

STRANDINGS OF BEAKED WHALES IN THE ITALIAN WATERS: A PERSPECTIVE OF 25 YEARS

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Summary

The Authors present data relative to the strandings of beaked whales along the Italian coastline from 1986 to 2011 in relation to the biology of the species and what is known from the post-mortem of a few individuals.

Introduction

In the recent years, strandings of beaked whales have drawn considerable attention in the scientific community because of the possible relationships with sonar-derived pathologies involving the formation of gas and fat bubbles in the bodily cavities. The impact of military activities on the onset of this phenomenon has been considered and mitigation measures invoked (Fernández *et al.*, 2005; Frantzis, 1998; Jepson *et al.*, 2003). As a contribute to the debate, we searched the Italian national database from 1986 to present and considered the records of strandings relative to Cuvier's beaked whales (*Ziphius cavirostris*) and other members of the same Family. The data have been analyzed and discussed in reference to habitat, and – whenever available – postmortem evaluation.

Materials & Methods

The Italian stranding network is presently under profound re-structuring under the auspices of the Italian Ministry of the Environment. The Authors are involved in this process and have access to present and past data, collected since 1986 when the stranding network was firstly established as the result of the free interaction of individuals and organizations active along the coastline. An open *on-line* database with all the data is available at <http://mammiferimarini.unipv.it>. The data that we present here cover 25 years (1986 to 2010 with preliminary data on 2011) of strandings and can be considered also an update for the Italian coasts to a recent paper about Mediterranean beaked whales strandings (Podestà *et al.*, 2006).

Results

Ziphius cavirostris - strandings

The number of strandings of *Ziphius cavirostris* over the years is reported in Figure 1, while Figure 2 indicates their geographic distribution. Table 1 shows the regional division of the events and Figure 3 the annual regional number of strandings.

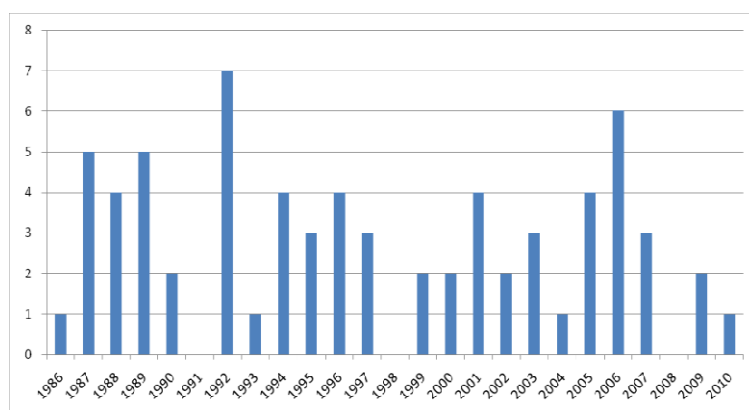
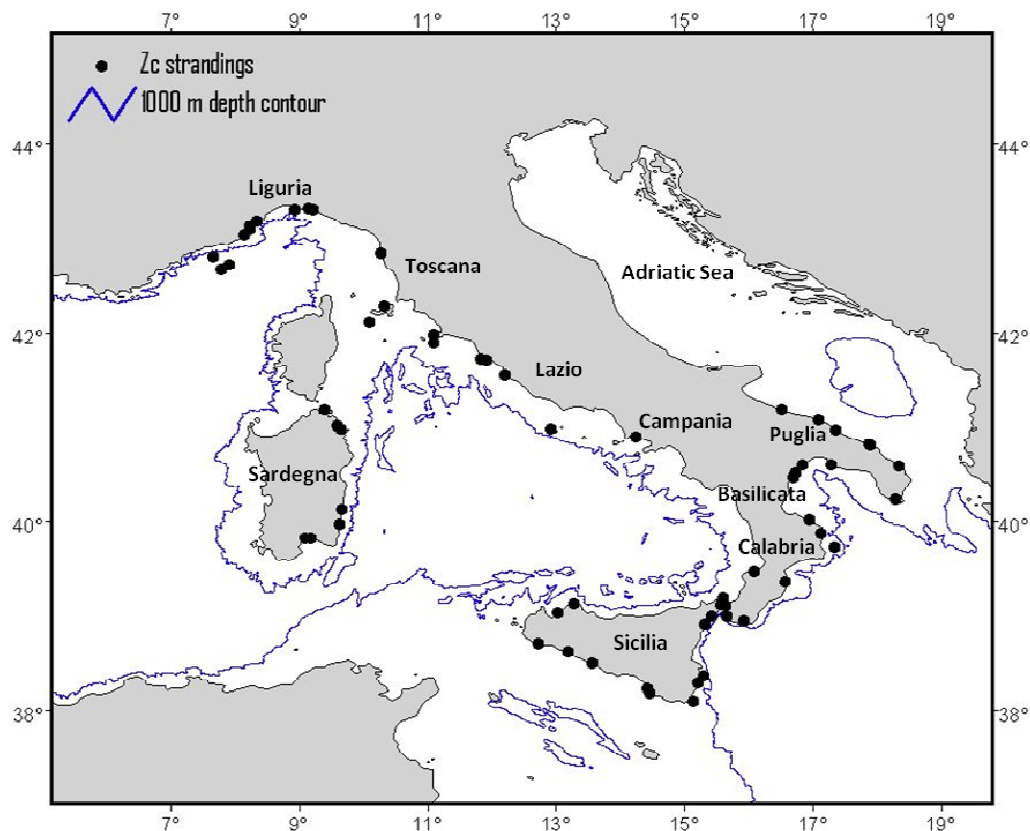


Fig. 1. Annual distribution of Cuvier's beaked whales strandings

Fig. 2 . Geographical distribution of strandings



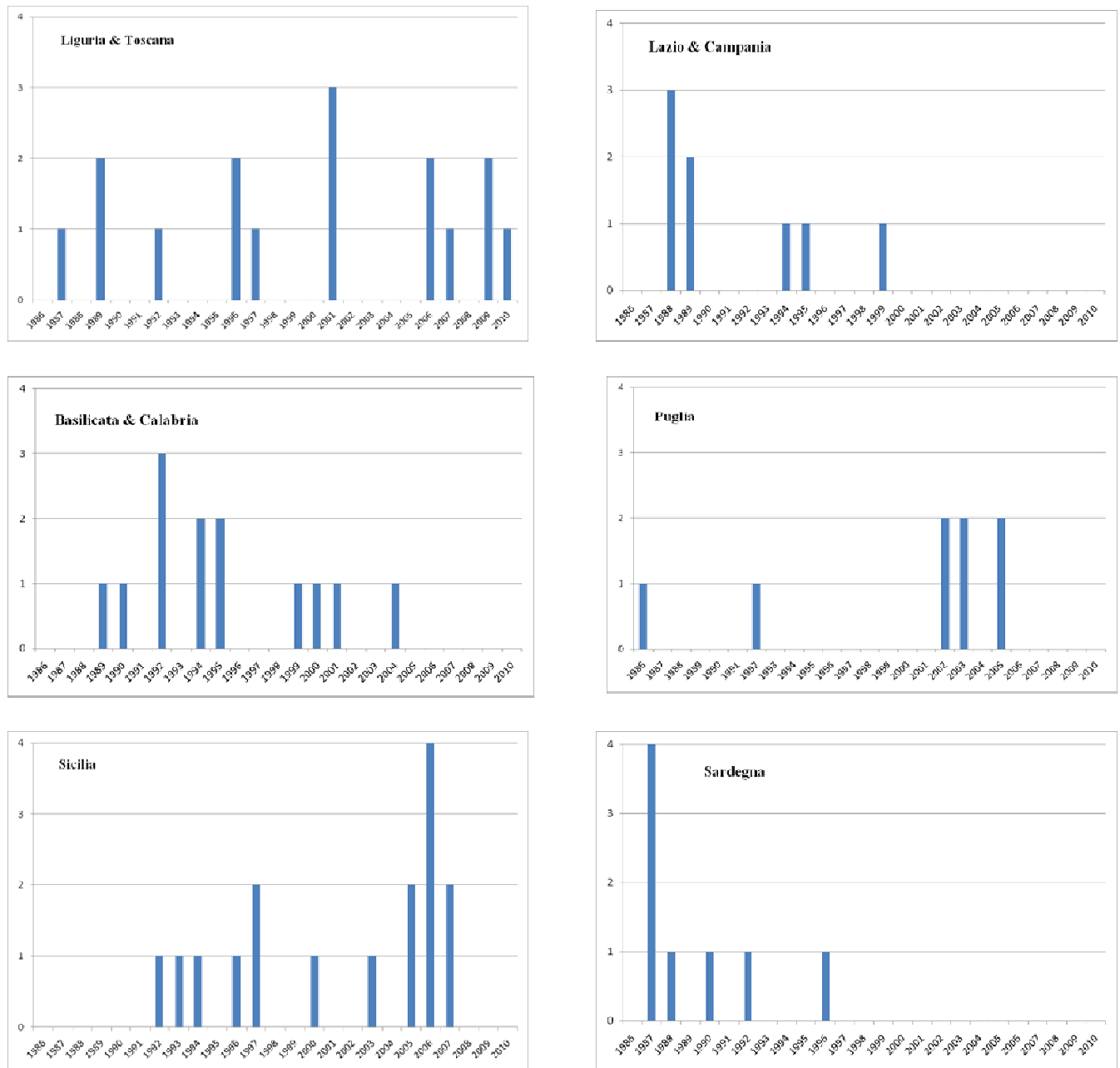
A total of 69 specimens (31 females, 17 males and 21 undetermined) were reported. The geographical distribution indicates correspondence with the parts of the Italian Mediterranean where waters are deeper and squids likely more abundant.

The data here reported are all but two referred to single stranding events. One "atypical" mass stranding was reported in January 1992, when three adult specimen (1 female, 2 males) were found already dead on the Calabrian coasts (S. Leo, Cariati, Cosenza). Unfortunately the animals were destroyed without a detailed necropsy. A second case occurred in 2006, when four animals stranded alive in Messina, Sicily. Three of them were refloated, while one was killed by unknown. This latter individual was examined and the results are reported here below. In addition to these events, in 2011, February, two Cuvier's beaked whales stranded alive on the Sicilian coastline, close to Syracuse. They were immediately refloated by the local Coast Guard and towed to open waters, but on the following day one of the two animals was found again in shallow waters. The specimen, a female approx 5 meters long, was apparently breathing normally but with occasional spasmodic movements and constantly swimming toward the shore. After few hours a local rescue team refloated the animal to the open sea and it was no more sighted.

Tab. 1. Regional distribution of strandings

Region	N. of strandings
Liguria & Toscana	16
Lazio & Campania	8
Calabria & Basilicata	13
Sicilia	16
Puglia	8
Sardegna	8

Fig. 3. Annual regional number of strandings



Ziphius cavirostris – postmortems and pathological findings

Detailed postmortem examinations were performed only when the experienced personnel was available and conditions of the stranded carcasses allowed them. In particular, only in two cases (case n.1: 4,8 m long adult female stranded in 2006 in Messina, Sicily, Ionian Sea; case n.2: 4,47 m long adult female stranded close to Genova, Ligurian Sea) a partial sampling was performed and tissue sampled were frozen for ancillary analyses. Case n. 1 was part of a mass event described before. A gross inspection of internal organs confirmed a moderate parasitic infestation of urinary tract due to *Crassicauda* sp. No gas emboli were detected during brain examinations but subsequent analysis on pulmonary tissue using the OsO_4 “en-bloc” post-fixation technique, revealed fat emboli in alveolar vessels suggesting a lipidic circulation as observed in “gas and fat embolic syndrome”, the pathological condition possibly associated to sonar emissions. Case 2 was found alive in the high

sea and subsequently stranded dead. Gross evaluation was not performed by expert veterinary pathologist and only few samples were evaluated microscopically, confirming severe splenic congestion and diffuse, hepatic lipidosis, the last suggesting a possible prolonged starvation.

Examination of the skull of another stranded specimen revealed pronounced deformation of the bones of the skull, but no apparent sign of previous fracture. A malformation was considered.

Other beaked whales

The only other beaked whale species that stranded along the Italian coastline was the Gervais' beaked whale (*Mesoplodon europaeus*). A single specimen stranded in 2001 along the coast of Tuscany, in the Tyrrhenian basin. Initially mistaken for a specimen of Cuvier's beaked whale, its identity was later established by comparative analyses of the skull and skeleton. (Podestà *et al.*, 2005).

It is possible that a precise identification of the species based on bodily remains (whenever they are available and recovered for analyses) could increase the number of *Mesoplodon* spp. in the area.

Availability of tissues

Tissues sampled from 6 beaked whales (5 *Ziphius cavirostris* and 1 *Mesoplodon europaeus*) were collected on site and are presently stored at the Mediterranean Marine Mammal Tissue Bank of the University of Padova (<http://www.mammiferimarini.sperivet.unipd.it/eng/index.htm>). Formalin-fixed or frozen samples are available to the scientific community upon request.

Discussion

Analyses of the data indicate that the number of Cuvier's beaked whales recovered is fairly decreasing in the last years. However some specific factors may interfere and partially alter the scenario. The state of the stranding network deteriorated significantly after 2000, and some Southern regions or parts of the coastline remained at least partially without responsible surveillance. Strandings and by-catches may have occurred and go unnoticed per several *local* reasons too complicated to be discussed here. Our opinion is that the phenomenon may have been more relevant for middle to small-sized cetaceans than for the large whales, more likely to attract the attention of the public opinion. Unfortunately the same parts of the coast where the surveillance of the network was curtailed correspond to deeper waters where strandings/by-catches are more likely to occur, at least based on prevalence of the past.

Data are insufficient to draw any definite conclusion, however some observations could be of interest. We emphasize here that all strandings are more common in the coastlines facing deep waters. Analyses of the causes of death, when possible, indicate that at least in one specimens of *Ziphius cavirostris* there were indications of fat embolism. The records of commercial or military sonar activities in the close vicinity of the stranding events are incomplete, although heavy naval traffic (including several submarines) in the area was signaled concurrent to the recent stranding of two Cuvier's beaked whales in Sicily (2011).

Comparative analyses of data for the different regions show a similar tendency to fluctuate and to a general reduction of the number of strandings/by-catches, except in Sicily, Liguria, Toscana and Puglia. The habitat in the latter area (Southern Adriatic Sea) should be considered as a potentially relevant habitat of the Cuvier's beaked whale, as it was also evidenced by Holcer *et al.* (2007) reporting some strandings of the species along the Croatian coasts. The influence of viral or other infective agents on the mortality rates remains unknown.

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