

RPT
[BHAL 0795

ANDAMAN & NICOBAR SEA TURTLE PROJECT

PHASE VIII

Submitted by Satish Bhaskar, December 1995.

CENTRE FOR HERPETOLOGY
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1 Objectives

- 1.1 Objectives of the project
 - 1.1.1 To locate sea turtle nesting beaches and feeding areas in the Andaman and Nicobar Islands.
 - 1.1.2 To undertake studies on sea turtle ecology relevant to turtle conservation.
 - 1.1.3 To recommend measures to manage and conserve turtles.
- 1.2 Objectives of Phase VIII
 - To undertake studies on South Reef Island, to establish :
 - 1.2.1 Remigration intervals of hawksbill and green turtles that nest there
 - 1.2.2 Trends in the nesting populations of these turtles
 - 1.2.3 A data base for further conservation-related work, including tagging studies

2 Timespans

- 2.1 Period covered by Phase VIII : 24 May - 3 Nov. 1995
- 2.2 Duration of field work on South Reef : 14 June - 27 Oct
 - 2.2.1 Active field work : 14 June - 18 Aug.
 - 2.2.2 Work limited to nest counts, due to a leg injury : 19 Aug - 27 Oct.

4 Site of study : South Reef Island

5 Background

5.1 Size, location and general information

South Reef is a Wild life Sanctuary situated off Middle Andaman at about 12°4' N and 92°40' E. It lies about 1½ km due SSW of the larger island of Interview. Though covered by forest, the island possesses about a 700 metre length of sandy beach. South Reef is presently 440 metres long and 90 metres broad at its widest. The island is one of three islands known to be most favoured by nesting hawksbills in the Andaman group. Though technically an uninhibited island, parties of fishermen, divers, ambergris hunters and poachers (the latter including citizens of Myanmar) occasionally camp on the island illegally, especially during the fair season, November to April. Green turtles also nest on the island. Hawksbills nest throughout the year, the main season being August through November. Green turtles also nest throughout the year, but the small numbers involved make it difficult to delineate the peak, if any, of the nesting season.

5.2 Results from earlier tagging programme

During the current project, hawksbills and green turtles have been tagged on South Reef every year since 1992, primarily during the hawksbill's main nesting season, August to November. Tagging operations had been undertaken during Phases II, IV, VI and VI A of the project.

5.2.1 Summary of results, 1992 to 1994, South Reef

Phase	Period of tagging study	Hawksbills		Green turtles	
		No. of turtles tagged	No. nesting in a year*	No. of turtles tagged	No. nesting in a year*
II	12 Sep - 12 Dec 1992	27	45	5	15
IV	14 Sep - 22 Nov 1993	28	50	7	20
VI	27 Jun - 9 Sep 1994	26	45	4	10
VI A	17 Nov - 7 Dec 1994	3		2	
Total over the years 1992, 1993 & 1994		84	140*	18	45*

* Estimated numbers

5.2.2 Renesting and remigration

Several of the hawksbills and green turtles tagged on South Reef were seen renesting (i.e. nesting repeatedly within a given nesting season) several times - upto 6 times. However, upto the 1994 season, none of the 55 hawksbills tagged over the years 1992 and 1993 had remigrated to nest, showing that in this area, hawksbills do not remigrate within 2 years. The same is true for the 12 green turtles tagged over the years 1992 and 1993.

The present study (Phase VIII) sought primarily to establish remigration intervals for hawksbills and green turtles nesting on South Reef. This objective was achieved only in part. A leg injury sustained by the principal investigator on 18th August resulted in the premature discontinuation of the tagging operations.

6 Results

6.1 Summary

Numbers of nests, nesters and tagged turtles on South Reef, 1995.

Period of field study	Species	No. that nested	Number tagged **	No. with tags from 1992-1994	No. of nests	Nests per annum *	Nesters per annum *
14 June to 27 Oct 1995	Hawksbills	35	14	1	108	160	45
	Green turtle	8	6	0	22	50	10

* Estimated Number

** Tagged during the period 14 June to 18 Aug 95.

6.2 Yearly trends, number of turtle nests on South Reef

6.2.1 Hawksbills

Year	Period covered by study	No. of days	No. of nests counted	Estimate nesters per annum	Average no. of nests per day during the study
1992	8 July - 11 Dec	159	116	45	739
1993	12 July - 21 Nov	133	128	50	962
1994	27 June - 7 Dec	163	120	45	736
1995	14 June - 27 Oct	136	108	45	794

The table shows that the number of nests made annually, and the estimated numbers of nesters, remained fairly steady over the period 1992-1995.

6.2.2 Yearly trends, number of green turtle nests

Year	Study period	No. of days	Nests counted	Estimated no. of nesters per annum	Number tagged	Avg. no. of nests per day during the study
1992	8 July - 11 Dec	159	44	15	5	277
1993	12 July - 21 Nov	133	55	20	7	414
1994	27 June - 7 Dec	163	42	10	6	258
1995	14 June - 27 Oct	136	22	10	6	162

The table show that the years 1994 and 1995 saw a decline in nesting numbers. At least a portion of the decline can be attributed to the accidental drowning of green turtles in shark fishing nets.

6.3 Nests per week

6.3.1 Hawksbills, South Reef, 1995

Month	Period	No. of days	No. of nests	Avg. no. of nests per day	No. of days	No. of nests	Avg. no. of nests per day
June	16 - 22	7	2	.286	15	5	333
	23 - 30	8	3	.375			
July	01 - 07	7	1	.143	31	18	581
	08 - 15	8	5	.625			
	16 - 23	8	5	.625			
	24 - 31	8	7	.875			
Aug	01 - 07	7	9	1.286	31	26	839
	08 - 15	8	9	1.125			
	16 - 23	8	4	.5			
	24 - 31	8	4	.5			
Sep	01 - 07	7	4	.571	30	26	867
	08 - 15	8	3	.375			
	16 - 22	7	7	1			
	23 - 30	8	12	1.5			
Oct	01 - 07	7	15	2.143	27	33	1 222
	08 - 14	7	8	1.143			
	15 - 22	7	9	1.286			
	23 - 27	5	1	.2			
Overall figures					134	108	.806

The peak of the nesting season therefore occurred in the last week of September and the first week of October.

6.3.2 Nests per week, green turtle, 1995, South Reef

Month	Period	No. of days	No. of nests	Avg. no. of nests per day	No. of days	No. of nests	Avg. no. of nests per day
June	16 - 22	7	3	.429	15	7	.467
	23 - 30	8	4	.5			
July	01 - 07	7	2	.286	31	8	.259
	08 - 15	8	4	.5			
	16 - 23	8	0	0			
	24 - 31	8	2	.25			
Aug	01 - 07	7	1	.143	31	1	.032
	08 - 15	8	0	0			
	16 - 23	8	0	0			
	24 - 31	8	0	0			
Sep	01 - 07	7	1	.143	30	5	.167
	08 - 15	8	2	.25			
	16 - 22	7	2	.286			
	23 - 30	8	0	0			
Oct	01 - 07	7	0	0	27	1	.037
	08 - 14	7	0	0			
	15 - 22	7	1	.143			
	23 - 27	5	0	0			
Overall figures					134	22	.164

Of 22 nests made between 16 June and 27 October, 15 (68.2%) had been made between 16 June and 31 July, suggesting that this period may include the main nesting season.

6.4 Tag numbers, renesting intervals and measurements, 1995

Abbreviations used : SCCL : Standard Carapace Curved Length
 SCCW : Standard Carapace Curved Length
 NNC : Non-nesting crawl
 RI : Renesting interval

6.4.1 Hawksbills

- * First nesting of the season for the turtle
 ** Last nesting of the season for the turtle
 *** Confirmed remigrator

Date of tagging	Tag no.	RI (days)	Dates of nesting	SCCL (cm)	SCCW (cm)	Min. no. of nests
21 Jun	024 X	16,15,15	21-6, 7 & 22-7, 6-8	75½	67½	4
25 Jun	042 X	16	25 Jan, 11 Jul**	87	81	2
30 Jun	044 X	14,14,13	30*6, 14 & 28-7, 10-8	84½	72½	4
30 Jun	045 X	14,15,14	30*-6, 14 & 29-7, 12-8	79	71½	4
11 Jul	046 X	15,17	11* & 26-7, 12-8	85½	77	3
14 Jul	CA 738	14,14	14* & 28-7, 11-8	74½	63½	3
17 Jul	047 X	14,14	17* & 31-7, 14-8	78½	73½	3
18 Jul	048 X	15,16	18*-7, 2 & 18-8	73½	66½	3
20 Jul	049 X	14,14	20*-7, 3 & 17-8	-	-	3
21 Jul	CA 735	12,12	21*-7, 2 & 14-8	73¾	67	3
25 Jul	CA 736	14	25*-7, 8-8	73½	68	2
26 Jul	CA 737	12	26*-7, 7-8	84¾	78	2
2 Aug	AN 305***	13	2* & 15-8	-	-	2
6 Aug	CA 739	-	6-8	69½	63	1
13 Aug	CA 741	-	13-8	73	64½	1

6.4.2 Green turtle

** Final nesting of the season of the turtle

Date of tagging	Tag no.	RI (days)	Dates of nesting	SCCL (cm)	SCCW (cm)	Min. no. of nests
16 Jun	CA 729	11	16 & 27** June	81	82	2
19 Jun	CA 733	11	19 & 30** June	97	85½	2
20 Jun	CA 734	11,12	20-6, 1 & 13** July	98	86	3
23 Jun	041 X	11,11,12	23-6,4,15 & 27** July	96½	91½	4
28 Jun	043 X	14,14,12	28*-16,12,26-7,7-8	90	76½	4
14 Jul	CA 740	12,14	14* & 26-7, 9-8	100½	90½	3

6.5 Size of nesters on South Reef

6.5.1 Hawksbills. Carapace measurements

6.5.1.1 Carapace measurements of hawksbills in 1995

Parameter (cm)	n (no. of turtles)	Range (cm)	Average (cm)	Sample S.D. (cm)
SCCL	13	69½ - 87	77.9	5.78
SCCW	13	63 - 81	70.25	5.84

The turtle tagged with the number 042 X on 25 June 1995 was the largest of 94 nesting hawksbills that have been measured on South Reef in the four seasons from 1992 to 1995. It measured 87 cm in SCCL and 81 cm in SCCW.

6.5.1.2 Comparison of sizes of hawksbills over four nesting seasons

Parameter (cm)		1992 (n 27 turtles)	1993 (n 28)	1994 (n 26)	1995 (n 13)
SCCL	Average	77.7	77.1	76.7	77.9
	Range	71 - 85.25	64 - 86.5	69.75 - 86.75	69.5 - 87
	Sample S.D.	4.25	4.74	4.39	5.78
	Average	68.5	69.1	68.3	70.25
	Range	58.5 - 79.25	58.5 - 79	59 - 76.75	63 - 81
	Sample S.D.	4.68	5.25	4.68	5.84

The table shows that the turtles measured in 1995 averaged out slightly larger than the ones measured over the preceding three seasons.

6.5.2 Green turtles. Carapace measurements

6.5.2.1 Green turtles in 1995

Parameter (cm)	n (no. of turtles)	Range	Average	Sample S.D.
SCCL	6	90 - 100.5	95.5	4.12
SCCW	6	76.5 - 90.5	85.3	5.56

6.5.2.2 Sizes of nesting green turtles over 4 nesting seasons

Parameter		1992 (n 5 turtles)	1993 (n 7)	1994 (n 4)	1995 (n 6)
	Average	90.5	94.75	94.25	95.5
	Range	86.5-93.25	92-96.5	91 - 99	90 - 100.5
	Sample S.D.	2.79	1.48	3.43	4.12
	Average	83	87	87	85.3
	Range	81-85.25	81.25-94.75	81.25-94.75	76.5-85.3
	Sample S.D.	1.83	5.59		5.56

The turtle tagged with the number 043 X on 29 June 1995 had the smallest SCCW (76.5 cm) among the 22 nesting green turtles measured over the four seasons from 1992 to 1995.

6.6 Renesting intervals

6.6.1 hawksbills

6.6.1.1 Hawksbills renesting intervals in 1995

Renesting intervals (days)	n	Range (days)	Average (days)	Sample S.D. (days)
Avg for each turtle	13 turtles	12 - 16	14.17	1.33
Based on instances of renesting	25 instances	12 - 17	14.24	1.27

6.6.1.2 Frequencies of renesting intervals (RI) for hawksbills over four nesting seasons

RI (days)	Frequencies of RIs					Overall % of 104 RIs
	1992 (15 RIs)	1993 (35 RIs)	1994 (29 RIs)	1995 (25 RIs)	Overall (104 RIs)	
11	0	0	0	0	0	0
12	1	6	1	3	11	10.6
13	5	11	2	2	20	19.2
14	3	9	14	11	37	35.6
15	4	7	9	5	25	24
16	1	2	3	3	9	8.7
17	1	0	0	1	2	1.9
18	0	0	0	0	0	0

The table shows that 14 days is the most frequent renesting interval, that 78.8% of renesting intervals fall within the duration 13 to 15 days, and that 98.1% fall within the duration 12 to 16 days.

6.6.2 Renesting intervals of green turtles

6.6.2.1 Renesting intervals in 1995

RI (days)	n	Range (days)	Average (days)	Sample S.D.
Average for each turtle	6 turtles	11 - 13.3	11.9	1.04
Based on instances of renesting	12 instances	11 - 14	12.1	1.24

6.6.2.2 Frequencies of Ris for green turtles over 4 nesting seasons

RI (days)	Frequencies of renesting intervals					Overall % of 52 RIs
	1992 (13 RIs)	1993 (17 RIs)	1994 (10 RIs)	1995 (12 RIs)	Overall (25 RIs)	
10	0	0	0	0	0	0
11	0	2	2	5	9	17.3
12	4	6	6	4	20	38.5
13	4	7	2	0	13	25
14	3	0	0	3	6	11.5
15	2	2	0	0	4	7.7
16	0	0	0	0	0	0

The table shows that 12 days is the most frequent renesting interval.

6.7 Proportion of hawksbills and green turtle nests on South Reef

Species	1992		1993		1994		1995		Overall	
	Mid Jul-12 Dec		Mid Jul-21 Nov		27 Jun - 7 Dec		14 Jun - 27 Oct			
	No. of nests	% of total	No. of nests	% of total	No. of nests	% of total	No. of nests	% of total	No. of nests	% of total
Hawksbill	116	72	128	69.9	120	74.1	108	83.1	472	74.2
Green turtle	45	28	55	30.1	42	25.9	22	16.9	164	25.8
Total	161	100	183	100	162	100	130	100	636	100

The above table shows that :

- (A) Averaged over the four nesting seasons from 1992 to 1995, about 3 out of 4 nests on South Reef had been made by hawksbills.
- (B) In the 1995 season, due to a drop in the number of green turtle nests, hawksbills made about 5 nests out of every six.

6.8 Non-nesting crawls on South Reef

6.8.1 Hawksbills

Dates of study	1992	1993	1994	1995	Overall
	12 Sep-11 Dec	14 Sep-22 Nov	28 Jun-29 Jul & 25 Aug-8 Sep & 16 Nov - 7 Dec	14 Jun-18 Aug & 6-28 Oct	
Total crawls	102	83	84	71	340
NNC & % w.r.t. total crawls	22 (21.6%)	11 (13.3%)	21 (25%)	7 (9.9%)	61 (17.9%)
Nesting crawls & % w.r.t. total crawls	80 (78.4%)	72 (86.7%)	63 (75%)	64 (90.1%)	279 (82.1%)

The table shows that, on average, one out of six strandings by hawksbills result in a non-nesting crawl.

6.8.2 Non-nesting crawls by green turtles on South Reef

Dates of study	1992	1993	1994	1995	Overall
	12/9-11/12	14/9-22/11	28/6-29/7, 25/8-8/9 & 16/11-7/12	14/6-27/10	
Total crawls	26	46	36	44	152
NNC & % w.r.t. total crawls	6 (23.1%)	21 (45.7%)	21 (58.3%)	26 (59.1%)	74 (48.7%)
Nesting crawls & % w.r.t. total crawls	20 (76.9%)	25 (54.3%)	15 (41.7%)	18 (40.9%)	78 (51.3%)

The table shows that, on average, green turtles nest on South Reef on only about half the occasions they strand there.

7 Inscriptions on tags

Two sets of corrosion-resistant metal tags were used.

7.1 Those of the X series (eg. one stamped with the number 045 X) also carried the following inscription :

RETURN WILDLIFE
BOX 155 NORTH QUAY
4002 QLD AUSTRALIA

7.2 Those of the CA series (eg. one stamped with the number CA 738) also carried the following inscription :

RETURN ANPWS
GPO BOX 636
CANBERRA AUST 2601

8 Additional data

8.1 Poachers operating from Myanmar

This year, the first batches of 'Burmese' poachers arrived by mechanized dugouts earlier than usual, on 19 August, when a party of at least 7 were seen diving off the reef off the southern end of South Reef. They appeared to have been collecting sea cucumbers and molluscs. Burmese dugouts were also seen near South Reef on 26 August, 12 September, 6 October, 17 and 27 October. The poachers seen on 17 and 27 October operated from three mechanized dugouts,

and numbered about 50 people in all. The crews worked southwards on 17 October and were seen going northwards on 27 October. In general, these groups take turtle eggs, and probably nesting turtles also, at every opportunity.

8.2 Turtle nesting before the commencement of the study

At least 5 green turtle nests made in the month prior to our arrival at South Reef (on 14 June) were counted. There was also evidence of a single hawksbill nest made during this period. The date 20 June could be considered to be the start of the nesting season for the hawksbill in the 1995-96 season, because no hawksbills nested at least within a week preceding this date, and because at least one nested every week following this date, right upto my departure from South Reef on 28 October 1995.

8.3 Poaching of turtle eggs on South Reef

Two of the five green turtle nests made prior to our arrival at South Reef had been poached by humans, as tracks indicated. No poaching, however, occurred during my 4 month stay on the island. This gives additional proof, if any is required, that the mere presence of an official or a conservationist on a nesting beach deter poachers.

9. Acknowledgements

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