailua, Hawaii

June trip to Hawaiian Islands Refuge

Last month a trip was made to French Frigate Shoals to continue studies of the Hawaiian monk seal and green sea turtle. Major objectives were to tag seal pups produced this spring and to tag and observe nesting of turtles during the peak of the breeding season. Other objectives were patrol, inspect habitat conditions and wildlife populations there, and observe activities of employees of the Smithsonian Institution conducting studies there under the cooperative agreement with the Bureau.

Personnel included in the Bureau party included myself, Biologist Ernest Kosaka of the Hawaii Division of Fish and Game, and Dr. Hendrickson of the Oceanic Institute, Waimanalo, Hawaii. Most of Kosaka's expenses were funded through our contract with the Division to furnish assistance to me on the refuge while the balance was funded by the Division itself. Hendrickson was a last minute substitute for Biologist John Sincock who was unable to go because of an accident to his knee on Kauai about a week before the trip. Hendrickson is an authority on sea turtles, and the trip afforded him an opportunity to inspect this area where he hopes to conduct turtle investigations financed by either the National Science Foundation or the Office of Naval Research.

Hendrickson was there for one week, Kosaka for two weeks, and I for three weeks. I was forced to stay for a week longer than planned, to June 27, because personnel at the Loran station there forgot to notify Coast Guard District headquarters about the number of passengers who would be returning on June 20, and as a result there was not enough room on the plane for me. Kosaka was needed by his agency that week.

Transportation to and from French Frigate Shoals was via the Coast Guard aircraft operating from Oahu and in conjunction with its weekly support trip there. The Coast Guard cooperated further by allowing us to berth and mess with Loran station personnel. Travel within the atoll was via the 14-ft. skiff left there in March, 1967 and the 20hp outboard motor we brought with us. We primarily operated out of Tern Island since we were limited to the amount of supplies and equipment which we could take out with the airplane; however, a number of nights were spent camping on the other islands.

Activities were hampered for several days by strong winds and rough lagoon waters which confined us to Tern Island. During the first week I was hampered by a reaction to bird tick bites which caused fever, watery and bloody blisters where bitten, and a badly swollen leg for several days. These ticks are abundant here and on the other refuge islands during the summer months and are noted for attacking humans. Most people are not bothered too much, but others, such as myself, are highly allergic to their bites.

A total of 65 monk seals (49 pups and 16 yearlings) were sexed and tagged.

Since September 1966, a total of 475 monk seals have been tagged by us on the refuge. In addition to the tagging this month, another 13 animals tagged during previous trips were recaptured. All had been tagged here.

Including the pups, a total of 136 animals were tallied on the various islands. The 49 pups produced this year was a surprisingly large number and far exceeded expectations. Since this was the first time we have had the opportunity to visit this area during this time of the year and after most pupping has taken place, we are unable to say whether this would be normal production. It does, however, point up to this area as a very important breeding area for this animal.

A total of 118 green sea turtles were tagged. This brings the total of animals tagged on the refuge to 428 - 253 of which were tagged at French Frigate Shoals. Return of tags so far is rather meagre, but we have records of tagged animals being taken by fishermen off Hawaii, Molokai, and Kauai of the main islands. In addition we have recaptured breeding animals here which we tagged on Laysan Island and Pearl and Hermes Reef. A pattern appears to be developing which indicates that French Frigate Shoals is the most important breeding area by far for all the turtles in the Hawaiian archipelago. All the more reason to keep it inviolate.

Only animals basking on the beaches or returning to the sea after egg laying were tagged. Others engaged in digging nests or laying eggs were not disturbed. A vinyl bouy paint was used to paint identifying numbers on shells of tagged animals, but observations later indicated that this paint, also, was failing the test for a good permanent marking on the shell. Other methods, possibly notching the shell or perhaps branding the shell, will have to be tried. At present it is necessary to turn the animal in order to immobilize it for tagging. This is hard on both turtle and man. We want to avoid handling them as much as possible. Measurements of both the carapace and plastron were taken of 87 animals.

Records were kept of animals which showed evidence of bites, presumably shark bites. More than a few were missing parts of flippers and tails or had pieces out of their shells which gave every appearance of having been bitten off. Sharks abound in these waters. Late during the afternoon of June 26, a large male turtle was observed being washed back and forth by the surf on the beach of Tern Island. The animal was dragged ashore in hopes that it could rest and possibly recover somewhat from the shock of having its entire tail, right rear flipper, and left front flipper very recently bitten off. The animal died during the night. Photographs were taken to document the extent of the wounds. photo

* Attempts to devise a quick way to estimate the probable breeding populations were proven unreliable so it is back to the drawing board. However, of the 118 tagged, we only observed four again. Dr. Hendrickson surmised that perhaps there were 1,500 to 2,000 animals using the atoll for the breeding season from late May to midAugust. This was off the top of the head figure, but it could very well be that this is the case.

While there, I reviewed A. Binion Amerson's preliminary draft of the Smithsonian report on this area. The report was not complete, however. Amerson hopes to be able to complete the first draft sometime this year. Both he and Ronald Amerson (no relationship) spent most of June on the refuge banding birds, recapturing those previously banded, censusing populations, and taking blood samples.

Of note was the red-billed tropicbird they collected on East Island during the second week of June. The only other record for the Hawaiian Islands was that of a bird collected by Alexander Wetmore off Nihoa Island in 1923.

They were using a 16-man rubber raft with a transom suitable for a 10 to possibly 20hp outboard motor. The raft was far more seaworthy than the 14-ft. fibre glass skiff we were using. Weighing about 250 lbs., it is readily transported, when deflated and rolled up, in a car or airplane. They store it at Tern Island. I was informed that it cost about \$600.00. I prefer the 16-ft. Boston Whaler for this type of work, but the raft has its merits; not the least of which is its ease of transport by plane.

Three large porpoises were seen inside the reef once as they accompanied our skiff from Tern to Trig Islands. Rays were noted several times around Whale-Skate Islands. Sharks did not appear to be as abundant off Whale-Skate Island as they usually are. Several 10-ft. specimens were seen. One patrolled East Island for some time, and the Amersons reported it taking unwary albatross chicks which had either alighted on the water or swam offshore for reasons only a gooneybird could explain.

Having to spend the last unplanned week on Tern Island upset a scheduled speaking engagement before a bird group here, since rescheduled, plus end of the fiscal year reports, purchases, bookkeeping, etc.,.

Eugene Kridler

Aug 31, 1969

REPORT OF
WILDLIFE MANAGEMENT STUDY

Progress Report No. 1

Division of Wildlife Refuges

Project: Hawaiian Islands Refuge

Region: 1

Code: No. 2

Title: Populations and Movements of the Green Sea Turtle (Chelonia mydas) on the Hawaiian Islands National Wildlife Refuge.

ABSTRACT

Since 1961, a total of 469 green sea turtles have been tagged on the Hawaiian Islands Refuge. Another 35 have been tagged on Midway Island which is about 95 miles west of the last unit of the refuge, Pearl and Hermes Reef. Tag returns confirmed the hypothesis that turtles which breed on refuge islands are taken by fishermen from waters off the main Hawaiian Islands. Censuses reveal that the islets at French Frigate Shoals are by far the most important nesting areas for this species in the central Pacific and probably the nation. No known nesting takes place in the Hawaiian archipelago except on refuge islands. Nesting can occur from May through August. Preferred islets are those which are low and sandy and free of human disturbance. Reef fish, ghost crabs, and possibly frigate birds are highly predaceous on hatchling turtles. Sharks prey on adult turtles, but the incidence of this predation is limited to observations of loss of limbs and chunks bitten out of shells. Measurements and weights have not been analyzed yet, but most involve adult animals. Unknown is what happens to hatchlings after they leave. Few small "platter" size turtles have been observed around refuge islands. A full scale study confined to this species alone is needed to obtain information about food habits, breeding populations, success of nests, and fate of hatchlings from time of reaching the sea until they return as nesters. Lack of time plus inadequate transportation facilities hamper the study. Originally set up as a five-year study, it will have to be extended indefinitely.

OBJECTIVES

1. Gather data on populations of sea turtles using the Hawaiian Islands Refuge by islands, seasons, and year.
2. Determine probable breeding populations.
3. Determine nesting requirements.
4. Determine migration and movement in the Hawaiian archipelago and possibly the central Pacific ocean.
5. Investigate the possible relationship of refuge populations with those harvested in waters of the main Hawaiian Islands.
6. Determine subspecies in the Hawaiian Islands.

7. Begin preliminary life history studies with special reference to longevity, growth rates, foods, and mortality factors.

INTRODUCTION

Although the green sea turtle has been almost completely eliminated as a breeding entity in the Mainland United States, it is still fairly common in the Hawaiian Islands. However, until recently, little attention has been devoted to this animal to obtain even the most elementary information about its populations (including trends), movements, breeding areas, productivity, or basic life histories. A few animals have been tagged by the Hawaii Division of Fish and Game, but other than this, little else has been done. There are no restrictions on the seasons, kind, or number of turtles that can be taken in the state. They receive protection only on the refuge. Although there is some information obtained on the commercial take, this is skimpy at best. No one has any idea what the noncommercial take is, and this undoubtedly far exceeds what may be the commercial harvest. Although it was surmised that animals taken around the main islands probably bred on the Northwestern Islands since no known breeding areas existed on the main Hawaiian Islands, there was no proof. Accordingly, refuge personnel with assistance later from Mr. John Sincock, endangered wildlife research biologist stationed on Kauai, initiated a fact gathering program in 1964. Emphasis was placed on a tagging program to determine movements of turtles. So-called turtle experts were unsure as to what species exist in this part of the Pacific. Refuge personnel have taken a number of measurements which might be of assistance in determining subspecies as well as growth rates. In 1967 Dr. John Hendrickson, who had studied this animal thoroughly in Sarawak, evinced interest in initiating a complete study of the turtle on the refuge as well as the main islands. He accompanied refuge personnel to French Frigate Shoals in June, 1968 to familiarize himself with this area during the breeding season so he could better plan his study. Unfortunately, he has since moved to Arizona without following through on his original plans. Lack of time plus lack of transportation has resulted in refuge personnel limiting themselves so far to a tagging and censusing program. With acquisition of SCUBA training and diving authorization, it is hoped that we can follow the animals into the water to study their activities there.

Methods

Census Techniques

So far this has been limited to counting turtles found on beaches. When they can be captured they are sexed, tagged, or examined for tags placed previously. During June, 1968, attempts were made to determine numbers coming up the beach each night on one particular islet to nest by dragging the beach each morning to obliterate tracks made previously. This was given up because we were unable to spend all our time on only one islet. This system has merit if one was able to spend all his time going from islet to islet each morning for the four month nesting season, seas permitting travel each day between islets.

Tagging

Animals have to be turned over on their backs in order to tag them. Very powerful, it takes at least two men to turn one unless you are able to get behind them and flip at the moment both front flippers are just past the half way mark to the rear. Thus its forward motion assists flipping. According to Hendrickson, turtles on Sarawak were easily tagged with no disturbance after

they had completed nesting and had just finished covering the nesting hole. Supposedly they were exhausted from the effort. However, they must differ from the Sarawak turtles in this regard because when a tag was affixed at this time, the animal lurched forward convulsively and quickly began crawling down to the water with one man trying to hold it back and the other trying to tag or get his pliers open after tagging. Two men cannot handle an adult turtle in this manner. This method, however, might be useful if one has much time to spend an entire night on an islet waiting for the laying activity for each animal to terminate - an act that may take as much as an hour and a half per animal.

cool
The tag itself is a monel metal cattle ear tag which is numbered on one side and bears the inscription "U.S. Wildlife, Honolulu" or later "U.S. Wildlife, Kailua, Hawaii" on the other side. It is affixed to the right front flipper near the body just where the flipper begins to flatten out. In June, 1968 bouy paint was used to number each animal; however, it did not last since males copulating later with females in the water mount them clawing and scraping with their own front flippers thereby scraping the paint off. In March, 1968 epoxy paint was used at Pearl and Hermes Reef, but none of the animals were seen since so we were unable to determine the success of this method. We plan to work with the Oceanic Institute at Waimanalo, Oahu to test paints on turtles they have in their display pond at Sea Life Park. Pressure paint guns used for marking fish in the water were tested, but the shell proved to tough for penetration. Observations on previously tagged animals indicate that the monel metal tag is retained well. This method is used by Dr. Carr of the University of Florida for tagging green sea turtles in the Carribbean.

Measuring

During the early phases of the program, measurements were taken of the carapace in a manner used by the Hawaii Division of Fish and Game. This consists of using a steel tape and measuring the longest and widest parts of the shell on the round. Later calipers were used to ~~horizontal~~ horizontal distances of the longest and widest parts of the carapace, longest of the plastron, and the thickness of the animal at the thickest part of the body. Measurements on the round were also taken for later analysis of possible correlation between the two methods.

Weights

Because it is necessary to travel as lightly as possible while walking around the beaches of the islands, a spring scale with 5-lb. graduations and a capacity of 500 lbs. is used. The animal is dragged onto a small tarpaulin which is drawn together by a rope. This is attached to the scale, and the animal is suspended from a two stout bamboo poles lifted by brute force by two men while the third man reads the scale.

DISCUSSION

Pearl and Hermes Reef and French Frigate Shoals support by far the largest populations on the refuge. Southeast Island and North Island at Pearl and Hermes are the most important there. However, very little nesting takes place at Pearl and Hermes although superficially it is very similar to French Frigate Shoals. Since it is further north, it may be that warmth of sand may be a factor. Almost all nesting takes place at French Frigate Shoals at Trig, Whale-Skate, and East Islands. Pits have been found on Gin and Little Gin, but we have been unable to determine success of these nests even though 50-60 pits may be noted on the latter two islands when visited in the late summer and early fall.

Little nesting takes place on Tern Island because of the activity of Coast Guard personnel manning the Loran station there. Lights, noise, and movements seem to warn the animals to go elsewhere.

Since these animals may dig more than one pit before depositing their eggs in one, there is no way of determining which are active without digging them up or being present when they hatch. This is impracticable. Occasionally one female may dig a pit on top of a nest constructed by another thereby scattering the eggs of the first nest over the surface of the sand. Occasionally turtles will crawl into a sooty tern colony and destroy tern eggs by crawling over them or scattering them about while it digs its pit. The entire north half of Trig Island may be churned up by digging activities.

Old reports relate how many turtles used to be taken by crews of ships landing at Laysan and Lisianski. One such crew even left a sign behind requesting any parties which may land later to exercise restraint in taking turtles. However, at no time have we ever recorded more than 6 turtles on Laysan or more than 25 on Lisianski. There is little evidence of nesting activity on either.

Since there are no mammalian predators on refuge islands, there is little predation, if any, on eggs. Hatchlings, however, are subjected to predation by ghost crabs, reef fish, and occasionally by frigate birds (if a nest hatches during the day). Since most nests hatch at night, birds are not too much of a problem. Reef fish probably are the most severe predators. In September, 1966 a nest with 64 hatchlings reaching the surface was observed for checking on the fate of the hatchlings. Several were flipped over on their backs while encountering obstacles while making their way to the beach. Many which made it to the water disappeared in a swirl a few feet from the beach as reef fish fed upon them.

Tagging to date has been largely confined to animals found on the beaches. Occasionally members of the diving club on Midway have cooperated with us by catching animals at night in the water. This cooperation has been sporadic and is contingent on whomever happens to be president of the club at the time or on the enthusiasm of some members. Table No. 1 shows the numbers of animals tagged by year and refuge unit. Numbers reflect relative abundance of animals although were refuge personnel able to spend several summers at French Frigate Shoals during the nesting season, the numbers for that unit would far exceed those for all others combined.

So far over 55 observations have been made of animals tagged previously. Most take place on the unit where they had been originally tagged. Table No. 2 shows animals observed or taken in areas other than where tagged. Seven were of animals tagged during the breeding season at French Frigate Shoals which were later taken by fishermen in waters around all the main Hawaiian Islands except Maui and Lanai. Doubtless others were taken but were not reported. Other records show travel between refuge units. Of significance was a male tagged at Pearl and Hermes Reef and observed 6 months later at French Frigate Shoals. A female tagged also at Pearl and Hermes Reef in September, 1966 was recorded at French Frigate Shoals a year later. There is a likelihood that at one time or the other adults may journey to French Frigate Shoals to breed.

Turtles are reputed to reach breeding age when about 5-6 years old. Frequency of breeding is reported to be every other year to every fourth year. Determination of frequency of breeding of the refuge population is as yet unknown. The average turtle is supposed to nest about five times each breeding season.

Sharks will attack adult turtles. Animals have been found with flippers and tails bitten off in part or even wholly. On June, 1968 an adult was found washing back and forth in the surf at Tern Island. When pulled ashore, it was discovered to have both rear flippers, its tail, and halves of the front flippers completely bitten off. It died that night. In March, 1968 another adult also found on the beach at Tern Island had a piece bitten out of its shell that was 10 inches long and 4 inches deep. The shape of the wound looked every bit like that which would be caused by a shark. Although some of the viscera was exposed, the animal was still lively so it was tagged in hopes that if it lived, it might be encountered later. Sharks are abundant around all refuge islands.

Unlike the Atlantic subspecies which supposedly does not come ashore at any time except to nest, that found on the refuge frequently comes ashore at all seasons to bask. This includes both males and females. As many as 25 have been found strung along the beach near the edge of the water at one time.

note - Females on the beach outnumber males, especially during the nesting season - to be expected then. Generally during the breeding season males await offshore to copulate with the females in the water although on two occasions copulation was witnessed in June, 1968 occurring on the beach.

All data, including tagging and recovery, have been transcribed onto 3 x 5 cards. Later it is planned to enter the data on special cards for ease of organization and analysis. Much literature search is needed.

CONCLUSIONS AND RECOMMENDATIONS

Because of the other studies refuge personnel are conducting on the short semianual trips plus the uncertainty of receiving transportation to the refuge, acquisition of data is and will continue to be a slow process. The study should be extended to at least 10 years. Preferably, and if it can be arranged, a university sponsored research program should be encouraged and undertaken with the refuge plugging in that already done and contributing what it can in the future, especially on other refuge islands. Care would have to be exercised, however, that the study not be detrimental to other forms of wildlife using the refuge, especially the monk seals on the smaller islands.

ACKNOWLEDGEMENTS

To John L. Sincock, endangered wildlife research biologist, Division of Wildlife Research, Koloa, Kauai, Hawaii for his assistance since September, 1966.

Submitted by: _____

Eugene Kridler
Wildlife Administrator
August 31, 1969

Distribution: John L. Sincock, Division of Research
Central Office

Table No. 1. Numbers of Green Sea Turtles Tagged on Hawaiian Islands
National Wildlife Refuge and Midway Atoll, 1961-69

<u>Date</u>	<u>Necker Island</u>	<u>French Frigate Shoals</u>	<u>Laysan Island</u>	<u>Lisianski Island</u>	<u>Pearl Hermes Reef</u>	<u>Midway Atoll</u>	<u>Totals</u>
September, 1961			2				2
December, 1963			3				3
March, 1964					7		7
September, 1964		3			20		23
March, 1965					2		2
August, 1965		87					87
March, 1966		10			1		11
April, 1966					9		9
June, 1966		4					4
August, 1966		2	1	2	45		50
March, 1967	2	24	1	8	11		46
May, 1967		34					34
September, 1967	1	2	1	5	7	13	16
March, 1968	1	1	3	9	9	22	45
June, 1968		118					118
February, 1969		3					3
March, 1969	1		2	9	12		24
May, 1969					1		1
June, 1969	—	9	—	—	—	—	9
Totals	5	297	13	33	124	35	507

Table No. 2. Noteworthy Green Sea Turtle Tag Return Observations, Hawaiian Islands National Wildlife Refuge

<u>Date Tagged</u>	<u>Date Returned</u>	<u>Elapsed Time</u>	<u>Island Tagged</u>	<u>Island Returned</u>	<u>Distance Traveled</u>	<u>Sex</u>	<u>Tagging Number</u>
6/18/68	9/12/68	3 months	French Frigate	Oahu	500 miles	F	Breeder 785
6/22/68	9/-/68	3 months	"	Molokai	525 miles	F	" 787
6/17/68	6/-/69	1 year	"	"	"	M	- 768
6/16/68	1/25/69	6 months	"	"	"	F	Breeder 755
9/20/66	3/12/67	"	Pearl & Hermes French Frigate	Hawaii	550 miles	M	Basker 123
6/12/66	2/12/67	8 months	French Frigate	Hawaii	650 miles	M	Breeder 110
3/22/66	5/22/68	1 yr. 3 mo.	"	Kauai	390 miles	F	Basker 91
3/21/65	12/13/67	2 yr. 9 mo.	Pearl & Hermes	Laysan	270 miles	F	" 1101
6/18/67	2/27/68	8 months	French Frigate	Molokai	525 miles	F	Breeder 612
9/22/66	9/17/67	1 year	"	Pearl & Hermes	550 miles	F	Basker 168

Distances are rounded off.

Animals taken at Oahu, Kauai, Molokai, and Hawaii were harvested by fishermen. Others were recorded and released.

360 0'
36/8'
377

Back to
main by env
Sept 1

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Table 6
Turtle Tagging
French Frigate Shoals
May 1972

Tag #	Date	Sex	Plastron Length	Carapace				Thickness	Weight	Total
				Length Straight	Width	Length Curved	Width			
19	5/5	M	32 1/2	31 1/4	25 1/4	32 1/2	32	11 1/2	155	Trt
20	5/5	M	25 1/4	31 1/2	25	33	31 1/4	18 3/8	153	Trt
21	5/5	F	23 1/2	29 3/4	22 3/4	32	30	11 1/2	140	Trt
			Missing 1/2 hind right flipper							
22	5/5	F	30 1/4	36 1/4	28 3/4	38 1/2	40 1/4	13 1/8	280	Trt
			Missing 1/2 hind right flipper							
23	5/5	M	27 1/4	34	25 1/2	35 1/2	34 1/2	12 1/2	175	Trt
24	5/5	M	27 3/4	35 1/2	27 1/2	36	34 3/4	12 1/4	205	M.S.
25	5/5	M	24 1/4	31	24 3/4	32 1/4	30 1/4	10 1/4	145	M.S.
26	5/5	M	27 1/2	33 1/4	26 3/4	35 1/4	34 3/4	11 1/4	190	M.S.
27	5/5	F	28	36 1/4	27 1/2	38	34 1/4	16	210	M.S.
28	5/5	M	29	36 1/4	27 3/4	38 1/4	37	12 1/2	210	M.S.
29	5/5	M	27 3/4	34 3/4	29 1/4	38	35 3/4	10 1/4	215	M.S.
30	5/5	M	28 1/2	35 1/2	27 1/2	36 3/4	34 1/4	12 3/4	235	M.S.
31	5/5	M	26 3/4	31 3/4	24 1/2	34 1/4	33	13 1/2	185	M.S.
32	5/5	F	31 3/4	38 1/2	30	39 1/2	41	15 1/4	282	M.S.
33	5/5	M	25 3/4	32 1/4	25	34	32	12 1/4	160	M.S.
34	5/5	F	31 1/4	37 1/4	29	39	39	15 1/2	285	M.S.
35	5/5	M	26 1/4	33 1/4	24 3/4	34 3/4	32 1/2	11	175	M.S.
36	5/5	M	29	37	28	39	35	11 1/2	205	M.S.
37	5/5	M	26 1/2	33 1/4	25 1/2	35	33 3/4	11 1/2	180	M.S.
38	Tag lost in sand									
39	5/5	F	29 3/4	36	29 1/4	37 1/2	37 1/2	12 1/4	230	M.S.

Table 5

Tag #	Date	Sex	Plastron Length	Carapace		Length Curved	Width	Thickness	Weight	Island
				Length Straight	Width					
40	5/5	F	29	36	27 1/2	38	36	14 1/2	265	W. S.
41	5/5	F	29 1/2	35 3/4	28 3/4	38 1/4	35 1/2	14	255	W. S.
42	5/5	M	24 1/2	32 1/4	25 1/4	34	31	10 1/4	160	W. S.
43	5/5	F	30 1/4	35 3/4	27 3/4	39 1/2	36	15 1/4	280	W. S.
44	5/5	M	27 3/4	33 1/2	26	35	33 1/4	11 1/2	185	W. S.
45	5/5	M	25 3/4	33 1/4	25 1/4	35 1/2	32	11 3/4	180	W. S.
46	5/5	M	26	33 1/2	25 1/4	34 1/2	32 1/2	11 1/2	200	W. S.
47	5/5	M	27 1/2	32 3/4	26 1/2	34 1/2	34 1/4	13 1/4	210	W. S.
48	5/5	F	33 3/4	36 1/2	29	38 1/4	37 1/4	15 1/2	325	W. S.
49	Tag destroyed									
50	5/5	F	28 1/2	35 1/4	25	37 1/4	34 1/4	14 3/4	260	W. S.
51	5/5	F	27 1/2	35 1/4	26 3/4	38	34	13 1/2	250	East
52	5/5	F	29 1/4	35 3/4	26 3/4	37 3/4	36	14	255	East
53	5/5	F	29 1/4	35 1/2	28 3/4	38 1/4	35 1/2	12 1/4	230	East
54	5/5	F	30 1/2	37	28	39 1/2	38 1/2	14	280	East
55	5/7	F	28 1/4	36 1/4	27 1/2	36	34 1/4	13 1/4	205	East
56	5/7	F	29 1/4	36	26 1/2	39	37 1/2	16 3/4	315	East
57	5/7	F	29 1/2	37	28 3/4	39 1/4	37 1/4	14 3/4	280	East
58	5/7	M	28 1/4	34 1/4	23 3/4	35 1/2	33 3/4	12 1/2	220	East
59	5/7	F	28 1/4	35 1/4	28	38 1/8	35 1/4	14 1/4	205	East
60	5/7	F	28 1/2	34 3/4	27 1/4	38	36	15 1/4	255	East
	Photos of egg pit and sand									
61	5/8	F	27 1/4	33 3/4	25 3/4	36 3/4	35	14 1/4	210	East
62	5/8	F	29 3/4	35 1/4	28 1/4	38	37	14 1/4	230	East
63	5/8	F	28 3/4	35 3/4	26 1/2	38	36	13 1/2	230	East

Table 6

Tag #	Date	Sex	Plastron Length	Carapace		Length	Width	Thickness	Weight	Island
				Length Straight	Width Curved					
64	5/9	F	30	37 1/2	27 1/4	40	38	13 3/4	270	W.S.
65	5/9	M	27 3/4	34 3/4	25 3/4	37	34	13 3/4	210	W.S.
66	5/9	M	27 1/2	33 3/4	26 3/4	36	35 3/4	13 1/4	205	W. S.
67	5/9	M	26 3/4	33 3/4	25 3/4	35	32 1/4	12 1/2	190	W. S.
68	5/9	F	29 1/4	35 3/4	27 1/2	38	37 3/4	15 1/2	260	W. S.
69	5/9	F	28 1/4	35 3/4	27 1/4	36	36 3/4	14 1/4	230	W. S.
70	5/5	F	28 3/4	35 3/4	27	37	34 1/2	14 3/4	225	W. S.
71	5/9	M	28 1/4	36 1/4	27	38	34	13 3/4	225	W. S.
72	5/10	F	28 3/4	34	27 1/2	37 1/2	36 3/4	14 3/4	275	East
73	Lost in sand									
74	Did not use									
75	Did not use									

Table 7

Turtle Recaptures
French Frigate Shoals

<u>Tag #</u>	<u>Sex</u>	<u>Location</u>	<u>Date</u>	<u>Carapace Length</u>	<u>Carapace Width</u>	<u>Plastron Length</u>	<u>Thick.</u>	<u>Round Measurements</u>	<u>Weight</u>
736	F	East Is.	6/14/68	No measurements taken					
	F	Trig Is.	5/17/71	37.8	28.6	29.9	13.7	40 X 36 1/2	270
	F	Trig Is.	3/5/72	37 1/4	29.0	30	13 1/2	39 X 37	275

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