

# Unusual behaviour of an immature loggerhead turtle released in the Alboran Sea

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## Abstract

*Unusual behaviour of an immature loggerhead turtle released in the Alboran Sea.*— A juvenile loggerhead turtle with buoyancy problems was captured in the Alboran Sea (Mediterranean Sea, south of Spain) and released 14 months later after healing. Six days after the release, the turtle was seen swimming 42 km from the point of release, displaying unusual behaviour. We re-captured and released it again, 95 nautical miles offshore, near the Alboran Island. Ten days later the turtle arrived at the beach close to where it had been maintained in captivity. We discuss these findings in the context of behavioural alteration and habituation in released sea turtles. Capture–mark–recapture studies of sea turtles should be approached with caution as manipulated animals may modify their usual behaviour.

Key words: Sea turtle, Captivity, Capture–mark–recapture, Post–release, Mediterranean Sea.

## Resumen

*Comportamiento inusual de un ejemplar de tortuga boba joven liberado en el Mar de Alborán.*— Un individuo juvenil de tortuga boba con problemas de flotabilidad fue capturado en el Mar de Alborán (Mar Mediterráneo, sur de España). Fue liberado 14 meses después de su curación. Seis días después de la liberación, la tortuga fue vista nadando a 42 km del punto de liberación, con un comportamiento inusual. Por este motivo fue recapturada y liberada de nuevo, a 95 millas náuticas de la costa cerca de la Isla de Alborán. Diez días más tarde, la tortuga llegó a la playa, cerca de donde se la había mantenido en cautividad. En la presente nota se discuten estos hechos en el contexto de la alteración de la conducta y la habituación de las tortugas en libertad. Los estudios centrados en la captura, marcaje y recaptura de las tortugas marinas, por ejemplo, deben de abordarse con cautela, ya que la manipulación de estos animales podría modificar su comportamiento habitual.

Palabras claves: Tortuga marina, Captura–marcado–recaptura, Posliberación, Mar Mediterráneo.

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## Introduction

In animal behaviour philopatry has been defined as a tendency to remain in, or return to, an individual's birthplace (Parker, 2003). This phenomenon should be considered in any capture–mark–recapture study on wild migratory species, or when an individual is released back into its natural habitat after recovery from an injury because studies have indicated that such events may induce behavioral alterations (for example, Addison & Nelson 2000; Gauthier–Clerc et al., 2004; Dugger et al., 2006).

It is well known that sea turtles have a strong sense of orientation and return to their natal beaches after many years (Lohmann et al., 1999; Putman & Lohmann, 2008). Swingle et al. (1994), however, found that released turtles exhibited alterations in behaviour, and Addison & Nelson (2000) also reported another case of habituation in a loggerhead sea turtle from Florida (Atlantic USA). Behavioural modifications, nevertheless were not been taken into account in recent studies of capture–mark–release in loggerhead sea turtle (e.g. Casale et al., 2007; Hochscheid et al., 2007; Revelles et al., 2008; Cardona et al., 2005, 2009). Eckert et al. (2008) used wildlife animals in their study of capture–mark–release in Loggerhead from the Western Mediterranean Sea, to avoid behavioural modifications.

We present the unusual behaviour of an immature loggerhead turtle released in the Alboran Sea, and examine the possible consequences of such modifications in studies of marine migratory species.

## Material and methods

### Study area

The Alboran Sea connects the Western Mediterranean Sea with the Atlantic Ocean. It is an outstanding area for megafauna in the North Atlantic–Mediterranean region, providing an important corridor for migratory marine turtles (e.g. Camiñas, 1997). The loggerhead turtle *Caretta caretta* is the most abundant sea turtle (Bellido et al., 2010) in this region but little is known about its use of the Alboran coast. Recent studies have shown, however, that Atlantic turtles cross the Strait of Gibraltar, enter the Western Mediterranean basin looking for feeding grounds, and later return to the Atlantic, again crossing Alboran waters (Camiñas & De la Serna, 1995).

### Threatened Marine Species Recovery Centre

The "Consejería de Medio Ambiente de la Junta de Andalucía" (the Andalusia Environmental Advisory Board) supports a network of Recovery Centres for Threatened Marine Species and a volunteer stranding network with a strong presence in all the municipalities of the Andalusian coast. Other bodies, such as local police and scientific groups, collaborate closely in the detection and care of stranded individuals. Every year, many Loggerhead turtles strand in Andalusian waters and are transferred to a recovery centre.

The recovery centre in Aula del Mar of Malaga has indoor tanks of 2 x 2 m. The temperature of the water ranges between 23°C in summer and 18°C in winter. Sea turtles are fed small pelagic animals, such as mackerel or squid, that are rich in fat. When the veterinary team considers the animal is fit, it is released. On release, all turtles are tagged with an internal microchip and an external metal tag.

## Results and discussion

A loggerhead turtle with buoyancy problems was found on 19 V 2007 in waters of Almuñecar (36° 40' N, 3° 41' W). Its straight carapace length was 43 cm. It was captured and treated for lung infection. The recovery process took 10 months, but the veterinary team decided to delay the turtle's release until the summer season to increase its chances of acclimatization. It was released at Malaga Bay (36° 33' N, 4° 26' W) on 3 VII 2008, after 14 months in the Aquarium Aula del Mar at Benalmádena (36° 35' N, 4° 31' W).

Six days later, the turtle was seen swimming near the coast of Torrox (36° 43' N, 3° 56' W), 42 km from the point of release. People at the beach noticed that the turtle exhibited unusual swimming behaviour, insistently approaching people. For this reason, the turtle was re–captured and moved back to Aula del Mar of Benalmadena, where it spent 5 more weeks before going back to the sea. This time the turtle was released 95 nautical miles offshore, near the Alboran Island (35° 55' N, 03° 02' W). Ten days later the turtle was found on the coast of Benalmadena (36° 36' N, 4° 28' W), close to the site where it had lived for more than a year (fig. 1).

The present case exemplifies a loggerhead turtle's change in behaviour after living in captivity, and is similar to the report of habituation cases observed by Swingle et al. (1994), and Addison & Nelson (2000).

Nowadays, the most accepted hypothesis for turtle philopatry is magnetic imprinting (Putman & Lohmann, 2008). However, in addition to magnetic imprinting, Putman & Lohmann (2008) believe that turtles could use local recognition cues such as female pheromones and chemicals from the beach. Use of cues of this type would likely account for alterations in their natural behaviour and explain their ability to return to the place of captivity. Larger studies on behavioural alterations are needed so that reintroduction policies can incorporate ways of reducing habituation in turtles prior to release.

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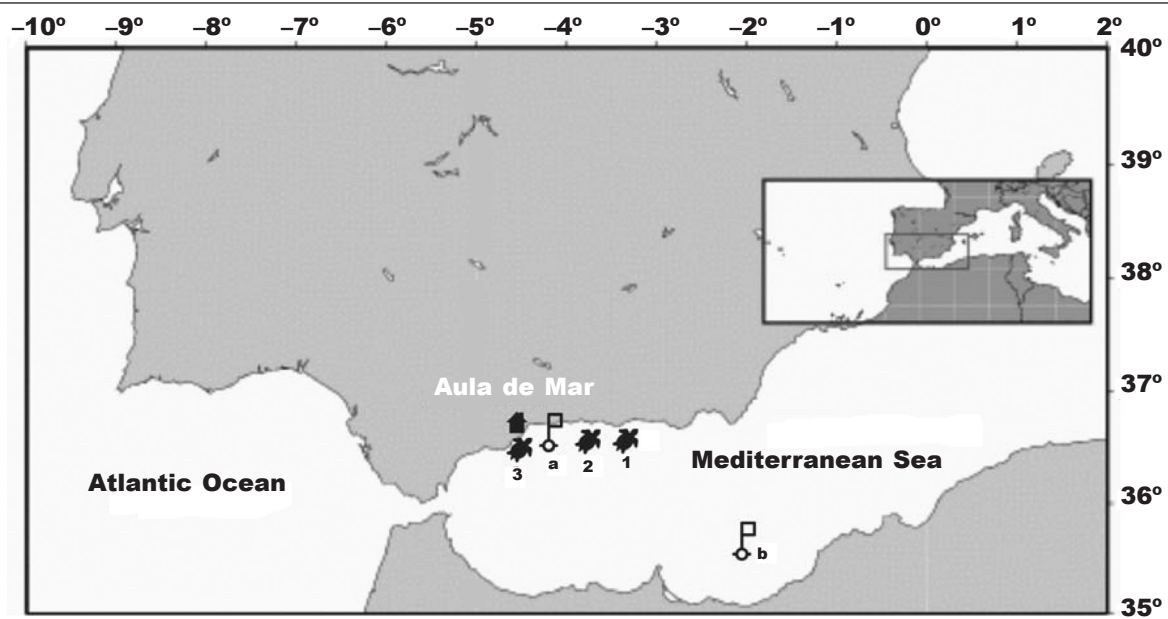


Fig. 1. Study area (Andalusia Coast, Spain): 1. First detection (19 V 07); a. The turtle is released (3 VII 08); 2. It appears in Torrox (9 VII 08); b. Released again, Alboran Island (6 VIII 08); 3. It appears in Benalmádena. We used "maptool" (available on [www.seaturtle.org](http://www.seaturtle.org)) as mapping tool.

Fig. 1. Área de estudio (costa andaluza, España): 1. Primera detección (19 V 07); a. La tortuga es liberada (3 VII 08); 2. Aparece en Torrox (9 VII 08); b. Liberada de nuevo, isla de Alborán (6 VIII 08); 3. Aparece en Benalmádena. Utilizamos "maptool" (disponible en [www.seaturtle.org](http://www.seaturtle.org)) como herramienta de mapeo.

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