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Marine turtle nesting at Patara, Turkey, in 2000

by Ali Erdoğan, Mehmet Öz, Yakup Kaska, Serdar Düşen, Aziz Aslan, Mustafa Yavuz, M. Rızvan Tunç, and Hakan Sert

Abstract. The reproduction of the sea turtle population at Patara in southern Turkey was investigated in 2000. Two Green Turtle (*Chelonia mydas*) nests were identified, which is the first record for the area, and the westernmost nesting site in the Mediterranean. 85 Loggerhead Turtle (*Caretta caretta*) nests were found, but hatchlings emerged from only 19 of them. Beach erosion and the covering of nests by shifting sand dunes was responsible for the loss of 54% of all nests. Although 72% of all emergences occurred on the eastern half of the beach and 74% of all clutches were laid there, there was no significant difference found in nesting success between both beach sections, which differ markedly in structure and human impact.

Kurzfassung. In Patara in der Südtürkei wurde die Fortpflanzungsbiologie der Meeresschildkröten im Jahr 2000 untersucht. Es wurden zwei Nester der Suppenschildkröte (*Chelonia mydas*) identifiziert. Dies stellt für das Gebiet den ersten Nachweis dar, und gleichzeitig den östlichsten Nistplatz im Mittelmeer. Von der Unechten Karettschildkröte (*Caretta caretta*) wurden 85 Nester ermittelt, von denen aber nur aus 19 Junge schlüpften. Die Erosion des Strandes und die Verschüttung von Nestern durch Wanderdünen war für den Verlust von 54% aller Nester verantwortlich. Obwohl 72% aller Schildkrötenspuren in der östlichen Strandhälfte gezählt wurden, und auch 74% aller Gelege dort abgelegt wurden, wurde zwischen beiden Strandhälften – die sich in bezug auf Struktur und menschlicher Nutzung deutlich unterscheiden – kein signifikanter Unterschied im Nisterfolg gefunden.

Key words. Green Turtle, *Chelonia mydas*, Loggerhead Turtle, *Caretta caretta*, southern Turkey, Mediterranean Sea.

Introduction

Patara has been identified as one of the most important nesting beaches of Turkey for the Loggerhead Turtle, *Caretta caretta*. The high proportion of false crawls and low hatching success was first mentioned by BARAN & KASPAREK (1989). Several subsequent studies, summarised by TAŞKIN & BARAN (2001), have confirmed this in principal, but were unable to explain adequately the reasons for it. The aim of this study was to investigate Loggerhead Turtle reproduction at Patara, and to make a comparison between the eastern and western parts of the beach, which greatly differ in structure and human use. It was hoped to determine whether these factors have an impact on the proportion of false crawls and the nesting success.

Material and methods

Patara beach is located to the south of the ancient Lycian towns of Patara, Xanthos, Letoon and Pydnae and is bisected by the mouth of the ancient Xanthos River, which is now called Eşençay. The stretch of the beach to the west of Eşençay belongs to Muğla Province, and is 5000 m long;

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the beach to the east of the river mouth belongs to Antalya Province and is 6915 m long. The beach extends from 36°14'93" N and 29°18'98" E in the south-east to 36°19'72" N and 29°13'52" E in the north-west. The western beach, compared to the eastern one, is relatively flat, its sand is compact and hard, and vehicles regularly drive on the beach. For a description of the area, see BARAN & KASPAREK (1989) and TAŞKIN & BARAN (2001).

The present study was conducted between 30 May and 5 September, 2000. The beach was patrolled at night (21.00 p.m. to 2.00 a.m.) and again in the early morning (6.00 to 11.00 a.m.). All activities from the preceding night were accepted and evaluated as the next day's activity.

The tracks at and around recently predated nests often enabled the predator to be identified. Fox prints are smaller than dog prints, with a different arrangement of paw pads. After predation, the sand surrounding the nest was checked for eggs left by the predator. Damaged or non-viable eggs were taken to determine the stage of development. All predated eggs were counted and cleared, and any eggs which were considered viable were covered with sand again. One nest was screened with mesh wire against predation, and another was relocated from the wet zone to further up the beach as examples for further studies.

If a nest was recorded as hatched, but only a few hatchling tracks were seen, then the nest was left for a few days to allow the majority of hatchlings to emerge in a natural way. The nest was then excavated by hand roughly one week after the first emergence. The number of hatchlings emerged, dead and able to reach sea were recorded until the nest was excavated. This was done carefully, as a few living hatchlings could still be found in the nest.

The total number of eggs was assessed by recording the number of hatched and unhatched eggs. Unhatched eggs, removed from the nest, were checked to detect the level of development. All unhatched eggs were classified as unfertilised (yolked, but no sign of development; no white spot on the eggshell or no reddish point on the yolk could be seen, as early indications of development); or as embryos dead in the shell (visible embryo or white spot on the eggshell and/or reddish circle on the yolk and/or brownish spot on the inner side of the eggshell). Those hatchlings which had died after hatching, in the sand column or on the beach, were also recorded. Very small eggs were excluded from the total number of eggs. The number of eggs for the unhatched nests and totally predated ones was not determined.

Results and discussion

Green Turtle, *Chelonia mydas*

Two nests were identified as Green Turtle nests late in the season on 27 and 28 June, 2000. There was a large and deep nesting pit and large amounts of sand were disturbed. The tracks leading to and from the nest were also identified as Green Turtle tracks. No hatchlings emerged from these nests. This is the first record of Green Turtle nesting in Patara, and the westernmost nesting record in the Mediterranean (KASPAREK et al. 2001).

Loggerhead Turtle, *Caretta caretta*

163 Loggerhead Turtle emergences were counted during summer 2000, resulting in 85 nests. The number of nests was 52 in 1992, 85 in 1993, 35 in 1996 and 52 in 1997 (TAŞKIN & BARAN 2001), but in some years the study area was confined to certain parts of the beach (mostly to the eastern part), and sometimes did not cover the entire nesting period, so that it

Tab. 1. The fate of the Loggerhead Turtle nests at Patara during the nesting season 2000.

	West of Eşencay	East of Eşencay	Total
Total emergences	45	118	163
Number of nests	22	63	85
▪ Completely predated	5	15	20
▪ Predated and Hatched	3	7	10
▪ Inundated & eroded (not hatched)	9	27	36
▪ Hatched nests	5	14	19
Number of eggs			
▪ Infertile eggs	122	89	211
▪ Dead embryo in shell	74	165	239
▪ Hatchlings produced	305	794	1,099
Number of hatchlings			
▪ Total no. of dead hatchlings	150	348	498
▪ Dead in nest	12	24	36
▪ Eaten by foxes	25	74	99
▪ Eaten by crabs	81	170	251
▪ Dead under sun	32	80	112
▪ Hatchlings reached the sea	155	446	601

is difficult to compare the results. Almost half of all emergences (48%) were false crawls. This is much lower than has been recorded in previous years: TAŞKIN & BARAN (2001) report a portion of 70–75% false crawls in Patara. The reason for the relatively low proportion of false crawls in 2000 could not be determined.

Three-fourths (74%) of all nests were recorded east of Eşençay. This may be explained by the fact that the beach to the west of the river mouth is much flatter, has very compact sand, and is therefore less suitable for turtle nesting. There is also a much greater human impact on the western beach, including camping on the beach and vehicle driving. On the eastern beach section, there are mostly only daily visitors, with no vehicles. The impact of these activities has not yet been clearly assessed.

The first hatching occurred on 3 August and the last on 4 September, 2000. Only 22% of the 85 Loggerhead Turtle nests produced hatchlings. The proportion of hatched nests was practically equal on the western and eastern sides of the beach. 54% of the nests were inundated due to beach erosion or were covered by shifting sand dunes. This parameter also revealed no significant difference between the eastern and western beach sections.

35% of the nests were totally predated by foxes (*Vulpes vulpes*), and 11% were partly predated by foxes and subsequently by ghost crabs (*Ocypode cursor*). These nests produced some hatchlings (Tab. 1). The number of nests previously reported for Patara beach is close to these results. The hatching success, at 22%, was very low when compared to previous years: 24% of 58 nests hatched in 1990 (BARAN et al. 1992), but 48% in 1992, 67% in 1993, 82% in 1996 and 86% in 1997 (TAŞKIN & BARAN 2001). Beach erosion and the covering of nests by shifting sand dunes is the major reason for the loss of nests, and is actually responsible for about half of all nest losses. Ghost crabs and foxes are the only animal predators. Screening of these nests with wire meshes would greatly help to reduce the predation rate.

The mean incubation period for these 19 nests was 54.8 days (min. 48, max. 68). It was not possible to locate two nests exactly once the hatchlings had emerged because of sand erosion, and so the number of the eggs per nest could only be determined for 17 nests: The average number of eggs per nest was 87.5 (min. 20, max. 103).

Of the hatchlings produced, 3.3% were found dead in the egg chamber, 42.% were predated or were found dead on the way to the sea, and 54.7% of all hatchlings were able to reach the sea. The one nest relocated and the one that was screened successfully produced hatchlings.

Beach erosion and the subsequent inundation by high waves plus the coverage of nests by shifting sand dunes are the main factors for the low hatching success of marine turtles at Patara. Vehicle driving on the western beach section has also contributed to the compaction of the sand and has enlarged the inundation zone. Access by vehicles should be prohibited at least during the breeding season. Nest relocation to a hatchery area would be a suitable measure to combat the loss of nests from beach erosion and coverage by shifting sand dunes.

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