

# Tagging Study of Green Turtles (*Chelonia mydas*) on the East Coast of Peninsular Malaysia

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## ABSTRACT

A tagging program of green turtle has been conducted intensively in Peninsular Malaysia since in 1993 especially at two rookeries namely Mak Kepit, Redang Island in Terengganu and Chendor in Pahang. The objectives is to determine their nesting frequency at two major rookeries Mak Kepit and Chendor on the east coast of Peninsular Malaysia. The results showed that, out of 313 green turtles that had been tagged at Mak Kepit from 1993 to 2000 only 78 individuals had remigrated. This indicates that only 25 % of green turtles had returned back for nesting at Mak Kepit rookery. At Chendor, a total of 344 of green turtles were tagged from 1993 to 2000 and only 73 individuals were recovered. It showed that only 21 % remigrated to the same location for nesting. Green turtles took a period of approximately 2 years to return back for breeding at Mak Kepit, whereas they started to return back within 3 years at Chendor. At Mak Kepit 22 % of green turtles had nested more than 5 times and 44 % at Chendor rookery.

**KEYWORDS:** Green turtles, tagging, nesting, recovered, remigrated

## INTRODUCTION

Marine turtles have been listed as one among the endangered species in the IUCN (International Union for Conservation and Natural Resources) Red list. Several species of sea turtles exist world wide. They are green (*Chelonia mydas*), leatherback (*Dermochelys coriacea*), hawksbill (*Eretmochelys imbricata*), olive ridley (*Lepidochelys olivacea*), loggerhead (*Caretta caretta*), Kemps ridley (*Lepidochelys kempfi*), Australian flatback (*Natator depressus*) and black turtle (*Chelonia agassizi*). All species except black turtle (*Chelonia agassizi*) are known to nest in the Southeast Asian region. Green turtle is the most common species in this region.

As early as 1960 itself, Peninsular Malaysia had been identified as one of the major nesting places for sea turtles in Southeast Asian region. Among the seven species distributed worldwide, green, hawksbill, leatherback and olive ridley turtles have been confirmed to nest in various rookeries along Peninsular Malaysia. The seven rookeries are; Mak Kepit, Cagar Hutang, Ma Daerah and Geliga in Terengganu, Chendor in Pahang, Segari in Perak and Mersing Marine Park in Johor have been recognized as major nesting locations for green turtle (Fig.1). The highest nesting of green turtles has been observed in Terengganu followed by Pahang, Perak and Johor.

The Department of Fisheries Malaysia is the main institution for conducting the conservation and management efforts for marine turtles in Peninsular Malaysia. The green turtle incidence in

Terengganu and Pahang during the period from 1991 to 2000 has reduced drastically from 5,311 to 1,510 and 437 to 78

respectively (Karim, 2003). Conservation efforts such as in situ hatchery, artificial hatchery, tagging and population genetic studies have been conducted intensively since 1993 especially in Chendor (Pahang) and Mak Kepit, Redang Island in Terengganu. The breeding season for green turtles is from April to October with peak nesting from May to August.

The objective of the turtle tagging program was to determine their nesting frequency especially at two major rookeries Mak Kepit and Chendor on the east coast of Peninsular Malaysia.

## MATERIAL AND METHODS

Tagging exercises have been carried out at Mak Kepit (Terengganu) and Chendor (Pahang) since 1993. The Department of Fisheries employs at least two contract workers for sea turtle conservation and management activities from April to October who patrol along the beach every night to search for sea turtles landing and record their activities and behavior including tagging. The landed turtles were tagged externally on the flippers using inconel tags. To avoid the problem of tag loss, turtle were tagged on both flippers. The curved carapace length (CCL) and curved carapace width (CCW) were measured to the nearest centimeter. Nesting location and the clutch size for each turtle also been recorded. These activities were continued until the end of nesting season.

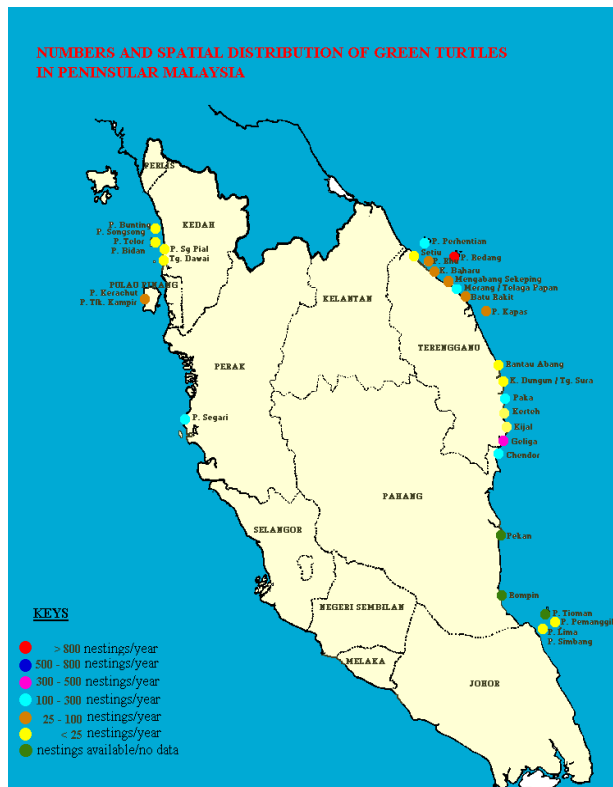


Figure 1: Map showing the nesting distribution of green turtles in Peninsular Malaysia.

## RESULTS

At Mak Kepit, most of the turtles took almost two years to return back for nesting at the same location (Table 1). Out of 313 green turtles that had been tagged from 1993 to 2000, only 78 individuals remigrated. This indicated that only 25 % of green turtles have returned back for nesting at Mak Kepit. At Chendor, most of green turtles took a period of three years to return back for nesting with an exception in 1998, wherein one turtle that remigrated was tagged in 1997. A total of 344 green turtles were tagged from 1993 to 2000 and only 73 remigrated to nest at Chendor rookeries. This indicated that only 21 % of sea turtles remigrated to the same nesting location. The nesting frequency of green turtles varied from 1 to 8 at Mak Kepit during the 1998 and 1999 nesting season. However, only 22 % have exhibited a nesting frequency of more than five times (Fig. 2). About 78 % of the turtle managed to nest between one and four times. At Chendor, the nesting frequency ranged from one to ten. Only 44 % of the turtles were observed with a nesting frequency of five and above. About 56 % exhibited nesting frequency of four and below (Fig. 3)..

## DISCUSSION

Among the green turtles tagged at Mak Kepit in 1993, only one was recovered in 1995. Similar recovery was made in 2000 with a green turtle

tagged in 1998. This has indicated that the female green turtles at Mak Kepit took a period of two years to return back to the same location for nesting. The number of tagged turtles remigrating has gradually declined over the years.

For instance, 53 individual female green turtles were tagged in 1993 and the number of remigrations increased from 1 to 10 individuals from 1995 to 1997. However, the number declined from 5 to 1 individuals from 1998 to 2000.

At Chendor rookeries, the new female green turtles that were tagged in 1993, 1994, 1995 and 1996 were first recovered in 1996, 1997, 1998 and 1999 respectively. This indicated that the turtles took almost three years to return to the same location for breeding. The number of remigrations has also gradually decreased with the year series. Thus, it can be presumed that the female green turtles in east coast Peninsular Malaysia took a period of two to three years to return back to the same location for nesting.

Each female usually choose to return to the same beach or island to lay several clutches within one nesting season (Limpus, 1993). After two to eight years, many of these females will make yet another breeding migration, each generally returning to nest on the same beach as before (Limpus, 1993). Genetic and tagging studies suggest that the female returns to breed in the same region as her birth. For example, a turtle born in Terengganu should return to breed in Terengganu when it grows up, but not necessarily to the same kilometer of the beach (Limpus, 1993).

It is also expected that a large number of *Chelonia mydas* from the Malaysian rookeries could have been harvested in neighboring countries, especially Indonesia. With the reduction of the breeding population in Terengganu and the expected continuous decline because of past insufficient production, the survival of these turtles must be maximized both at the nesting beaches in Malaysia and neighboring countries like Indonesia in order to have any hope of recovery of the Peninsular Malaysian *Chelonia mydas* population.

There are some major factors that brought negative impact on nesting population of sea turtles in Peninsular Malaysia. These factors are failure to protect 100 % of eggs deposited, fisheries activities in inshore territorial waters, commercial harvesting of turtles in neighbouring countries, in-water harassment of turtle by tourists, over development of fragile islands leading to habitat destruction and pollution by oil chemicals, siltation and persistent debris (Chan, 2003). The incidental capture of sea turtles in fishing gear is a very serious threat to sea turtles and is blamed for major population decline. Shrimp trawlers have been singled out as major threats to sea turtles (Liew, 2003).

The nest populations of green turtle at Mak Kepit and Chendor have reduced over the years from 1993 to 2000. The enforcement of fishing acts and the management of tourism activities at turtle

rookeries should be undertaken to reduce mortality of sea turtles and provide a conducive nesting location for these reptiles.

Table 1: Number of green turtles tagged and remigrated starting from 1993 – 2000 at Mak Kepit, Redang Island

Year	1993	1994	1995	1996	1997	1998	1999	2000	No. of individuals recovered
1993	53		* 1	* 3	* 10	* 5	* 2	* 1	22
1994		40		* 1	* 8	* 2	* 2	* 5	18
1995			74		* 1	* 10	* 10	* 3	24
1996				23		* 1	* 4	* 2	7
1997					56			* 6	6
1998						22		* 1	1
1999							24		
2000								21	
<b>Total number of turtles tagged</b>	53	40	75	27	75	40	42	39	78 (total number of recovered)

\* Number of individuals recovered

Table 2: Number of Green turtle tagged and remigrated starting from 1993 – 2000 at Chendor, Pahang

Year	1993	1994	1995	1996	1997	1998	1999	2000	No. of individuals recovered
1993	27			* 8	* 3	* 2	* 7		20
1994		75			* 17	* 6	* 8		31
1995			84			* 5	* 6	* 8	19
1996				23			* 2		2
1997					47		* 1		1
1998						46			
1999							30		
2000								12	
<b>Total number of turtles tagged</b>	27	75	84	31	67	59	54	20	73 (total number of recovered)

\* Number of individuals recovered

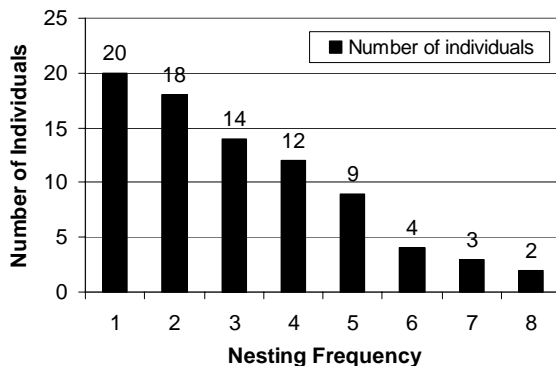


Figure 2: Nesting frequency of green turtles during nesting season at Mak Kepit in 1998 & 1999

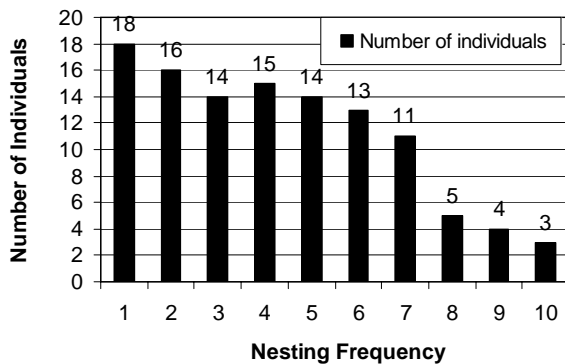


Figure 3: Nesting frequency of green turtles during nesting season at Chendor in 1998 & 1999

**CONCLUSION**

At Mak Kepit, only 25 % of green turtles have returned back for nesting and took almost two years to return to the same location. At Chendor, only 21 % of sea turtles remigrated to the same nesting location and mostly took a period of three years to return back for nesting.

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