

THE SUBMARINE CANYON OF CUMA (SOUTHERN TYRRHENIAN SEA, ITALY), A CETACEAN KEY AREA TO PROTECT

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Abstract:

The submarine canyon of Cuma is an important habitat very close to the northern part of Ischia island where a particular pelagic assemblage can be found. The constant presence of whales and dolphins, pelagic fishes and marine birds is related to the geological and ecological characteristics of the area. Our research try to define the role played by the canyons in distribution and abundance of trophic resources of cetaceans and to include this area (at least the more coastal part of it) into the future perimeter of the marine protected area proposed by Italian Ministry of Environment called "Regno di Nettuno" (islands of Ischia, Procida and Vivara). The shelf area of the Ischia island in front of the canyon is characterised by *Posidonia oceanica* (sea grass) beds, rocky banks and rocky cliff with coralligenous formations. During cetaceans surveys in the area it was possible to ascertain the presence of some pelagic fishes as *Mobula mobular*, *Thunnus* sp., *Xiphias gladius* and sea birds as *Calonectris diomedea*, *Puffinus puffinus* and *Larus ridibundus*. The analysis of fin whales' faecal material has revealed the presence of crustacean exoskeleton belonging to the euphasiacean *Meganyctiphanes norvegica*, a key species in the pelagic trophic web. Every summer we can observe in the area large groups of common (*Delphinus delphis*), striped (*Stenella coeruleoalba*), bottlenose (*Tursiops truncatus*) and Risso's dolphins (*Grampus griseus*). Feeding and mating behaviours were observed in all species. Newborn were sighted in July and August. The area is also used as feeding ground by fin whales (*Balaenoptera physalus*), the commonest species in the canyon. The strong impact of the boats on cetaceans is becoming everyday routine especially in summertime: distress and disorientation, collisions and deaths by a propeller strike. Timely management measures to protect cetaceans in this key area are clearly needed.

INTRODUCTION: The waters off the island of Ischia (Gulf of Naples) are long-term monitored for a study on cetaceans since 1991 (Mussi *et al.*, 1997, 1998). From 1997 the research focused in the area on the north coast of the island, corresponding to the submarine canyon of Cuma, a particular habitat characterised by a remarkable biodiversity and concentration of pelagic fauna (Mussi *et al.*, 1999).

The aim of this work is to examine closely the distribution of the different species of cetaceans with particular attention to the area corresponding to the submarine canyon of Cuma, in order to include this area (at least the more coastal part of it) into the future perimeter of the marine protected area proposed by Italian Ministry of Environment, named "Regno di Nettuno" (islands of Ischia, Procida and Vivara).

Every summer we could observe in the area large groups of common (*Delphinus delphis*), striped (*Stenella coeruleoalba*), bottlenose (*Tursiops truncatus*) and Risso's dolphins (*Grampus griseus*). Feeding and mating behaviours were observed for all species. Newborns were sighted in July and August. The area is also used as feeding ground by fin whales (*Balaenoptera physalus*), the most common species in the canyon.

During cetacean surveys in the area the presence also of some pelagic fishes as *Mobula mobular*, *Thunnus* sp., *Xiphias gladius* and sea birds as *Calonectris diomedea*, *Puffinus puffinus* and *Larus ridibundus*, was noted. The analysis of fin whales' faecal material revealed the presence of crustacean exoskeletons belonging to the euphasiacean *Meganyctiphanes norvegica*, a key species in the pelagic trophic web.

METHODS: In the periods 09/07/97-31/08/97; 03/07/98-19/08/98; 20/03/99-10/05/99 the observations occurred on board of "Barbarian", a 15 m sail boat equipped for underwater listening with towed hydrophones. From 20/06/00 to 30/08/00, following the wreck of the lab boat, the

studies were continued on board of “Jean Gab”, a 17.7 m long cutter equipped, in addition to the previous system, with an underwater video camera fixed at the bow of the boat. Audio and video signals were synchronically recorded with a BetaCam support.

The routes were chosen to optimise the sights and were determined daily on the basis of previous sightings; particular attention was paid to follow the bottom topography and depth profiles. No trip was performed in conditions greater than sea state 5 (Beaufort). Shots were made using automatic cameras with objectives 70]200 mm/f:1-2,8 zoom, films Kodak ektacrome 200 Asa, with exposition time inferior to 1/250. Along with weather conditions (sea and wind), also distance from the coast and depth were recorded.

RESULTS: 211 outgoing have been carried out, 2970 nautical miles have been covered, for a total amount of 197.6 hours of direct observation, and 166 cetacean sightings. The most common species was fin whale with an amount of 66 sightings. In the studied area cetaceans reveal a coastal habit, the average depth of the sighting was 197m (± 128.2 SD, range 2.5-700), and the average distance from the nearest coast was 4.1 Km (± 2.9 SD; range 0.05-14.4). Sightings were located on the bank of Forio, or mostly on the bathymetric lines of 200 and 300m off the north coast of Ischia. This area, corresponding to the promontory of the island defined by Punta Vico and Punta Cornacchia, represents the most coastal part of the canyon of Cuma where a great concentration of cetaceans takes place.

The canyon of Cuma is a large deep submarine valley, which, starting from the areas close to Cuma and Ischia island reaches a maximum depth of 800 m between the islands of Ischia and Ventotene. This canyon represents a great sedimentary basin for materials which are carried along the coast by Volturno and Garigliano rivers (Gulf of Gaeta); the canyon increases the upwelling speed and acts also as conveying duct to the waters of the deep basin (De Pippo *et al.*, 2000). The shelf area of the Ischia island in front of the canyon is characterised by *Posidonia oceanica* (sea grass) beds, rocky banks and rocky cliff with coralligenous formations.

All species of Odontocetes used the area of Cuma either as breeding or as feeding ground. In 27% of the sightings mating and socialising were registered. The abundance of food resources probably favour the wean of calves without wasting energies, in fact, in Cuma we had a high number of newborns in dolphins' groups.

The peaks of cetaceans' births corresponds with the period of maximum tourists crowding along the coast of Ischia, newborns have today to face a new threat constituted by the screws of the speed pleasure crafts.

It is to be pointed out the presence of the rare common dolphin with 38 sightings. The Mediterranean short beaked common dolphin and its habitat are today at risk because of the probable joint effect of high levels of pollution, accidental or deliberate captures in fishing gears, decrease in resources because of over fishing, intense sea traffic and general degradation of the habitat. In Cuma area, it was possible to observe periodically a great group of about 80 individuals of common dolphin. Photo-identified individuals, re-detected from 1997 to 2000, suggest that it is a unique group which resorts to the utilisation of the area in the most favourable period.

CONCLUSIONS: The submarine canyon of Cuma is a very important habitat close to the northern coast of the Ischia island where a particular pelagic assemblage can be found. The constant presence of whales and dolphins, pelagic fishes and marine birds is related to the geological and ecological characteristics of the area. The strong impact of the boats on cetaceans is becoming everyday routine especially in summertime: distress and disorientation, collisions and deaths by a propeller strike. Timely management measures to protect cetaceans in this key area are clearly needed, regardless of its inclusion in the area proposed for the Marine Park.

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HUMAN-CETACEAN INTERACTIONS



Fig.1: The impact of fin whales with the shipping companies is documented with difficulty.



Fig. 2: Traces of collisions remain on the bodies of the cetaceans under form of scars or cuts on the back.



Fig. 3: A 80cm long striped dolphin with the skull wide opened by a propeller strike.



Fig. 4: Risso's dolphins harassed by pleasure boaters: a dramatic human-dolphin interaction with a high stranding risk.