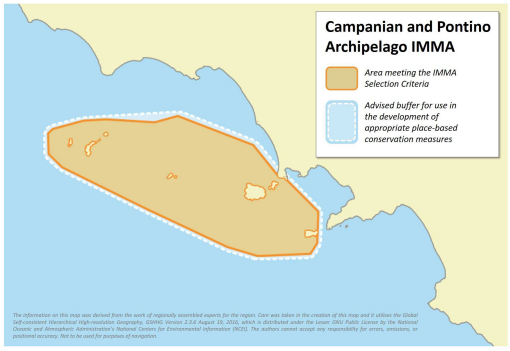
# Campanian and Pontino Archipelagos Important Marine Mammal Area - IMMA




### Area Size

4,948 km$^2$

### Qualifying Species and Criteria

Sperm whale -
*Physeter macrocephalus*
Criterion A; C (i, ii)

### Marine Mammal Diversity

[*Balaenoptera physalus, Delphinus delphis, Grampus griseus, Physeter macrocephalus, Stenella coeruleoalba, Tursiops truncatus*]

### Summary

The Campanian and Pontino Archipelagos is an important habitat for Endangered Mediterranean sperm whales (*Physeter macrocephalus*). Groups of solitary males, loose male aggregations, bachelor groups, and social units of females with immature whales have been observed to coexist in the area. Approximately 60% of the identified individuals have been observed to return to the archipelago, showing site fidelity. This area has also been identified as a feeding site, the complex topography of canyon systems being a driving factor shaping the species' presence and distribution.

## Description

The area includes the Pontine Archipelago and the Campanian Archipelago, both situated on the eastern Tyrrhenian Sea continental margin. The Pontine Archipelago is composed of five islands: Ponza, Palmarola and Zannone, Ventotene and Santo Stefano. The Campanian Archipelago in the Gulf of Naples comprises four islands: Ischia, Procida, Vivara (designated as a Marine Protected Area) and Capri. The area is characterised by complex canyons systems (Cuma, Magnaghi and Dohrn) and erosional channels that influence oceanographic processes that concentrate nutrients and structure prey availability vertically in the water column (e.g. upwelling phenomena), consequently attracting key species in the pelagic trophic web such as the Euphausiid *Meganyctiphanes norvegica* as well as sperm whales *Physeter macrocephalus* (Mussi et al., 1999, 2005, 2014).

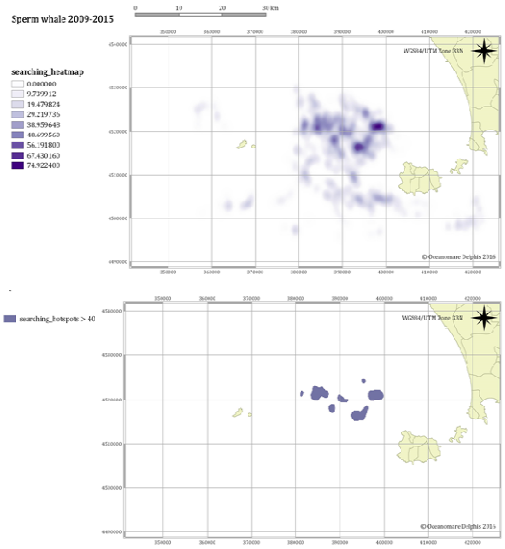
The boundary of this area, within 1000m isobaths and entirely within Italian jurisdiction, includes the main geological structures present in the region, with a specific attention to canyon systems. Based on published and unpublished data by Oceanomare Delphis Onlus, the entire region appears important for a diversity of 7 cetacean species. A total of 1366 daily visual and acoustic surveys were conducted in 2000-2016, during which about 58,100 km of track line were completed in 10,649 hours of effort. Sperm whale solitary males, loose male aggregations and bachelor groups, as well as social units of females with immatures coexist in the area (Mussi et al., 2005; Pace et al., 2014a), with a preferential distribution in waters of about 600-800 m depth (but they are also present over the 300 to 1000 m contour). The area is reported as a feeding

and breeding site for the species (Mussi et al., 2005, 2014; Pace et al., 2012, 2014a; Pace, 2016). About 60% of the identified individuals returned the area and were re-sighted on occasions over a year apart (Pace, 2016).

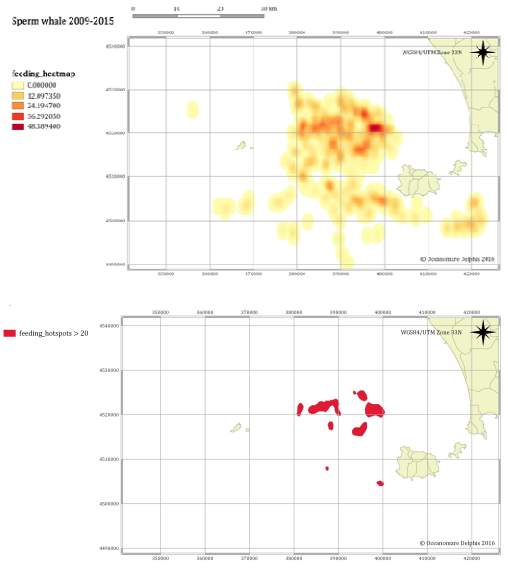
A combination of visual/acoustic sperm whale presence data coming from the area was used to investigate habitat suitability for the various sperm whale group types (solitary individuals, clusters and social units). Maximum entropy modelling technique (Maxent) was applied to test predictive species distribution and the potential differences between groups. The modelling exercise showed that high habitat suitability and related sperm whale groups' potential distribution are expected in regions comprising the south of Ponza Island in the northwest (Pontine Archipelago), the area of the Magnaghi-Dorhn canyon system in the south-east, and the southern part of Capri Island (Campanian Archipelago) (Pace, 2016).

## Criterion A - Species or Population Vulnerability

The Mediterranean sperm whale population is classified as an "Endangered" subpopulation in the IUCN Red List of Threatened Species. Genetic data suggest that sperm whales in the Mediterranean constitute a separate subpopulation. The species is subject to several threats including bycatches in fishing gear, ship strikes, disturbance, noise and chemical contaminants with several potential negative effects at the population level (Notarbartolo di Sciara et al., 2012). The assessment is based on IUCN criterion C2a(ii) which refers to a 'population size estimated to number fewer than 2500 mature individuals and either: a continuing decline, observed, projected, or inferred, in numbers of mature individuals and at least 95% of mature individuals in one subpopulation (Notarbartolo di Sciara et al., 2012). There is great concern that scientific efforts to understand the ecology and population dynamics of the Mediterranean sperm whale population lag far behind the needs of conservation managers and governmental decision makers (Pace et al., 2014b).




*Heatmap (Kernel Density Estimator, KDE; upper map) and hotspot (spatial autocorrelation Moran's I and Getis-Ord General G methods; lower map) plots of sperm whale searching behaviour in the study area (Pace, 2016).*




*Heatmap (Kernel Density Estimator, KDE; upper map) and hotspot (spatial autocorrelation Moran's I and Getis-Ord General G methods; lower map) plots of sperm whale feeding behaviour in the study area (Pace, 2016).*

## Criterion C: Key Life Cycle Activities

### Sub-criterion Ci: Reproductive Areas

Data on breeding and calving is available (Azzali et al., 2003; Mussi et al., 2005; Pace et

al., 2014a; Pace, 2016). A number of 8 social unit encounters out of 142 was recorded in the area. Despite the low number of social units seen during the 2000-2016 period, their presence in the area was concentrated in autumn (October, November, and December), with a couple of newborns observed (Mussi et al., 2005; Pace et al., 2014a). The limited number of encounters with social units (and calves too) may be due to a non-homogeneous sampling effort. In fact, social units were generally observed in autumn, when a reduced effort was applied due to weather conditions and limited availability of funds; furthermore, the area around Ventotene island – where 4 out of 8 encounters occurred – received a lower searching effort, therefore limiting our detection probability. Some novel regions to investigate for social units' presence were identified applying Maxent habitat suitability model, suggesting the potential for adding new knowledge on social units' distribution within the study area (Pace, 2016).

## Criterion C: Key Life Cycle Activities

### Sub-criterion Cii: Feeding Areas

Data on feeding is available (Mussi et al., 2014; Pace, 2016). In the area, a total of 557 .wav file, corresponding to 251 hours of audio recordings, was analysed to represent the time spent in searching and foraging activities (2009-2015 period). Overall, sperm whales in the area spent the majority of the recording time (both entire and partial dive cycles) in searching activities (72.51%). This behaviour included the usage of Usual Clicks (UC) with some pauses between sequences. Whales' searching activity in the area occurred over a wide range of depths and at any stage of the dive. Feeding activities (assessed measuring creaks, CR) comprised 5.75% of the time, as well as a mix of searching-feeding activities (5.23%, combined acoustic behaviour). The mean number of CR per dive was lower than the values found in other studies, and about 30% of the dives were not associated with any creaks. Searching and feeding heatmaps and hotspot maps obtained with the acoustic tracking indicate higher activity at depths deeper than 500 m, near the main canyon heads (Pace, 2016).

## Supporting Information


*Azzali , M., Impetuoso, A., Mussi, B., Miragliuolo, A., Battaglia, M., Antollovich, W. 2003. Analysis of acoustic signals emitted from a nursery school of sperm whale (Physeter macrocephalus) recorded off Ventotene Island (Southern Tyrrhenian Sea, Italy). European Research on Cetaceans 17: 22-25.*

*Mussi, B., Miragliuolo, A., Monzini, E., Diaz Lopez, B., Battaglia, M. 1999. Fin whale (Balaenoptera physalus) feeding ground in the coastal water of Ischia (Archipelago Campano). European Research on Cetaceans 13: 330-335.*

*Mussi, B., Miragliuolo, A., Pace, D.S. 2005. Acoustic and behaviour of sperm whale nursey groups in the waters of Ischia, Italy. European Research on Cetaceans 19.*

*Mussi. B., Miragliuolo, A., Zucchini, A., Pace, D.S. 2014. Occurrence and spatio-temporal distribution of sperm whale (Physeter macrocephalus) in the submarine canyon of Cuma (Tyrrhenian Sea, Italy). Aquatic Conservation: Marine and Freshwater Ecosystems 24(S1): 59-70.*

*Notarbartolo di Sciara, G., Frantzis, A., Bearzi, G., Reeves, R. 2012. Physeter macrocephalus (Mediterranean subpopulation). The IUCN Red List of Threatened Species 2012: e.T16370739A16370477. http://dx.doi.org/10.2305/IUCN.UK.2012-1.RLTS.T16370739A16370477.en*

*Pace, D.S. 2016. On the sperm whale (Physeter macrocephalus) ecology, sociality and behavior off Ischia Island (Italy): patterns of sound production and acoustically measured growth. PhD dissertation. Sapienza University of Rome, Italy.*

*Pace, D.S., Miragliuolo, A., Mussi, B. 2012. The case study of the marine Canyon of Cuma (Tyrrhenian Sea, Italy): implication for cetacean conservation off Ischia Island. In Mediterranean submarine canyon. Ecology*

*and governance. Würtz M (ed). IUCN: Gland, Switzerland. Pp 89-97.*

*Pace, D.S., Miragliuolo, A., Mariani, M., Vivaldi, C., Mussi, B. 2014a. Sociality of sperm whale off Ischia Island (Tyrrhenian Sea, Italy). Aquatic Conservation: Marine and Freshwater Ecosystems 24(S1): 71-82.*

*Pace, D.S., Mussi, B., Gordon, J., Wurtz, M. 2014b. Foreward. Aquatic Conservation: Marine and Freshwater Ecosystems 24(S1): 1-3.*

## Acknowledgements

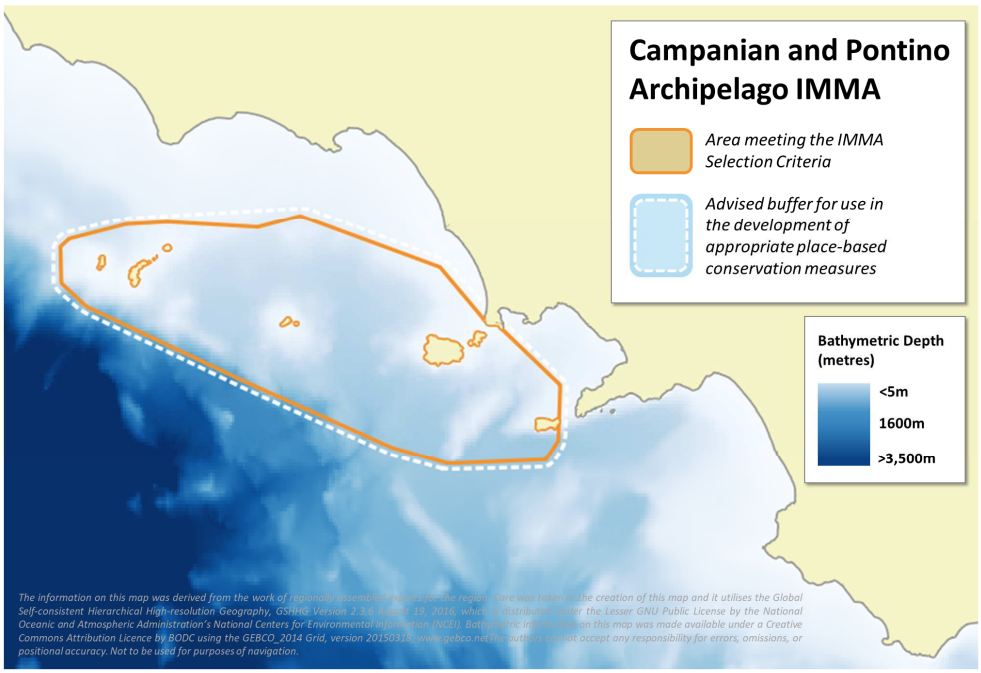
The participants of the 2016 IMMA Regional Expert Workshop held in Chania, Crete, for the Identification of IMMAs in the Mediterranean Sea. Daniela Silvia Pace. Barbara Mussi.


**Suggested Citation: IUCN-MMPATF (2017) Campanian and Pontino Archipelagos IMMA. Full Accounts of Mediterranean IMMA Factsheet. IUCN Joint SSC/WCPA Marine Mammal Protected Areas Task Force, 2017.**

**PDF made available for download at https://www.marinemammalhabitat.org/portfolio-item/campanian-and-pontino-archipelagos/**

# Annex I

## Supplementary Maps



# Annex II

## List of Primary and Secondary Species

### Primary Species – Meet the IMMA Selection Criteria

| Scientific Name | Common Name of Species | Population / Subpopulation Name | IUCN Red List Status |
|---|---|---|---|
| *Physeter macrocephalus* | Sperm whale | Mediterranean subpopulation | Endangered |

### Secondary Species – Do not individually meet the IMMA Selection Criteria but are present within the area

| Scientific Name | Common Name of Species | Population / Subpopulation Name | IUCN Red List Status |
|---|---|---|---|
| *Stenella coeruleoalba* | Striped dolphin | Mediterranean Subpopulation | Vulnerable |
| *Tursiops truncatus* | Common bottlenose dolphin | Mediterranean Subpopulation | Vulnerable |
| *Grampus griseus* | Risso's dolphin | Mediterranean subpopulation | Data Deficient |
| *Balaenoptera physalus* | Fin whale | Mediterranean subpopulation | Vulnerable |
| *Delphinus delphis* | Common dolphin | Mediterranean subpopulation | Endangered |