

Cetaceans' occurrence off the west central Portugal coast: a compilation of data from whaling, observations of opportunity and boat-based surveys

Cristina Brito^{1,2}, Nina Vieira¹, Erica Sá¹ & Inês Carvalho^{3,4}

¹ Escola de Mar, Lisboa, Portugal.

² CHAM, Faculdade de Ciências Sociais e Humanas, Lisboa, Portugal.

³ Faculdade de Ciências do Mar e Ambiente, Universidade do Algarve, Faro, Portugal.

⁴ Sackler Institute for Comparative Genomics, American Museum of Natural History, New York, USA.

Abstract

Throughout the years some researchers have dedicated their efforts to the study of cetaceans' occurrence off Mainland Portugal. However, it is still missing a systemic scientific methodology for studying the presence of coastal dolphins and whales. This work intends to be a first approach on the occurrence of cetaceans off the west central coast of Portugal. Our objective was to contribute towards the compilation of relevant "forgotten science" such as whaling data and observations of opportunity, together with two years of boat-based surveys. We found 1313 occurrences of great whales captured off Setúbal and Sesimbra (1925-1927 and 1944-1951) and a total of 45 cetaceans in non-directed captures between 1976 and 1978. We accounted 45 dolphins and whales in sea-sightings as a result of observations of opportunity, from 2002 to 2008. In 2007 and 2008 a total of 63 boat-based visual surveys were conducted from three different geographic locations, Nazaré, Peniche and Sesimbra, and as a result 45 independent sightings of cetaceans were recorded. The most frequent small dolphin off the Portuguese mainland coast is the common dolphin (*Delphinus delphis*) as shown by the three distinct approaches used in this study. Regarding whales the most common species is the fin whale (*Balaenoptera physalus*) as shown by whaling records. Overall, the small delphinid community along the central coast of Portugal is similar to the one that can be found along the Iberia shore. [JMATE. 2009;2(1):10-13]

Keywords: Cetaceans, Sightings, Whaling, Portugal

Introduction

Mainland Portugal has a coastline of about 832 km with several important oceanographic and topographic features and a cetacean biodiversity which has never been the object of a continuous and long term study. Throughout the years now some researchers have dedicated efforts to study cetaceans' occurrence. However, only sparse information on cetaceans off the Portuguese continental shores has been published since the 19th century (3, 17, 18).

Oral historical sources indicate that common dolphins (*Delphinus delphis*), locally known as *toninhas*, existed and were captured in large amount off Mainland Portugal during late 19th and 20th centuries. Currently they are reported by fishermen, ecotourism operators and tourists. Their existence is also confirmed by results of some oceanographic campaigns that included cetaceans' observations (12) as well as from stranding data (13, 14, 15). Other species are also commonly referred such as harbour porpoises (*Phocoena phocoena*), bottlenose dolphins (*Tursiops truncatus*) and striped dolphins

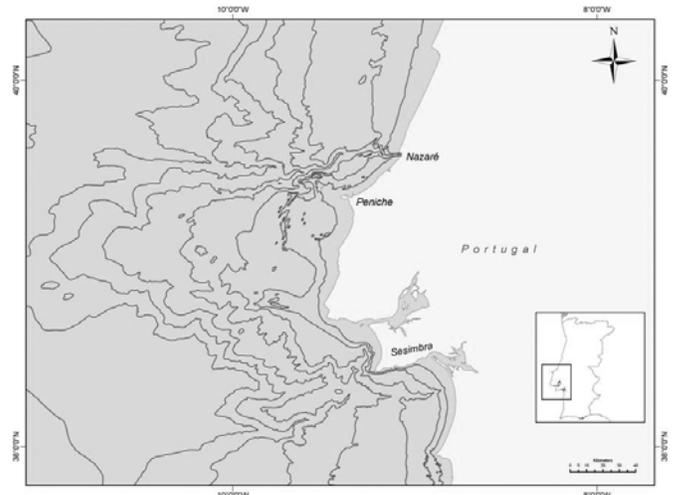


Figure 1 – Localization of Mainland Portugal indicating the three submarine canyons through bathymetric lines and the starting points of boat based surveys.

(*Stenella coeruleoalba*), besides the common dolphins (12, 11, 21, 22). In the Sado estuary lives the only resident population of bottlenose dolphins in Portugal continuously studied for several decades (9, 19, 7, 8). Nevertheless, a systematic scientific methodology is still missing for studying the presence of coastal and oceanic dolphins and whales.

This work intends to be a preliminary approach on the occurrence of cetaceans off the west central coast of Portugal. Our objective was to contribute towards the compilation of relevant "forgotten science", namely 20th century whaling and dolphin capture data and opportunistic observers' reports on whales and dolphins, in order to reduce the lack of knowledge in central mainland Portugal. This information together with boat-based surveys for obtaining new biological data is a starting point for a new methodological approach.

Methods

The current study includes three different approaches: (a) whaling data; (b) observations of opportunity and (c) boat-based surveys. Whaling data obtained from the secretariat of the International Whaling Commission was compared with Portuguese statistical books (1, 2) and a whaling data sheet was produced. This information refers globally to mainland Portugal, but the factories were installed in Tróia Peninsula and whaling occurred only off Setúbal and Sesimbra. Unpublished information and grey literature data are also included, particularly the work by Teixeira (17, 18) referring to the capture of small dolphins along the Portuguese shore. Most

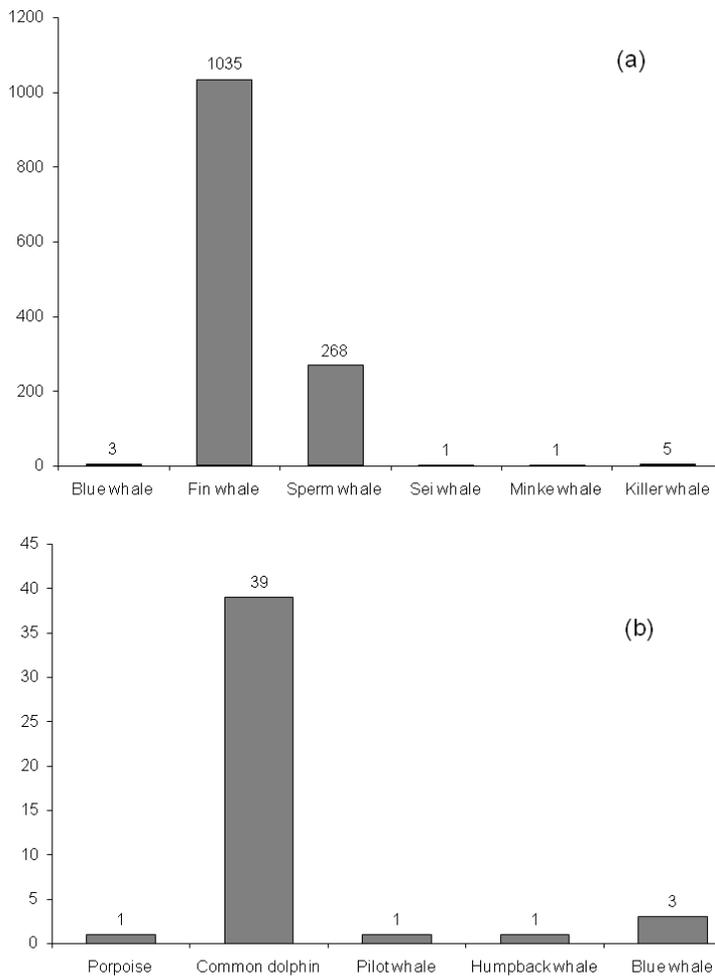


Figure 2 – Number of captured cetaceans (a) between 1925-1927 and 1944-1951, and (b) between 1976 and 1978.

of his information relates to captures off Sesimbra even though a number of other fishing villages are included, such as Póvoa de Varzim in the northwest coast. A search for “observations of opportunity” was conducted based on information given by nature photographers, scuba divers and biologists. We used only positive identifications from photos and/or 100% secure personal observations together with respective approximate geographic location. Most sightings occurred in the west central coast, our study area, even though there is one observation off Póvoa de Varzim.

During 2007 and 2008, 63 boat-based visual surveys were conducted with an effort of 8226 minutes at sea from three different geographic locations: Nazaré, Peniche and Sesimbra (Fig. 1). These three locations were considered as a result of the presence of important topographic/bathymetric features. In Nazaré there is a submarine valley known as Nazaré canyon that is the largest canyon in Europe and one of the largest in the world, 230 km length, extending from depths of 5000m to the coast (20). To the south there are two more submarine canyons near to Lisboa and Setúbal and two major estuaries, Tejo (Lisboa) and Sado (Setúbal). Our study area is under the influence of the Nazaré canyon (surveys off Nazaré and Peniche) and the Lisboa and Setúbal canyons (surveys off Sesimbra, in between the last areas).

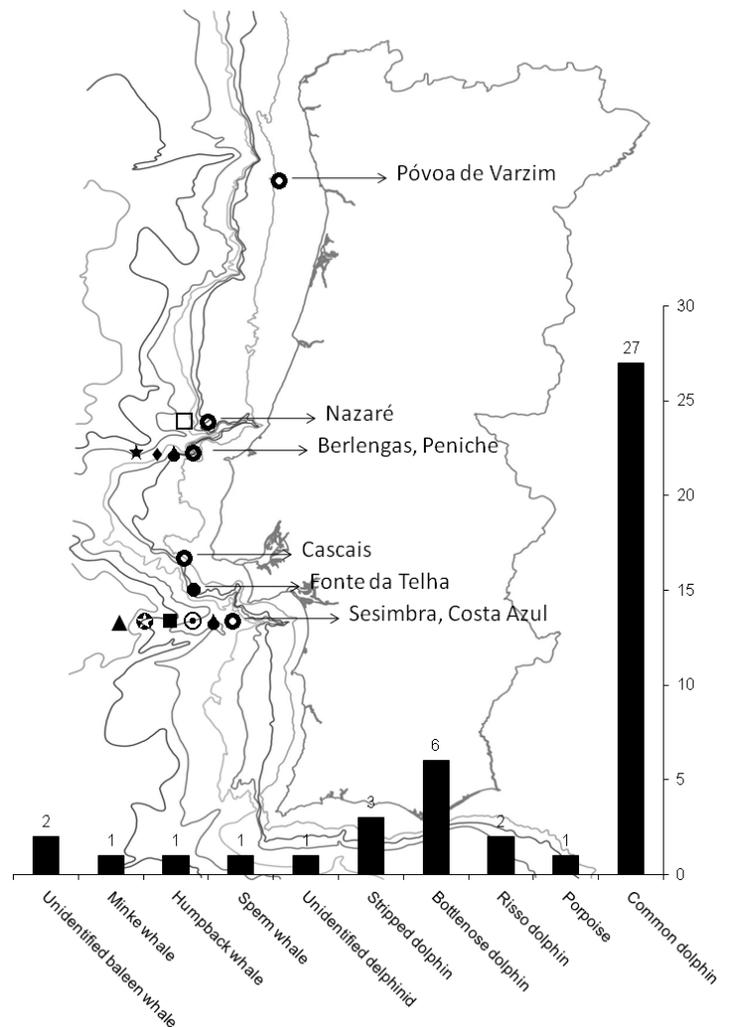


Figure 3 – Map showing the distribution of observations of opportunity along mainland Portugal (● - common dolphin; S - bottlenose dolphin; ▣ - striped dolphin; n - Risso dolphin; " - harbour porpoise; ⊕ - humpback whale; ▲ - minke whale; ◆ - sperm whale; l - unidentified delphinid; ★ - unidentified baleen whale) and respective counts of observed cetaceans.

A survey route was selected without pre-determined fixed waypoints. Surveys normally ran perpendicular to the coastline to a maximum of 10 nautical miles off the coast with some variations depending upon prevailing weather and encounter with cetaceans. All surveys were conducted under a Beaufort sea-state inferior to 4. During the surveys a minimum of one observer was stationed at each side of the boat scanning an area right ahead the vessel to approximately 135° from its bow. In each sighting the following were recorded: specie identification, GPS positions, accounting of individuals, calves presence, behavioural activity and photos for individual identification. Whenever possible, depth records and sea surface temperatures were collected for future analysis. Maps were produced with ArcGis 9.1 and images and shapefiles were downloaded from the Portuguese Hydrographic Institute website.

Results

Whaling data

We found 1313 occurrences of cetaceans (including several baleen whales and two species of odontocetes - sperm whales,

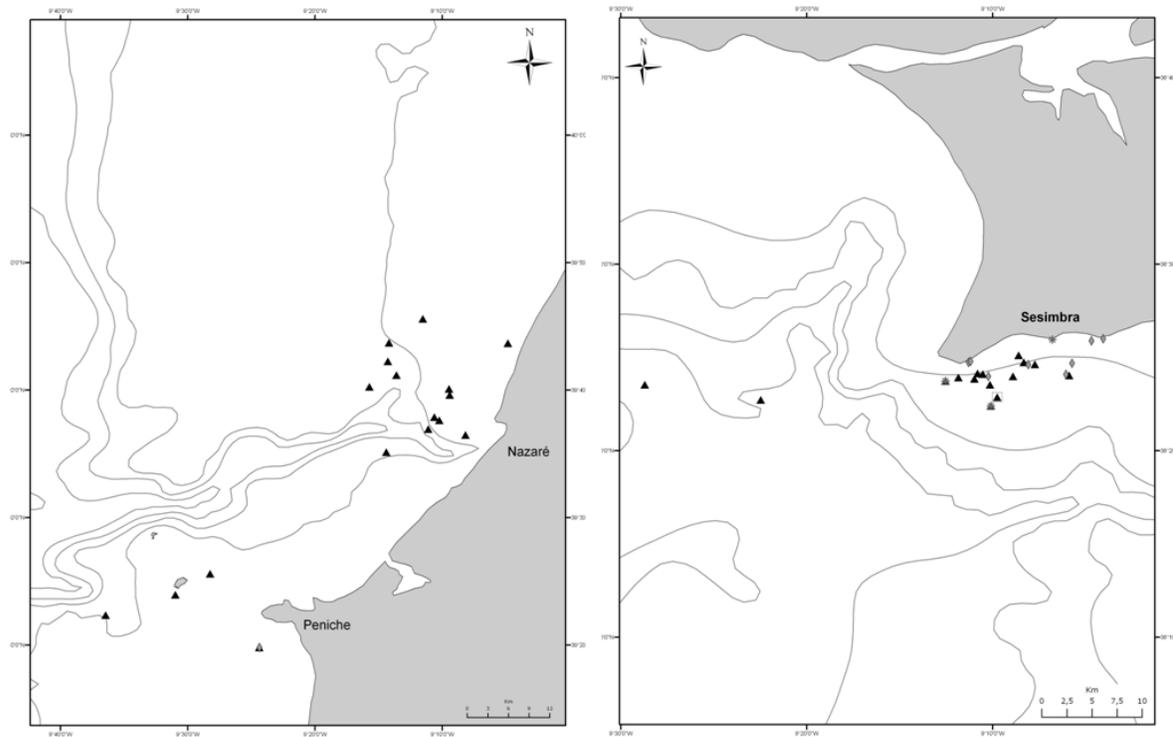


Figure 4 – Map showing GPS positions of sighted cetaceans during 2007 and 2008, showing Nazaré and Peniche sites on the left and Sesimbra on the right: ▲ - common dolphin; ◆ - bottlenose dolphin; * - striped dolphin; | - minke whale.

Physeter macrocephalus and orcas, *Orcinus orca*) in whaling captures off Setúbal and Sesimbra, in two distinct periods: 1925-1927 and 1944-1951. Fin whales, *Balaenoptera physalus*, were the most common, with 80% of the total occurrences, followed by sperm whales with 20%; other species were only caught sporadically (Fig. 2a).

Between 1976 and 1978, research was conducted for captured cetaceans in fish markets along the Portuguese shore (Póvoa de Varzim, Peniche, Cabo da Roca, Cascais, Sesimbra, Setúbal, Anção, S. Vicente), resulting in 45 cetaceans. Most captures were small cetaceans (87% common dolphins) although 4 baleen whales were also registered (Fig. 2b).

Observations of opportunity

Based on sea sightings from 2002 to 2008, we counted 45 dolphins and whales (Fig. 3) as a result of observations of opportunity. The more frequent sighted cetacean was the common dolphin with 60% of the total occurrences, followed by bottlenose dolphins with 13.3% and striped dolphins with 6.7%. Observations of opportunity were distributed along the coastline as shown in Fig. 3.

Boat-based surveys

We recorded 45 independent cetaceans' sightings, 71.1% common dolphins, 20% bottlenose dolphins and 6.7% striped dolphins in the three geographic locations (Fig. 4). We only had one sighting of a baleen whale (minke whale, *Balaenoptera acutorostrata*) off Sesimbra.

Discussion

Our results indicate that the sea off the Portuguese mainland coast is rich in cetacean species with 13 cetacean species: 8

odontocetes and 5 mysticetes. The most frequently observed small cetacean is the common dolphin, as showed by the three distinct approaches in this work. Regarding whales, the most common species is the fin whale, as shown by whaling records.

In 1925-1927 and 1944-1951, a land-based industrial whaling activity occurred continuously and in both time periods. It eventually ceased afterwards due to the reduced number of available whales (4). Cetacean captures registered between 1976 and 1978 were part of a local non industrial fishery. Cetaceans were not the main target, rather opportunistic catches or even by-catches of other fisheries. Teixeira (18) highlights that delphinids were not protected by law at the time and were caught with hand harpoons or accidentally drowned in fish nets, and sometimes sold at major fish markets like Sesimbra, Peniche and Póvoa de Varzim. In the Portuguese mainland a legislation protecting cetaceans was enacted in 1981, and since then only sporadic captures or by-catches have occurred.

From boat-based surveys near to shore mainly small cetaceans were sighted. Occurrence of some dolphin species seems to take place along main ocean topographic features, like the Portuguese submarine canyons. The most sighted species was the common dolphin as mentioned above (21, 22) contrary to what is usually sighted in the Galician coast (Spain) where bottlenose dolphins are the most frequently seen in coastal shallower waters (10). Overall, the small delphinid community (common, bottlenose and striped dolphins) along the central coast of Portugal is similar to what can be found in the Bay of Biscay, Spain (6).

The Nazaré canyon drives to the surface water rich in nutrients and plankton, allowing high biodiversity and presence of species with commercial value or top predators such as

cetaceans, as a natural consequence. The same applies to the area of Sesimbra where sightings of individuals may be due to the existence of Lisboa and Setúbal canyons as well as the influence of major estuaries. The Tejo estuary flow is very important for transportation of nitrogen and phosphorus loads to the adjacent coastal area causing significant impact on the biological productivity, namely on phytoplankton, zooplankton and benthos (5). We consider that great depths near shore are suitable habitats for more pelagic species of dolphins such as common and striped dolphins. In the Bay of Biscay shelf break, canyon areas and river plumes are areas of primary interest for dolphins (6). Bottlenose dolphins occurred very close to shore while common dolphins were mainly sighted along the 100m bathymetry, and this spatial segregation may be attributed to the spatial distribution of their preferred prey (6).

Cetacean distribution and abundance along Atlantic shores of Iberia is still poorly described and limited to a few sources (6, 16). Future studies using linear transects and continuous long-term approaches will give further insight to small cetaceans' occurrence along Mainland Portugal and its relation with different oceanographic features, particularly depths and distances to shore. On-going efforts in coming years are absolutely necessary to obtain knowledge for the conservation of cetaceans. A comparison between different areas will also be important, considering that the two marine reserves in Mainland Portugal, Marine Reserve Prof. Luiz Saldanha (Sesimbra) and Natural Reserve of Berlengas (Peniche) are both included in our study area.

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