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## BRIEF COMMUNICATION

### First record of a whale shark *Rhincodon typus* in continental Europe

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A whale shark *Rhincodon typus* was found in a set-net in southern Portugal in October 2011. This was the first record for continental Europe and represents an increase of the species' known range. Upwelling events and increase in sea-surface temperatures are possible reasons for this occurrence.

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The whale shark *Rhincodon typus* Smith 1828, was first described from a 4.6 m (total length,  $L_T$ ) specimen harpooned in Table Bay, South Africa (Stevens, 2007). It is the largest living fish on earth reaching *c.* 18 m  $L_T$  and a mass of *c.* 21 t. Externally, *R. typus* is characterized by a broad, flattened head, a very large and nearly terminal mouth, very large gill slits, three prominent longitudinal ridges on its upper flanks, a large first dorsal fin, a semi-lunate caudal fin and a unique checkerboard pattern of light spots and stripes on a dark background (Compagno, 2001).

Worldwide, relatively little is known about the biology of these animals and it was only recently established that *R. typus* is, in fact, a live-bearer (Joung *et al.*, 1996), with an ovo-viviparous mode of development (Colman, 1997).

The species' distribution is circumglobal, although restricted to tropical and warm seas. This species' proximity to the shoreline exhibits some seasonality, although most of its life cycle is spent in a pelagic environment. In the eastern Atlantic Ocean, it is known in the Azores, Senegal, Mauritania, Cape Verde Islands, Côte d'Ivoire, Gulf of Guinea, Gabon, Angola and South Africa (Western Cape Province) (Compagno, 2001). It is an epipelagic and neritic, oceanic and coastal, tropical and warm-temperate pelagic shark, often seen far offshore but regularly coming close

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inshore off beaches and coral reefs and sometimes entering lagoons of coral atolls (Compagno, 2001; Stewart & Wilson, 2005). It is present in areas with water-surface temperatures from 18 to 30° C, although Brunnschweiler *et al.* (2009) recorded it in water masses at temperatures down to 3.4° C. The species' preference is locations with water-surface temperatures between 21 and 25° C, where cool nutrient-rich upwellings mingle with warm surface waters of salinities close to 35 (Iwasaki, 1970; Eckert & Stewart, 2001).

*Rhincodon typus* are thought to be highly migratory but currently there is no direct evidence to support this (Compagno, 1984). Eckert & Stewart (2001) reveal a possible relation between the species' movement patterns and oceanographic features, such as sea-mounts and boundary currents, where primary productivity may be enhanced. These conditions may be optimal for production of plankton and small to moderate-sized nektonic organisms, all of which are prey of these filter-feeding species (Compagno, 2001).

*Rhincodon typus* ecotourism industries have been established at several aggregation points, such as Ningaloo Marine Park (NMP) in Western Australia, Mozambique, the Galapagos Islands, the Philippines, the Maldives, the Seychelles, Honduras, Belize and Mexico. The integration of large scale photo-identification with ecotourism has resulted in increased data collection (Holmberg *et al.*, 2008). *Rhincodon typus* is currently listed as Vulnerable (A2bd+3d) on the IUCN Red List of Threatened Species (Norman, 2005).

In 1994, Tunipex, a commercial fishing company, established a set-net in Olhão, south of Portugal. Their main target is bluefin tuna *Thunnus thynnus* (L. 1758), on their way back from spawning in the Mediterranean Sea. Thus, the net's mouth faces east and operates between April and November. The entrance of non-target species inside the net is common (*e.g.* rays, sharks and sunfishes), but these animals are usually released back into the wild.

On 7 October 2011, a 7–8 m  $L_T$  male *R. typus* was found inside the set-net. The animal was alive and apparently in good condition. Divers from Tunipex and from Flying Sharks (Tunipex's partner company dedicated to collections, scientific research and transport of marine organisms) were able to release the animal back into the ocean, by dropping one of the sides of the cage-like structure the animal was swimming in. On the day of this occurrence, water temperature was 22–23° C at the surface and 18–19° C at the bottom, 30 m below. Salinity was 35.

Although several studies on fish communities have been developed in this area (Santos *et al.*, 2005; Ribeiro *et al.* 2008), *R. typus* has never been recorded from the area before. Santos *et al.* (1997) recorded it in the Azores Islands and recently Wirtz *et al.* (2007) recorded it for Madeira. Therefore, this represents the first record for continental Portugal and also for continental Europe.

The highly mobile life style of this species associated with the local seasonal upwelling regimes (Fiúza *et al.*, 1982; Relvas & Barton, 2002; Relvas *et al.*, 2007) and the increase in sea-surface temperatures in the area where it was collected (Lemos & Pires, 2004) may explain its presence in an area where it has never been registered in the past. This new occurrence indicates a possible expansion in this species' geographical distribution and emphasises a need to gather further knowledge on its biology and behaviour, especially considering its conservation status.

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