THE UNIVERSITY OF THE SOUTH PACIFIC

PROGRESS REPORT - MARINE TURTLE RESEARCH

1. INTRODUCTION

Following discussions with the Fisheries Officer of the South Pacific Commission, Mr. R.H. Baird, the author undertook to carry out aspects of research on marine turtles at the University of the South Pacific, in Fiji. The research programme was commenced in January, 1974.

It was agreed that the initial effort should be concentrated on the study of the factors affecting the growth of hatchlings and young turtles. The studies were to include aspects of diet, density factors, the effects of light, tolerances to reduced salinities (mainly for evaluating health problems and the minimum salinity required to inhibit fungal growth) and effective tagging of the smallest individuals.

The immediate problem was to obtain enough hatchlings to carry out the planned research programme.

2. EFFORTS TO OBTAIN EGGS, HATCHLINGS AND YOUNG TURTLES

2.1 In early January a trip was made to Mbeqa Island and to the shores of the adjacent island of Nanuku. Four days search for turtle nesting activities proved fruitless.

2.2. The Department of Fisheries was approached for assistance. Since the Fisheries boats and the personnel were largely involved in the hurricane Lottie relief work, they were unable to search for eggs and hatchlings.

2.3 The Chiefs of the villages in Yasawas, Kadavu, Koro and Taveuni Islands were approached by radio telephones. On 14th February a batch of 122 eggs obtained from a single nest in Yasawas was shipped to Lautoka. Although the eggs were packed in sand, they were distorted and damaged on arrival in Lautoka. They were transported via taxi to Nadi, thence flown to Nausori. From Nausori they were transported in a taxi to the laboratory at the University. In the laboratory the eggs were burried to a depth of 30cms in clean moist sand contained in a round plastic tank measuring 50cm in diameter. The top layer of sand was occasionally sprinkled with distilled water. The temperature of the "nest" was recorded daily with a thermometer permanently fixed in the sand. During the entire incubation period the temperature remained relatively constant at 26 $\pm$ 0.8°C.

2.4 Visits were made to Qoma Island which lies 50 miles from Suva and $\frac{1}{2}$ mile off the S.E. coast of Viti Levu. The fishermen were instructed to carefully collect only $\frac{1}{2}$ the total number of eggs from each turtle nest and contact the University for transport arrangements. Two batches of eggs, each containing 145 and 70 eggs, respectively, were obtained from Qoma. They were transported in a boat ($\frac{1}{2}$ mile journey) and then via road to the laboratory. The eggs were burried in sand in two separate containers, exactly the same as described earlier.

Two young Hawksbill turtles were also obtained from Qoma Island for observations in the laboratory.

3. RESULTS

3.1 Eggs from Yasawas:

These eggs failed to develop. There appeared to be no sign of embryo formation. The result was not too unexpected as the eggs had been distorted in transportation.

3.2 Eggs from Qoma:

The first batch of eggs (145) failed to develop.

The second batch of 70 eggs obtained in late February produced 3 successful hatchlings in early June. There were 4 other fully developed hatchlings which failed to emerge. Thus, from only a single batch the successful emergence was 4.3%.

3.3 Observations on Hatchlings

Species: *Eretmochelys imbricata* (Hawksbill)

Minimum incubation Period: 60 days

	Date Born	Carapace Length (cm)	Carapace Width (cm)	Plastron Length (cm)	Weight (g)
1	2.6.74	4.27	3.12	3.14	14.690
2	4.6.74	3.98	3.12	3.14	14.816
3	5.6.74	3.72	2.73	2.83	12.550
	Average	3.99	2.99	3.04	14.02

The hatchlings were placed in a small plastic tank measuring 40 x 30 x 20 cm through which there was continuous flow of fresh seawater. They were fed on small pieces of tuna twice a day. Each hatchling could consume approximately 5g of tuna flesh per day. All hatchlings commenced feeding within 3 days after emerging from the egg. An additional hatchling was caught floating in the sea to the South of Suva Harbour. It was also placed in the same tank.

Second Measurement

	Date	Carapace Length(cm)	Carapace Width (cm)	Plastron Length (cm)	Weight (g)
1	14.6.74	4.33	3.52	3.35	16.635
2		4.30	3.35	3.36	16.301
3		3.92	2.80	3.00	13.615
	Average	4.18	3.22	3.24	15.517
*4		4.84	3.90	4.00	23.217

Third Measurement

	Date	Carapace Length (cm)	Carapace Width (cm)	Plastron Length (cm)	Weight (g)
1	2.7.74	4.80	4.17	3.87	23.49
2		4.70	4.04	3.86	23.08
3		4.16	3.39	3.35	15.34
	Average	4.55	3.87	3.69	20.64
*4		5.35	4.64	4.45	30.68

Average Growth Rate of Three Hatchlings in One Month

Carapace Length	14.03%
Carapace Width	29.43%
Plastron Length	21.38%
Weight	47.22%

3.4 Observations on Adults

Species: *Eretmochelys imbricata* (Hawksbill)

The two adult turtles were maintained in a large plastic tank through which there was a continuous flow of fresh seawater. These individuals were presented with a variety of food to test their diet preferences. Then, they were fed entirely on tuna. Each individual consumed approximately 400g of tuna per day.

	Food Presented	Food Acceptability		
		Accepted	Not Accepted	'Liked'
1.	Cockle (*Anadara* spp. - "Kaikoso")	+	-	+
2.	Surfclam (*Latona* spp. - "Siqalo")	+	-	+
3.	Freshwater bivalve (*Batissa* spp. - "Kai")	+	-	-
4.	Crab (*Sesarma* spp. - "Kuka")	+	-	+
5.	Fish (several kinds)	+	-	+
6.	Minced beef (reject cat food)	+	-	+
7.	Ripe bananas	+	-	-
8.	Ripe banana skins	+	-	-
9.	Coconut meal	-	+	-
10.	Turtle grass (*Syringodium isoetifolium* - "Vutia")	-	+	-
11.	Turtle grass (*Halophila ovalis* - "Vutia")	+	-	-
12.	Mangrove leaves	-	+	-
13.	Freshwater weed (*Hydrilla verticillata*)	-	+	-
14.	Water Lily (*Ceratophyllum* spp.)	-	+	-

The above observations suggest that Hawksbill turtles prefer animal tissues, particularly of marine origin.

Measurements

Date	Turtle No.	Carapace Length cm	Carapace Width cm	Head Length cm	Head Width cm	Plastron Length cm	Plastron Width cm	Wt. kg
5.5.74	1	37.2	34.9	7.7	4.4	26.5	31.4	3.875
	2	34.6	31.2	7.6	4.2	25.3	28.0	3.075
5.7.74	1	38.1	35.6	7.9	5.6	27.7	32.0	4.250
	2	35.1	32.0	7.8	5.3	26.2	29.0	3.400
% increase	1	2.42	2.01	2.60	27.27	4.53	1.91	9.68
in 2 months	2	1.45	2.56	2.63	26.19	3.56	3.57	10.57
	Average	1.94	2.28%	2.62	26.73	4.04	2.74	10.13

3.5 Observations on Stomach Contents of Five Green Turtles

Fresh and complete alimentary tracts of 5 green turtles (*Chelonia mydas*) were obtained from fishermen. The contents of each stomach were carefully emptied in a tray, separated into three following categories and weighed:

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No.	Food Present (% Total Wet Weight)		
	Syringodium isoetifolium	Halophila ovalis	Other
1	95.4	2.1	2.9
2	1.4	98.0	0.6
3	88.6	5.2	6.2
4	80.0	1.2	18.8
5	52.0	46.6	1.4

These results indicate that the main foods in the diet of the green turtles caught near Nukulau Island (approximately 1½ miles from the University of the South Pacific) are the two common species of "turtle grass". In some parts of the sea surrounding the Nukulau Island Syringodium covers over 80 - 90% of the sea-bed. The average yeild of syringodium in such areas is 5,800 kg/ha.

3.6. Other Observations

3.6.1. Visits were made to the Orchid Island toruist resort, 1½ miles from Suva, where four Hawksbills and ten green turtles are maintained for tourist shows. The Hawksbills are fed on fish and the green turtles are fed entirely on fresh mangrove leaves. The turtle run at Orchid island has existed for three years and the turtles of all sizes appeared to be in healthy condition.

3.6.2 Some Analyses of Turtle Food and Aquatic Plants of Potential Value in Turtle Culture

(measurements from single samples collected in late June)

	Material	Protein % dry wt.	Fat % dry wt.	*Calorific Value k cal g^{-1} dry wt (ash free)
1.	Syringodium isoetifolium ("Vutia")	5.50	1.03	4.25
2.	Halophila ovalis ("Vutia")	6.88	3.4	4.47
3.	Edible marine alga-green ("Nama)	4.19	4.7	4.00
4.	Edible marine alga-brown ("Lumi")	6.00	0.4	4.56
5.	River weed (Hydrilla verticillata)	9.64	3.5	5.42
6.				

*Average of two measurements.

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