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## **A TWINNING BETWEEN VENTOTENE AND ISCHIA FOR THE PROTECTION OF THE CANYON OF CUMA**

### **UN GEMELLAGGIO TRA VENTOTENE E ISCHIA PER LA PROTEZIONE DEL CANYON DI CUMA**

**Abstract** - The International Union for Conservation of Nature recognised the islands of Ischia and Ventotene and the underwater canyon system of Cuma as an Important Marine Mammal Area. The canyon represents a critical habitat for cetaceans, particularly sperm whales, whose Mediterranean subpopulation is classified as "Endangered" in the Red List. In addition, the coastal waters of Ischia and Ventotene are Marine Protected Areas (MPAs): MPA Regno di Nettuno and MPA Isole di Ventotene e S. Stefano. In 2021, the two MPAs established a Twinning to create a joint archive of environmental data. Oceanomare Delphis was responsible for monitoring cetaceans. The campaign occurred during the winter and spring months of 2021 and 2022. During 32 trips (1450 km, 217 hours), there were 21 sightings of sperm whale and 23 of striped dolphins. This collaboration represents a significant step in the shared management and protection of marine resources by different MPAs.

**Keywords:** MPAs, IMMAs, sperm whale, submarine canyons

**Introduction** - The International Union for Conservation of Nature (IUCN) has recognised the islands of Ischia and Ventotene and the entire underwater canyon system of Cuma as an Important Marine Mammal Area named "Waters of Ischia and Ventotene" (IMMA, Marine Mammals Protected Areas Task Force, 2017, <https://www.marinemammalhabitat.org/portfolio-item/waters-ischia-ventotene>). The canyon extends between Ventotene and Ischia, forming a vast valley that plunges to a depth of 850 meters between the islands (De Alteris and Toscano, 2003). The area represents a critical habitat for fin whales, *Balaenoptera physalus* (Linnaeus, 1758), striped dolphins, *Stenella coeruleoalba* (Meyen, 1833), Risso's dolphins, *Grampus griseus* (G. Cuvier, 1812), bottlenose dolphins, *Tursiops truncatus* (Montagu, 1821), common dolphins (*Delphinus delphis* Linnaeus, 1758), and particularly the sperm whale (*Physeter macrocephalus* Linnaeus, 1758), whose Mediterranean subpopulation is classified as "Endangered" in the IUCN Red List (Mussi and Miragliuolo, 2003; Mussi *et al.*, 2014, 2019). In addition, the coastal waters of Ischia and Ventotene are Marine Protected Areas (MPAs): AMP Regno di Nettuno, established in 2007, and AMP Riserva Naturale Statale Isole di Ventotene e S. Stefano, established in 1997 (Fig. 1). Ischia represents the emerged part of a volcanic complex, extending from the island of Procida to the submerged volcanoes west of the island (Bruno *et al.*, 2002). The Islands of Ventotene and Santo Stefano are also volcanic in origin, as they represent the tip of a large stratovolcano (Marani and Gamberi, 2004). North of Ventotene lies a submerged ridge, an elongated 11-km structure oriented NW-SE, rising about 200 m from the surrounding seafloor, composed of four morphological peaks, separated by deep channels, and located 165-400 m deep (Cuffaro *et al.*, 2016). In 2021, the two MPAs established a Twinning to create a shared archive on cetaceans. Whales and dolphins

are marine mammals that play a key ecological role as apex predators in aquatic ecosystems, regulating prey populations and maintaining ecological balance within marine food webs. Their presence can provide insights into the health of marine environments, making them bioindicators for assessing ecosystem changes. They are also umbrella species, which have special conservation importance. Additionally, cetaceans are iconic and charismatic, capturing public and media attention. Therefore, cetacean monitoring is of high general scientific interest and is of fundamental importance to the management activities of the MPAs. Oceanomare Delphis has conducted over 20 years of surveys in the study area mainly during the summer-autumn period, and data for the winter-spring period is limited. To address the existing data gap, the MPAs have engaged Oceanomare Delphis to conduct this census.

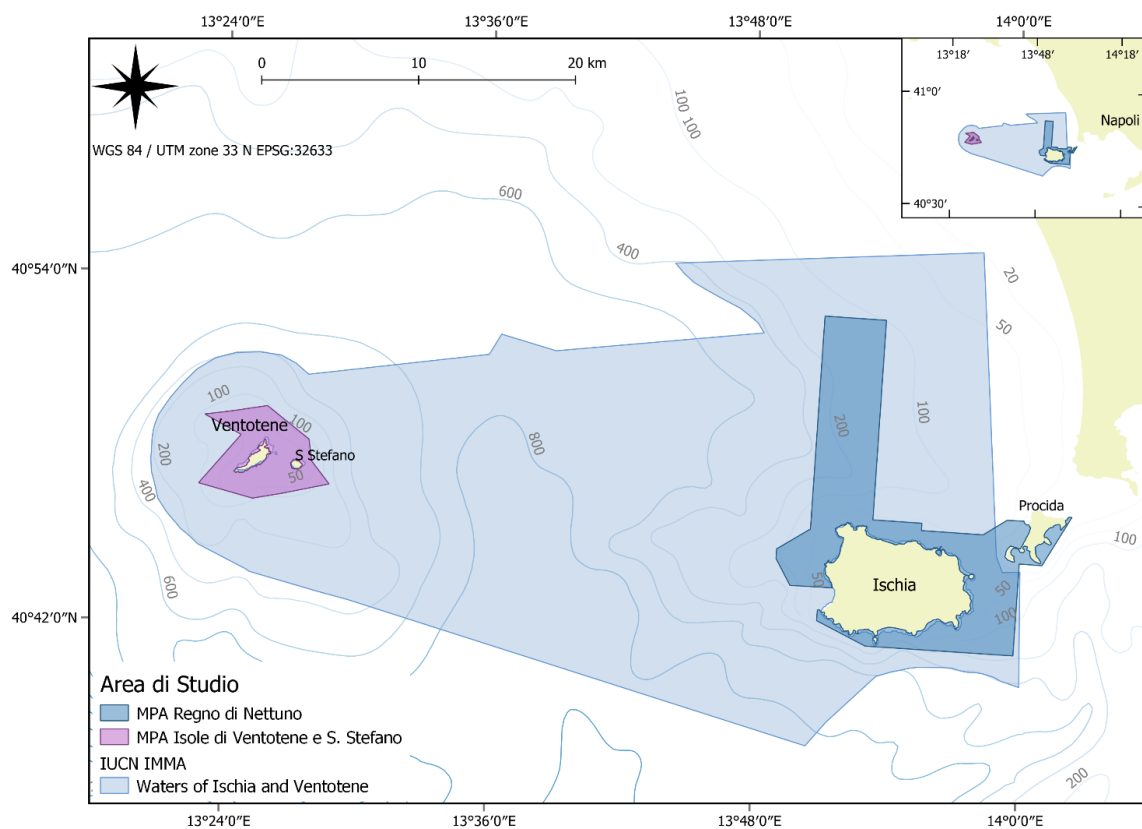


Fig. 1 – The study area includes the Isole of Ventotene and S. Stefano (27.99 km<sup>2</sup>) and Regno di Nettuno (112.56 km<sup>2</sup>) MPAs and the “Water of Ischia and Ventotene” IMMA, (1067 km<sup>2</sup>).

L'area di studio comprende le AMP Isole di Ventotene e S. Stefano (27,99 km<sup>2</sup>) e Regno di Nettuno (112,56 km<sup>2</sup>) e l'IMMA “Acque di Ischia e Ventotene” (1067 km<sup>2</sup>).

**Materials and methods** - The surveys were carried out during the winter and spring months of 2021 (from January to April) and 2022 (from February to May) aboard a 17.7 m sailing boat only in sea states of 3 (Beaufort) or less with good light conditions, at a vessel speed comprised between 2 and 6 knots. Survey tracks were laid out to provide a roughly even coverage of the study area, but might be adapted to prevailing weather conditions and vessel's limitations. Sighting data were collected by at least three experienced observers scanning with the naked eye and with 8-10 x binoculars from a 3 m height of eye. A detailed trip log of the route covered was recorded with GPS

positions taken every 3 minutes. Sperm whale were acoustically tracked through a towed stereo hydrophone (600 Hz-100 kHz) built in CIBRA laboratories (University of Pavia). Analogic acoustic signals were digitized with a 192-kHz A/D acquisition card and displayed on the workstation via PAMGUARD modules. Differences in the time of arrival of whale clicks on the two hydrophones were used to determine the bearings to the whales by Click Detector module. A digital camera (Canon Eos 80D) equipped with a high-quality, image-stabilized telephoto zoom lens (100–400mm F4.5–5.6) was used to take photo-identification images useful for identifying sperm whales based on their specific long-term natural marks. Images were stored in JPEG format (12-bit, 2.4 MB, 3072x2048 pixels). When possible, individuals were photographed on the right and the left side of the dorsal fin area, the trailing edge, and both the dorsal/ventral side of the flukes. Patches, nicks, notches, scars, or other irregularities were used to identify individuals. No photo-identification efforts were made on striped dolphins.

**Results** - The campaign occurred during the winter and spring months of 2021 and 2022. A total of 1450 kilometres were covered in the study area during 32 surveys, taking approximately 217 hours of research effort. Forty-six cetacean sightings were made, 21 encounters with sperm whales, 23 with striped dolphins (*Stenella coeruleoalba*, Meyen 1833), and 2 with unidentified delphinids (Fig. 2).

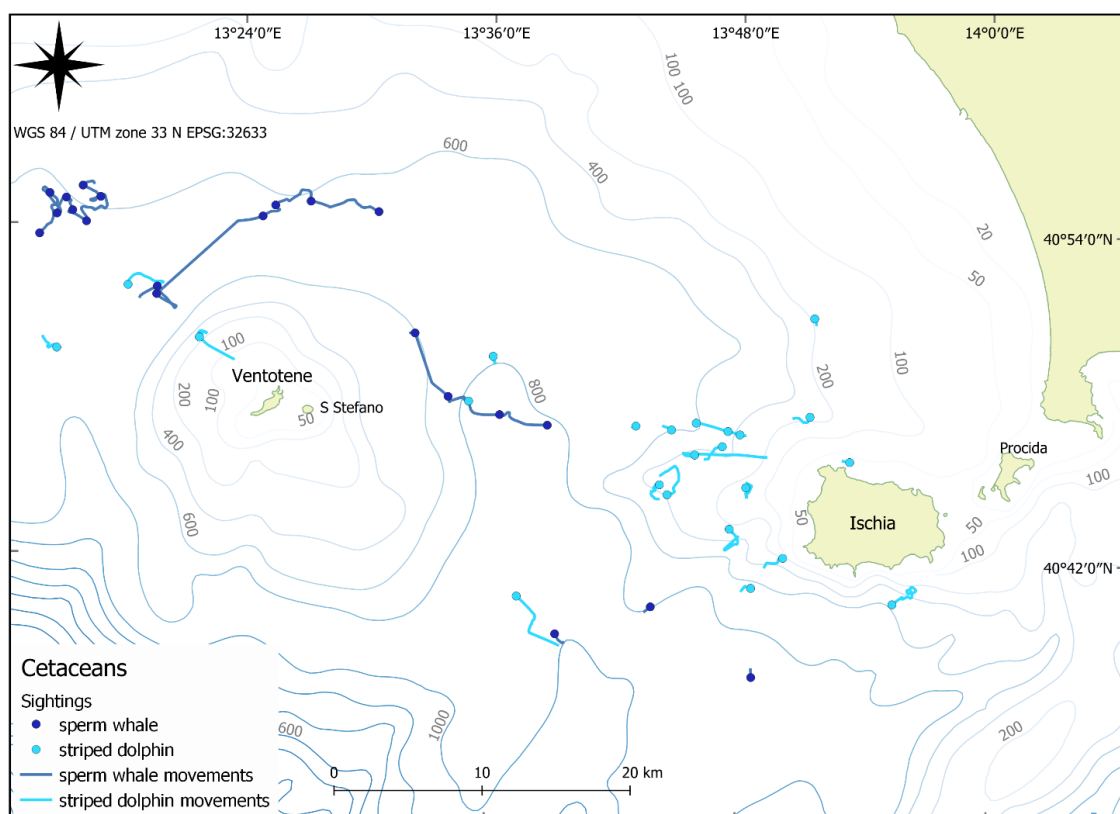


Fig. 2 – Cetaceans' sightings in the study area.  
*Avvistamenti di cetacei nell'area di studio.*

The animals were followed for a total of 10 hours, covering 104 km in direct observations. Striped dolphins have been encountered in both coastal and pelagic environments, with a depth range of 43.77-901.95 m (mean 467.81, SD  $\pm$ 224.45); the

mean group size was 16.13, SD  $\pm$ 19.64, range 1-83). Juveniles and calves were detected in 57% of the encountered groups. Sperm whales encounters were located at a depth range of 578.80-968.18 m (mean 664.92, SD  $\pm$ 117.03). Group size varied from 1 to 2 whales. There were 14 encounters with other pelagic fauna related to the species *Caretta caretta* (Linnaeus 1758) (n=9), *Mobula mobular* (Bonaterre 1788) (n=1), *Mola mola* (Linnaeus 1758) (n=1), and *Xiphias gladius* (Linnaeus 1758) (n=3). During monitoring, 4 sperm whale individuals were photo-identified. Among them, photo-identification analyses confirmed the recaptures of PMOD039\_SALVATORE, captured in 2009, and PMOD097\_JORAH, captured in 2019. The third individual was recognised as Atlante, captured in the Ligurian Sea in October 2021 by Menkab. Atlante is an immature juvenile, the victim of a collision that left deep wounds caused by impact with a propeller on the outline of the caudal fin. A fourth sperm whale was identified through details of the caudal fin and right flank. The animal had not previously been captured and was listed in the catalogue.

**Conclusions** - This study confirms the presence of sperm whales in the study area during the winter and spring months. Whales may utilize local feeding resources throughout the year, underlining a habitat-species connection that has implications for conservation efforts. The resighting derived from photo-identification results indicates site fidelity, highlighting the ecological importance of this area over the years. Moreover, this collaboration represents a significant step in the shared management and protection of marine resources by different MPAs.

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