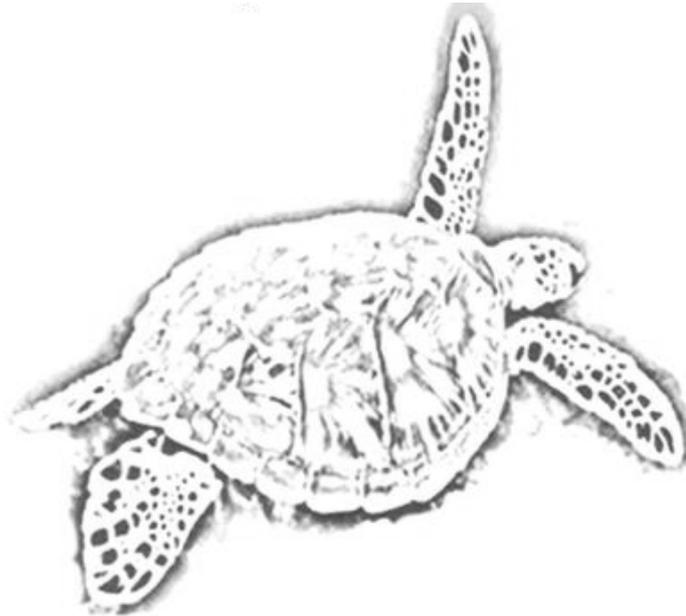


# **PROCEEDINGS OF THE SECOND MEDITERRANEAN CONFERENCE ON MARINE TURTLES**

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## **INTERNATIONAL MIGRATIONS OF NON-NESTING LOGGERHEAD TURTLES FROM GREECE TO TURKEY AND LIBYA**

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### **INTRODUCTION AND METHODS**

Migration and movements of turtles have traditionally been studied with mark-recapture programmes involving flipper tagging. However, results from this kind of study depend on third parties who must observe the turtle and tag, and subsequently notify the originating body. Hence tag recoveries can be biased by differences in tag recapture and reporting “effort” in different locations.

Until the year 1999, ARCHELON had tagged 2,868 loggerhead turtles at the main nesting sites of Zakynthos and Kyparissia Bay and from these only 100 were re-sighted at distances longer than 150km from the respective nesting areas (Margaritoulis et al. 2003). Tag returns indicate that the northern Adriatic and Gulf of Gabes are two of the most important foraging and overwintering sites for loggerheads nesting in Greece and that apparently very few turtles migrate to the southern and eastern parts of the Mediterranean (Margaritoulis et al. 2003).

Flipper tagging recoveries provide the observation locations of turtles and do not necessarily provide precise information whether the observation location was along a migratory route or at a residency area. However, when many tag recaptures are reported from the same area we can assume that this is a residence area and not sightings of numerous turtles *en route* to somewhere else.

To acquire a better knowledge on turtle migrations around the Mediterranean, ARCHELON initiated telemetry studies that could follow turtles along their migration routes using transmitters communicating with the Argos satellite system and data are managed using Satellite Tracking and Analysis Tool (STAT, Coyne and Godley 2005). To date, all transmitters have been deployed on non-nesting turtles. The tracks of the two international migrations of loggerheads from Greece are presented here.

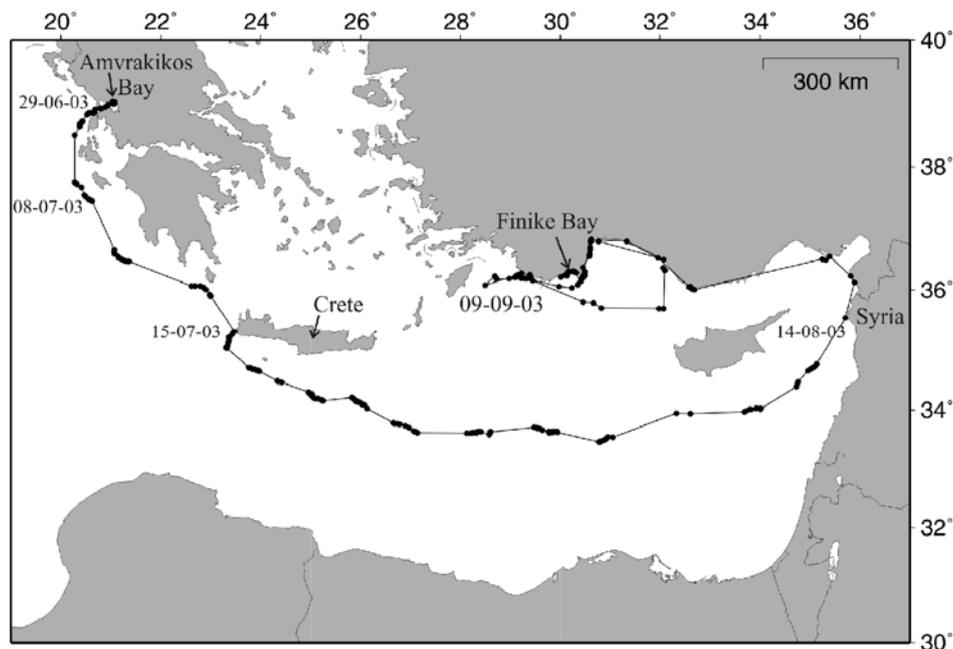
The first turtle, “Luar”, was captured in Amvrakikos Bay, which is bordered to the north by important RAMSAR designated wetlands and has extensive shallow areas with an abundance of foraging loggerheads (Rees and Margaritoulis 2006, 2008). The second turtle, “Toby”, was found injured on Crete and sent to ARCHELON's Rescue Centre at Glyfada near Athens for rehabilitation. After over a year at the Rescue Centre it was released and tracked as part of the study of behaviour and movements of post-rehabilitated turtles. Upon his release, Toby had recovered normal behaviour, controlling his buoyancy and feeding freely and normally. Both turtles were probably juveniles; details on their sizes and other information are found in Tab 1.

<b>Turtle</b>	<b>SCL (n-t)</b>	<b>Origin</b>	<b>Release date</b>	<b>Duration of transmitter operation</b>
Luar	70.0cm	Amvrakikos Bay	13 May 2003	418 days
Toby	66.5cm	Chania, Crete	6 June 2004	77 days

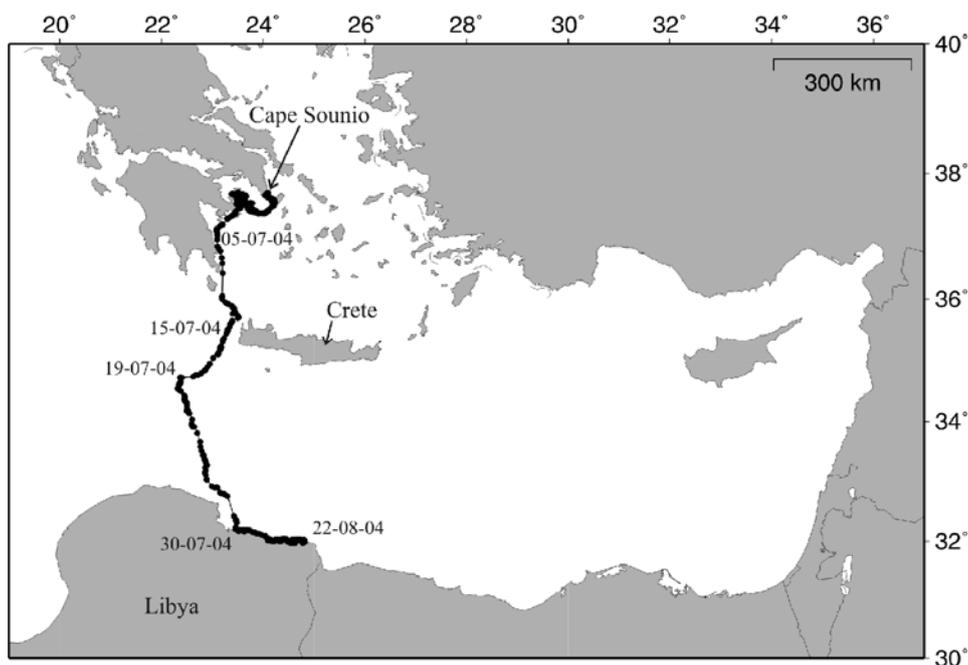
**Tab. 1.** Turtle and transmitter summary

## TURTLE MOVEMENTS

Luar remained within Amvrakikos Bay after its release until 29 June when it commenced its migration (Fig. 1). On 8 July it passed Zakynthos and next approached land when it passed by the westernmost part of Crete on 15 July. From there it continued eastwards for almost a month until it reached the coast of Syria on 14 August. The turtle then travelled north and west, following the coast of Turkey, until 9 September when it doubled back on itself. It made a final cycle around Antalya Bay, reaching its final destination of Finike Bay on 22 October where it stayed until the last transmission was received on 4 July 2004.



**Fig. 1.** Track of Luar's migration. Dates are for indicative purposes only



**Fig. 2.** Track of Toby's migration. Dates are for indicative purposes only

Toby was released at Cape Sounio and spent the majority of the next month in the Saronic Gulf (Fig. 2). On 5 July it started its migration south, passing along the east coast of the Peloponnesus. On 15 July it passed the westernmost part of Crete. On 19 July it made a distinct change from its south-westerly course to a south-south-easterly one. On 30 July the turtle reached Libya and travelled eastwards along the coast until the last transmission that was received on 22 August 2004.

## **DISCUSSION**

The movements presented here show directed, non-random migrations. The kinked nature of Toby's track on its journey to Libya was probably caused by climatic or oceanographic features and warrants further investigation. Despite the migrations being obviously directed they do not represent the turtles taking the shortest routes from one residential neritic foraging area to another as shown by Toby's eastward journey along the Libyan coast and Luar's extensive travels from the Syrian coast to south west Turkey. Luar's migration is exceptionally complex as the turtle passed, in early September, through the area it was to finally settle in late October.

These tracks reinforce the fact that turtles, albeit juveniles, travel from Greece to the east and south Mediterranean, a broad area from which there have been very few tag recoveries from turtles nesting in Greece. Several reasons for this can be proposed.

1. Juvenile loggerhead turtles exhibit different migration and residency patterns to adults.
2. The turtles belonged to nesting colonies outside Greece and were returning to their maternal lands after a period in Greek waters.
3. Migrations by turtles found in Greece to the south and east region of the Mediterranean are more common than previously known due to lack of observation or reporting from these distant localities.

We hope to gain more understanding of the migratory behaviour and population structure of turtles found in Greece through deployment of further satellite transmitters, continued flipper tagging at the nesting beaches and Amvrakikos Bay and from genetic analysis of turtles encountered throughout Greece.

Irrespective of whether there is a biological difference in migrations for juvenile and nesting turtles or that the lack of tagged turtles sighted in the south and east of the Mediterranean basin is due to lack of reporting, it is clear that marine turtles found in Greek seas are long-distance travellers and to be fully protected require cooperative conservation efforts at an international level.

## **ACKNOWLEDGEMENTS**

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