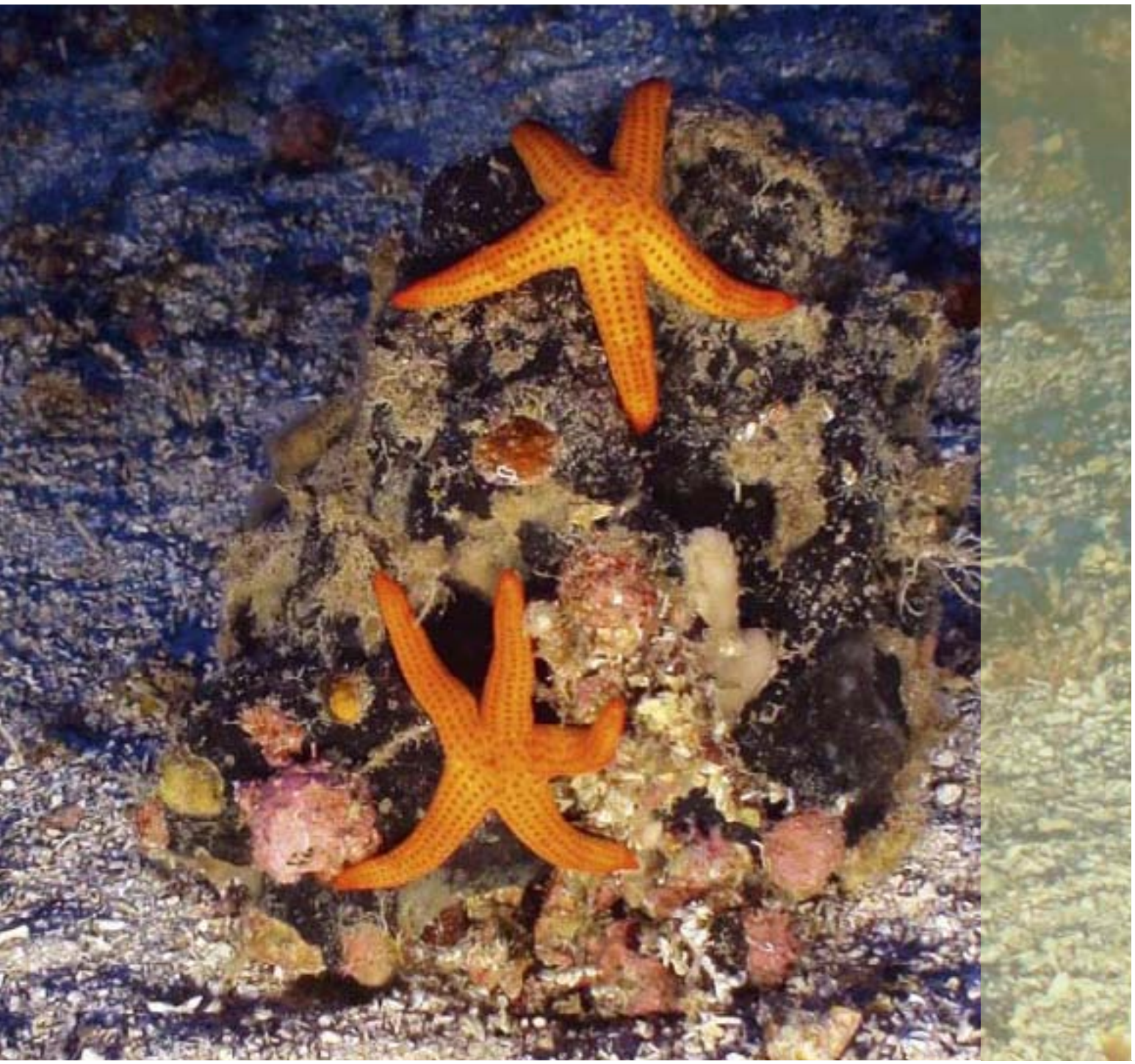

# SEAMOUNTS OF THE BALEARIC ISLANDS | **2010**

## Proposal for a Marine Protected Area in the Mallorca Channel (Western Mediterranean)

OCEANA

# SEAMOUNTS OF THE BALEARIC ISLANDS | **2010**

Proposal for a Marine Protected Area in the Mallorca Channel (Western Mediterranean)

# CONTENTS

Red mullet (*Mullus surmuletus*). Balearic Islands. © OCEANA/ Juan Cuetos

*Oceana Ranger* crewmembers lowering the ROV into the Mallorca Channel.
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# INTRODUCTION

Seamounts, usually of volcanic origin, are underwater elevations that are either isolated or join together to form archipelagos. These structures rise above the surrounding seabeds and constitute unique habitats in seas and oceans around the world. These submarine structures have different names depending on their height, where seamounts rise over 1,000 meters from the seabed; mounts rise between 500 and 1,000 meters and banks rise to a maximum of 500 meters. The popular names given to these structures do not always follow the same criteria, and the denominations given to them take into account not only their height but also their typology, including elevations, mounts, banks, hills, mounds, mountains, volcanoes or ridges.

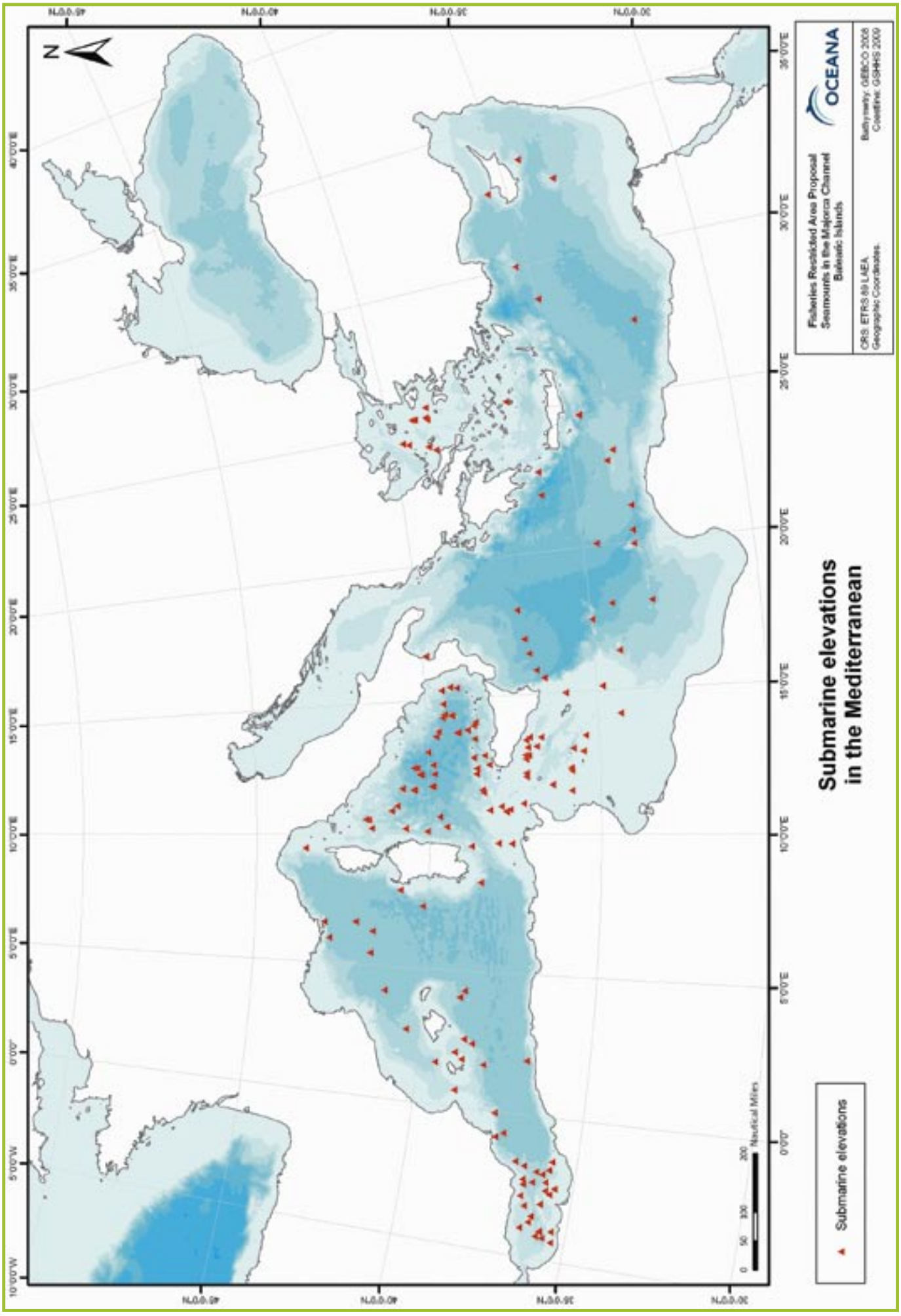
Seamounts harbour high levels of biodiversity and constitute a refuge for marine life because their isolated location in deep waters causes a change in ocean currents that leads to upwellings of nutrients. Thanks to increased productivity in adjoining waters, these elevations are veritable marine biodiversity "hotspots". They attract large schools of fish and groups of sharks, cetaceans, and marine turtles and birds, present high levels of endemism[1] and harbour species of commercial interest. As such, these areas are both ecologically and economically valuable.

Estimates point to the existence of at least 100,000 seamounts worldwide[2], although this figure could increase significantly if smaller elevations were taken into account. A variety of international research projects focus on these elevations, given their importance for biodiversity and economy on a global scale, making their protection an urgent matter.

Over 150 seamounts have been identified in the Mediterranean, with representation of all the classifications mentioned above according to type and height. Of these, at least 59 rise over 1,000 meters above the surrounding seabed[3] and as such, are considered true seamounts. One of the most prominent elevations is the Eratosthenes seamount, located SW of Cyprus, in the eastern Mediterranean. At roughly 2,000 meters high, this seamount starts at a depth of 2,700 m. and its peak is located at -690 m. deep[4].

The highest concentration of these types of elevations occurs in the Alboran and Tyrrhenian Seas, as well as in the Central Mediterranean.

Map 1. The most important seamounts in the Mediterranean Sea.▸


Submarine elevations
in the Mediterranean
Fisheries Restricted Area Proposal
Seamounts in the Majorca Channel
Balearic Islands
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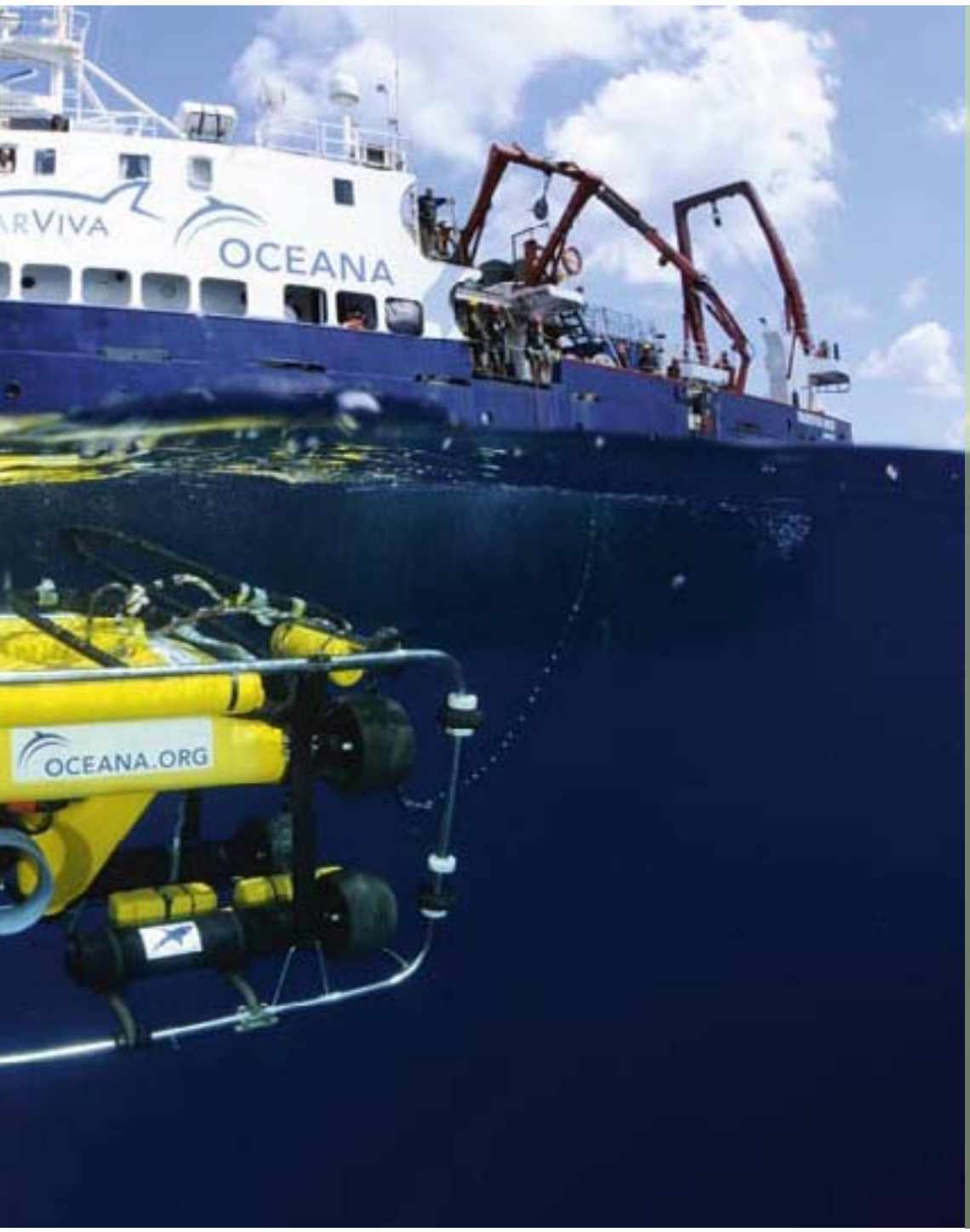
Submarine elevations
Nautical Miles


Launching the ROV over Emile Baudot from the *Marviva Med* oceanographic research vessel during Oceana's Mediterranean expedition in 2008. © OCEANA/ Carlos Minguell




# SEAMOUNTS OF THE BALEARIC PROMONTORY

In the Western Mediterranean, the highest concentration of seamounts occurs in the Alboran Sea and adjoining areas, as is the case of Seco de los Olivos seamount off Almeria or the seamounts and volcanic cones off Alboran. The LIFE+INDEMARES project focuses on these mounts and from 2009 to 2013 the project will study 10 Spanish marine areas for their inclusion in the Natura 2000 network, along with other areas of special ecological interest.

Currently, there are 10 named seamounts in the Balearic promontory or adjoining areas: Four are in the Mallorca Channel (Emile Baudot, Ausias March, Ses Olives and Guyot Bel), one is in the Ibiza Channel (Xabia), one is south of Formentera (Prunnes), one is north of Mallorca (Cresques), one is north of Ibiza (Morrot de Sa Dragonera) and two are south of the Menorca canyon (Jaume 1 and Colom), although other seamounts are pending designation.

## THE SEAMOUNTS OF THE MALLORCA CHANNEL

The seamounts in the Mallorca Channel are especially unique: Emile Baudot, Ausias March and Ses Olives are located in the heart of the Mallorca Channel, between the islands of Ibiza, Formentera and Mallorca. Furthermore, up to 118 pinnacles were identified near Emile Baudot, forming a veritable volcanic field[5].

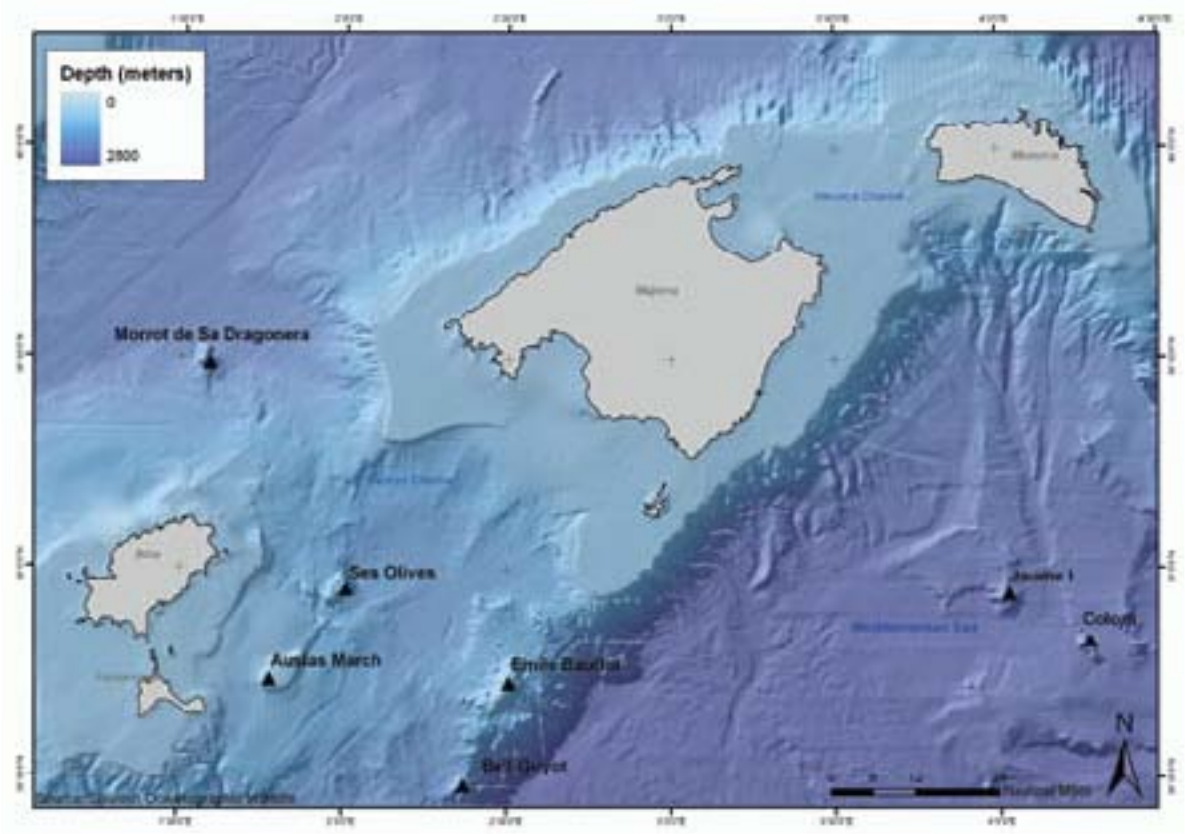



Figure 1. Location of the seamounts in the Mallorca Channel.

The peaks of two of these mounts, Emile Baudot and Ausias March, are located at a depth which allows the development of red algae.

Shamefaced crab (*Calappa granulata*). © OCEANA

Tunicate (*Salpa maxima*). © OCEANA

Cerianthid (*Cerianthus membranaceus*).
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## Emile Baudot

This is the southernmost of the three seamounts. It is located roughly 40 nautical miles SW of the Cabrera archipelago at 38°42'N and 002°20'E. Of volcanic origin, this seamount is found W of the Cabrera canyon, atop the crest of the Emile Baudot escarpment, from which the seabed falls almost vertically to over 2,000 meters deep. Both the seamount and the escarpment have been the subject of various geological studies[6].

## Ausias March

Continental in origin, it is located roughly 10nm ENE of Formentera at 38° 44'N and 001° 48'E. It extends between 90 and 120 meters deep and from there, it falls softly down to 400 meters, and continues falling more slowly after that.

## Ses Olives

Located 20 nautical miles E of Ibiza, at 38°.57'N and 002°.00'E, it is the smallest of the seamounts of the Mallorca Channel, although it is located in the deepest waters. Like Ausias March, it is continental in origin.

| Table 1. General characteristics of the seamounts in the Mallorca Channel | | | | | |
|---|---|---|---|---|---|
| | Coordinates | Distance from coast | Average depth at base | Approximate height | Approximate peak/ base surface are |
| Emile Baudot | 038°42'N 002°30'E | 30 mn, SW Cabrera. | 700-1,000 m. | >800 m. | 20/140 km² [500 km² including volcanic field] |
| Ausias March | 038° 44'N 001° 48'E | 9 mn ENE Formentera. | 400-500 m. | 300 m. | 50/100 km² |
| Ses Olives | 038° 57'N 002° 00'E | 18 mn, E Ibiza | 600-900 m. | 500-600 m. | 15/55 km² |

## OCEANOGRAPHIC CHARACTERISTICS

The waters of the Balearic Islands are located in a transition area between the Western Mediterranean's two main sub-basins[7]: the Algerian basin and the Ligurian-Provencal basin. The colder and more saline Surface Mediterranean Waters (SMW) from the Gulf of Lyons and the warmer less saline Modified Atlantic Waters (MAW) from the south, enter and mix through the channels between islands, making this a hydrographically complex area with strong currents and fronts, as well as *eddies*[8] and variations in salinity between 36.7 and 38 psu (practical salinity units)[9]. These oceanographic conditions are especially strong during the summer, when there is significant stratification, with surface temperatures that can reach 22-27°C in August, compared to the 13-14°C in winter[10], while summer temperatures at 100 meters depth are usually around 13.0-13.9°C[11].

Due to these conditioning factors, the Balearic Sea and promontory have special characteristics and the area can be considered isolated from the rest of the western Mediterranean[12]. However, its oceanographic conditions depend largely on the processes that occur in the rest of Europe and are strongly tied to meteorological changes and how these influence the water's conditioning factors, such as temperature, salinity or nutrients[13]. In fact, processes of cold, deep water formations[14] may occur and temporarily alter the usual patterns of exchange between water masses.

Furthermore, population dynamics of some commercial species, like hake (*Merluccius merluccius*) and red shrimp (*Aristeus antennatus*), fluctuations in recruitment success, and fishery accessibility have been associated with macro and meso-scale climate regimes that depend on North Atlantic and Mediterranean Oscillation, associated with increased or decreased inflow of colder Western Mediterranean intermediate waters or warmer Levantine intermediate waters[15].

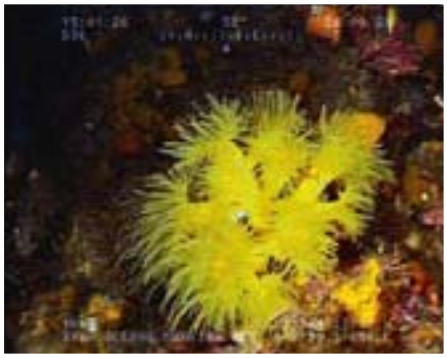
Although the abundance of plankton in this area is low, it is nevertheless comparable to other Mediterranean oligotrophic areas, with an average of 953-1.842 indiv/m³ of zooplankton and 5.4 mg dry weight/m³, with some peaks in productivity during the inflow of cold, nutrient-rich waters, that are usually over 1,200 indiv/m³, but sometimes reach over 5,000-6,000 indiv/m³. Copedods are especially prevalent (*Clausocalanus furcatus, C. pergens, C. arcuicornis, C. paululus, Paracalanus parvus, Centropages typicus, Acartia clausi, A. danae, Oncaea mediterranea, Temora stylifera, Oithona plumifera, O. nana, Ctenocalanus vanus, Diaixis hibernica, Neocalanus gracilis, Microsetella* sp., *Farranula rostrata,*

*Ischnocalanus tenuis, Nannocalanus minor, Conchoecia* sp., *Calanus helgolandicus, Calocalanus styliremis, Mecynocera clausi,* etc.), and may represent 54%-64% of the biomass, followed by cladocerans (*Evadne spinifera, E. nordmanni, E. tergestina, Penilia avirostris*, *Podon intermedius,* etc.), appendicularians (*Fritillaria* sp*., F. Pellucida, Oikopleura* sp.), doliolids (*Doliolum nationalis*), ostracods (*Conchoecia* sp.), pteropods (*Creseis acicula*), salps (*Thalia democratica, Salpa maxima, S. fusiformis, Isias zonaria, Pegea confederata, Ihlea punctata,* etc.), chaetognaths (*Sagitta* sp.), siphonophores (genera *Mugiaea, Lensia, Eudoxia y Abylopsis*) and other mesoplankton[16].

As far as phytoplankton is concerned, chlorophyll is usually less than 3 mg $l^{-1}$, with particular presence of dinoflagellates, as well as coccolithophores and diatoms (*Pseudonitzschia* spp., *Chaetoceros* spp. and *Guinardia striata*)[17].

Despite this oligotrophic environment, various scientific works[18] have shed light on the importance of the Balearic Islands as reproductive areas for both resident and migratory species, as well as its unique aspects compared to other spawning areas in the Mediterranean. These waters are extremely important for species of high commercial value like bluefin tuna (*Thunnus thynnus*), albacore (*Thunnus alalunga*), dolphinfish (*Coryphaena hippurus*), bullet tuna (*Auxis rochei*), swordfish (*Xiphias gladius*) and marlin (*Tetrapturus* sp.).

Spotted ray (*Raja montagui*).
© OCEANA



Yellow tree coral (*Dendrophyllia cornigera*).
© OCEANA

The oceanographic conditions in the Mallorca Channel lead to variations in the distribution patterns of fish larvae throughout the year as well as in the habits of the species, where mesopelagic and neritic species show the most significant variations. Thus, at the beginning of summer, larval distribution mainly depends on depth and the distribution of the two main bodies of water found in this channel; while at the end of summer, distribution depends more on the salinity gradient[19].

The Mallorca Channel and areas surrounding the Balearic Islands are especially important spawning areas for bluefin tuna, where optimum oceanographic conditions occur thanks to the warm waters and formation of oceanic fronts and gyres[20]. It is also an important spawning area for other species of commercial interest[21], and petitions have been made to create a sanctuary or marine reserve to conserve the spawning areas of these overexploited species.

In addition, the area is also well known for its crustacean fisheries. At least five of the Balearic fleet's main fishing grounds for red shrimp are located in the Mallorca Channel[22]: Cabrera, la Badia, es Gambussí, Formentera and Ibiza nord.

## ECOLOGICAL CHARACTERISTICS

A wide variety of studies have been completed concerning the formation and current geological structure of the oceans. Seamounts have been the subject of many oceanographic campaigns starting a few decades ago, although only 350 of the thousands of existing seamounts have been sampled and only 100 of these in detail[23]. As such, detailed knowledge about the habitats and species present on these structures, and their distribution, is still lacking.

As far as the Mediterranean is concerned, the lack of information is even more serious, although some projects have been implemented to conserve Mediterranean seamounts. This is the case, for example, of Eratosthenes, south of Cyprus, which the General Fisheries Commission for the Mediterranean (GFCM) established as a fisheries restricted area to conserve deep sea sensitive habitats[24].

Biological samplings[25] from Eratosthenes, although few, have reported roughly 40 different taxa, many of which are pending identification, including foraminiferans, sponges (*Hamacantha implicans, Rhizaxinella* sp.), cnidarians (cf. *Nausithoe* sp., *Kadophellia bathyalis, Caryophylliacalveri, Desmophyllum cristagalli*, etc.), molluscs (*Argonauta argo, Acar scabra, Bathyarca philippiana, Cardiomya* cf. *costellata, Kelliella abyssicola, Mycroyoldia micrometrica, Notolinea crassa, Propeamussium fenestratum*), polychaetes (*Jasmineira caudata, Filogranula stellata, Hyalopomatus variorugosus, Metavermilia multicristata, Protis* sp., *Semicermilia agglutiata*, etc.), sipunculans (*Apionsoma murinae*), crustaceans (*Odontaster mediterraneus*) and fish (*Hoplotethus mediterraneus*). This sheds new light on the distribution of some species in the Eastern Mediterranean basin and reinforces the uniqueness and richness of these areas.

Scientific work regarding the seamounts of the Mallorca Channel has mainly focused on geology, including sedimentology, mineralogy, petrography, morphogenesis, volcanology etc[26]. However, apart from the samplings carried out by Oceana[27], the biology of these structures has never been studied.

Despite the lack of other biological studies concerning the seabeds of the three seamounts of the Mallorca Channel, the work carried out concerning the channel's slope by means of scientific trawling[28], as well as larval samplings[29] or biological samplings of certain species[30] between Mallorca and the Pitiusas, offers a sample of some of the species of macrofauna present in the area. Other more general studies[31] concerning species in the Balearic waters do not distinguish between areas, so they have not been included in the following tables.

| Table 2. Species identified in the area of the Mallorca Channel during scientific expeditions prior to the work completed by Oceana | | |
|---|---|---|
| Fish | | |
| *Alepocephalus rostratus* | Anacanthini s.d. | *Anthias anthias* |
| *Antonogadus megalokyinodon* | *Apogon imberbis* | *Argentina* sp. |
| *Argentina sphyraena* | *Argyropelecus hemigymnus* | *Arnoglossus ghromanni* |
| *Arnoglossus imperialis* | *Arnoglossus laterna* | *Arnoglossus rueppelli* |
| *Arnoglossus* sp. | *Arnoglossus thori* | *Aspitrigla cuculus* |
| *Auxis rochei* | *Bathophyllus nigerrimus* | *Bathypterois mediterraneus* |
| *Benthosema glaciale* | Blennidae s.d. | *Blennius gattorougine* |
| *Blennius ocellaris* | *Blennius* spp. | *Boops boops* |
| *Bothus podas* | *Brama raji* | Callionymiidae s.d. |
| *Callionymus maculatus* | *Capros aper* | *Cataetyx alleni* |
| *Cataetyx laticeps* | *Centrolophus niger* | *Centrophorus uyato* |
| *Centroscymnus coelolepis* | *Cepola rubescens* | *Ceratoscopelus maderensis* |
| *Chalinura mediterranea* | *Chauliodus sloani* | *Cheilopogon heterurus* |
| *Chelidomychthys lastoviza* | *Chlorophthalmus agassizii* | *Chromis chromis* |
| *Citharus linguatula* | *Coelorinchus caelorhincus* | *Coelorinchus labiatus* |
| *Conger conger* | *Conger* sp. | *Coris julis* |
| *Coryphaena hippurus* | *Coryphaenoides guentheri* | *Coryphaenoides mediterraneus* |
| *Cyclothone braueri* | *Cyclothone pygmaea* | *Cyclothone* sp. |
| *Dactylopterus volitans* | *Dalatias licha* | *Diaphus holti* |
| *Diplodus* sp. | *Dysomma brevjrostre* | *Engraulis encrasicholus* |
| *Epigonus denticulatus* | *Epigonus telescopus* | *Epinephelus* sp. |
| *Etmopterus spinax* | *Euthynnus alleteratus* | *Evermannella balbo* |
| *Gadiculus argenteus* | *Galeus melastomus* | *Giplodys vulgaris* |
| *Glossanodon leioglossus* | Gobiidae s.d. | *Gobius* sp. |
| *Helicolenus dactylopterus* | *Hoplostethus mediterraneus* | *Hygophum* spp. |
| *Hymenocephalus italicus* | *Katsuwonus pelamis* | *Laemonema* sp. |
| *Lampanyctus alatus* | *Lampanyctus crocodilus* | *Lampanyctus pusillus* |
| *Lebetus guilletti* | *Lepidion guentheri* | *Lepidion lepidion* |
| *Lepidopus caudatus* | *Lepidopus* sp. | *Lepidorhombus boscii* |
| *Lepidorhombus* sp. | *Lepidorhombus wiffiagonis* | *Lepidotrigla cavillone* |
| *Lestidiops jayakari* | *Lestidiops* sp. | *Lesueurigobius friesii* |
| *Lipophris pholis* | *Lobianchia dofleiini* | *Lophius budegassa* |
| *Lophius piscatorius* | *Macroramphosus scolopax* | *Maurolicus muelleri* |

| Table 2. Species identified in the area of the Mallorca Channel during scientific expeditions prior to the work completed by Oceana | | |
|---|---|---|
| *Merluccius merluccius* | *Micromesistius poutassou* | *Microstoma* sp. |
| *Molva dipterygia* | *Mora moro* | *Mugil* sp. |
| *Mullus barbatus* | *Mullus surmuletus* | *Myctophum punctatum* |
| *Naucrates doctor* | *Nemichthys scolopaceus* | *Nettastoma melanurum* |
| *Nezumia aequalis* | *Notacanthus bonapartei* | *Notolepis rissoi* |
| *Notoscopelus elongatus* | *Oblada melanura* | *Ophidion* sp. |
| *Pagellus acarne* | *Pagellus erythrinus* | *Pagrus pagrus* |
| *Parablennius tentacularis* | Paralepididae s.d. | *Paraliparis leptochirus* |
| *Paraophidion vassali* | *Peristedion cataphractum* | *Phycis blennoides* |
| *Polyacanthonotus rissoanus* | *Pomatoschistus minutus* | *Raja asterias* |
| *Raja clavata* | *Raja naevus* | *Raja polystigma* |
| *Regalecus glesne* | *Sarda sarda* | *Sardinella aurita* |
| *Scomberesox saurus* | *Scorpaena elongata* | *Scorpaena notata* |
| *Scorpaena porcus* | *Scorpaena scrofa* | *Scorpaena* sp. |
| *Scyliorhinus canicula* | *Seriola dumerilii* | *Serranus cabrilla* |
| *Serranus hepatus* | *Solea* sp. | Sparidae s.d. |
| *Spicara smaris* | *Squalus blainvillei* | Sternptychidae s.d. |
| *Stomias boa* | *Symbolophorus veranyi* | *Symphodus* sp. |
| *Symphurus ligulatus* | *Symphurus nigrescens* | *Synchiropus phaeton* |
| *Syngnathus* sp. | *Thunnus alalunga* | *Thunnus thynnus* |
| *Trachinus draco* | *Trachinus radiatus* | *Trachinus vipera* |
| *Trachurus mediterraneus* | *Trachurus picturatus* | *Trachurus trachurus* |
| *Trachyrhynchus scabrus* | *Trachyrhynchus trachyrhynchus* | *Trigla lyra* |
| *Trisopterus minutus* | *Uranoscopus scaber* | *Vinciguerria attenuatta* |
| *Xiphias gladius* | *Xyrichthis novacula* | *Zeus faber* |
| *Zu cristatus* | | |
| Crustaceans | | |
| *Acanthephyra eximia* | *Acanthephyra pelagica* | *Alpheus glaber* |
| *Aristaeomorpha foliacea* | *Aristeus antennatus* | *Bathynectes maravigna* |
| *Boreomysis arctica* | *Calocaris macandreae* | *Chlorotocus crassicornis* |
| *Dardanus arrosor* | *Dorhynchus thomsoni* | *Euphausia krohni* |
| *Funchalia woodwardii* | *Gennadas elegans* | *Geryon longipes* |
| *Goneplax rhomboides* | *Hymenopenaeus debilis* | *Ligur ensiferus* |
| *Macropipus tuberculatus* | *Macropodia longipes* | *Meganyctiphanes norvegica* |

| Table 2. Species identified in the area of the Mallorca Channel during scientific expeditions prior to the work completed by Oceana | | |
|---|---|---|
| *Monodaeus couchi* | *Monopodia longipes* | *Munida intermedia* |
| *Munida iris* | *Munida tenuimana* | *Munnopsurus atlanticus* |
| *Nematocarcinus exilis* | *Nephrops norvegicus* | *Pandalina profunda* |
| *Paramola cuvieri* | *Parapenaeus longirostris* | *Pasiphaea multidentata* |
| *Pasiphaea sivado* | *Philocheras echinulatus* | *Plesionika acanthonotus* |
| *Plesionika antigai* | *Plesionika edwardsi* | *Plesionika gigliolii* |
| *Plesionika heterocarpus* | *Plesionika martia* | *Plesionika narval* |
| *Polycheles typhlops* | *Pontocaris lacazei* | *Pontophilus norvegicus* |
| *Procampylaspis armata* | *Processa canaliculata* | *Processa nouveli* |
| *Rhachotropis caeca* | *Richardina fredericii* | *Sergestes arcticus* |
| *Sergestes henseni* | *Sergia robusta* | *Solenocera membranacea* |
| *Stereomastis sculpta* | | |
| Molluscs | | |
| *Abralia veranyi* | *Abraliopsis pfeffer* | *Alloteuthis media* |
| *Ancistroteuthis lichtensteinii* | *Bathypolypus sponsalis* | *Brachioteuthis riisei* |
| *Chiroteuthis veranyi* | *Chtenopteryx sicula* | *Eledone cirrhosa* |
| *Eledone moschata* | *Heteroteuthis dispar* | *Histioteuthis bonnellii* |
| *Histioteuthis reversa* | *Illex coindetii* | *Loligo forbesi* |
| *Loligo vulgaris* | *Neorossia caroli* | *Octopus salutii* |
| *Octopus vulgaris* | *Onychotethis banksii* | *Opisthoteuthis agassizii* |
| *Pteroctopus tetracirrhus* | *Rossia macrosoma* | *Scaeurgus unicirrhus* |
| *Sepia elegans* | *Sepia officinalis* | *Sepia orbignyana* |
| *Sepietta oweniana* | *Todarodes sagittatus* | *Todaropsis eblanae* |
| Echinoderms | | |
| *Astropecten aranciacus* | *Luidia ciliaris* | *Echinaster sepositus* |
| *Stichopus regalis* | *Sphaerechinus granularis* | *Spatangus purpureus* |
| Ascidians | | |
| *Botryllus schlosseri* | *Diazona violacea* | *Phallusia mamillata* |
| *Ascidia mentula* | *Molgula appendiculata* | *Microcosmus vulgaris* |
| Algae | | |
| *Codium bursa* | *Laminaria rodriguezi* | *Phyllopora nervosa* |
| *Peyssonnelia* spp. | Corallinace s.d. | *Osmundaria volubilis* |
| *Mesophyllum* sp. | *Lithophyllum* sp. | *Lithothamnion* sp. |

Some species that have been identified in the Mallorca Channel, such as the green algae *Codium bursa*, are only found at depths of 40-50 meters and as such, do not reach as far down as the seamounts, which have a minimum depth of 80 meters. Some samplings have identified this type of algae at greater depths, although this is probably due to dragging from shallower areas. This is not the case of many species of coralline algae, however. Apart from being identified during Oceana samplings (see below), these algae are known for the important communities they form on the deep seabeds of the Balearic Islands[32].

In addition to the species listed above, it is also worth highlighting the presence of gorgonian mud facies (*Isidella elongata*) given its importance as a "sensitive habitat" that is home to large communities of fish and invertebrates, including commercially valuable species such as red shrimp (*Aristeus antennatus*), white shrimp (*Parapenaeus longirostris*), Norway lobster (*Nephrops norvegicus*), the whiting (*Micromesistius poutassou*) and hake (*Merluccius merluccius*)[33].

Other sensitive habitats are located in other areas of the Balearic promontory[34], like facies of deep-sea crinoids (*Leptometra phalangium*).

Scientific research points to the increased oligotrophy of the southern area of the Balearic Islands compared to the northern area, as well as decreased biomass[35] and increased dependence of the planktonic biomass on trophic chains compared to the benthic biomass[36]. This may however, lead to the development of more specific and sensitive communities and species, as proven by the presence of carnivorous sponges on Ausias March, a species that is protected by the Barcelona Convention[37].

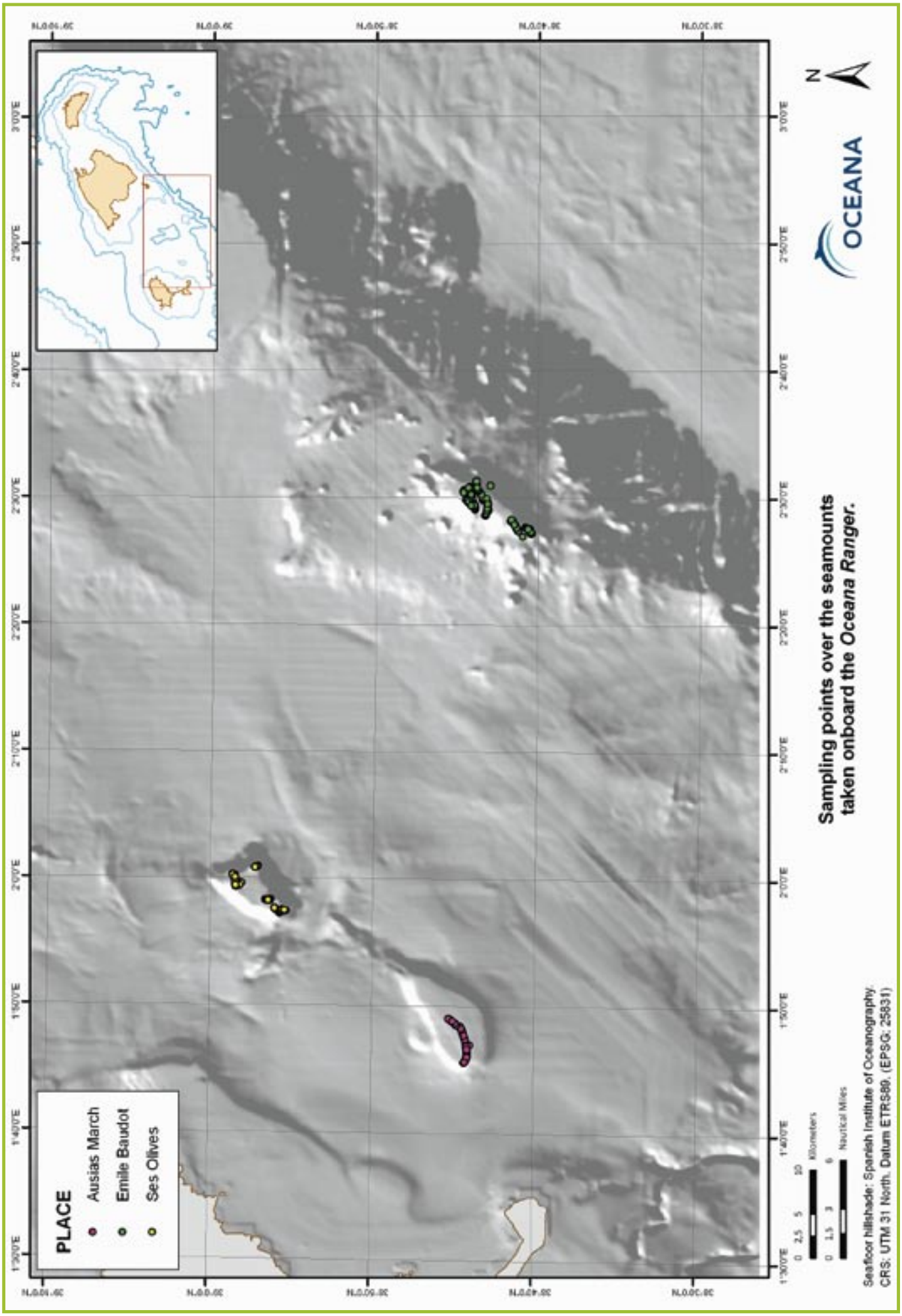
Given the variety of habitats present on these seamounts, it should be stressed that many other species are likely to be identified in future research. In addition, due to the depth of the Emile Baudot escarpment, where the seamount is located, some deep-sea species can also be found here, including the Portuguese dogfish (*Centroscymnus coelolepis*). Until now, this species has only been found in the southern part of the Balearic Islands because it is restricted to depths of over 1,400 meters[38].

Furthermore, the Mallorca Channel is one of the areas with the highest density of sea turtles, with strong interaction between loggerhead turtles (*Caretta caretta*) and fishing gear, especially surface longlines[39]. This is also an important distribution area of bottlenose dolphin populations in the Balearic Islands (*Tursiops truncatus*), which also strongly interact with some of the islands' fisheries[40]. In addition, it is the most important distribution area of the Balearic shearwater (*Puffinus mauretanicus*) in the islands[41]. A more detailed study of the area's avifauna would allow the verification of the presence and abundance of these and other species on seamounts.

## OCEANA SAMPLINGS

Oceana identified approximately 200 taxa over the course of more than 20 hours of seamount sampling in the Mallorca Channel with an ROV (Remote Operated Vehicle). Of these, 26 are included in national and European legislation, international conventions, red lists or protection proposals formulated by experts.

Map 2. Points sampled using the ROV on board the *Oceana Ranger*.


PLACE
Ausias March
Emile Baudot
Ses Olives
Sampling points over the seamounts
taken onboard the Oceana Ranger.
OCEANA
N
Kilometers
Nautical Miles
Seafloor hillshade: Spanish Institute of Oceanography.
CRS: UTM 31 North. Datum ETRS89. (EPSG: 25831)

| Table 3. Species identified by Oceana on Emile Baudot, Ausias March and Ses Olives. Protected species are indicated in green[42]. | | |
|---|---|---|
| Green algae | | |
| *Palmophyllum crassum* | | |
| Brown algae | | |
| *Halopteris filicina* | | |
| Red algae | | |
| Corallinacea s.d. | *Kallymenia* sp. | *Lithophyllum cabiochae* |
| *Lithophyllum* sp. | *Mesophyllum alternans* (9) | *Mesophyllum* sp. |
| *Neogoniolithon mamillosum* (9) | *Peyssonellia* sp. | Rodophycea s.d. |
| Poriferans | | |
| *Aplysia cavernicola* (3,4) | *Aplysilla spinifera* | *Aplysina aerophoba* |
| *Asbestopluma hypogea* (3,4) | *Asconema* sp. | *Axinella infundibuliformis* |
| *Axinella polypoides* (4) | *Axinella* sp. | *Cacospongia* sp. |
| *Chondrosia reniformis* | *Clathrina clathrus* | Demospongiae s.d. |
| *Geodia* sp. | *Halichondria* sp. | *Haliclona oculata* |
| *Haliclona* sp. | Hexactinellidae s.d. | *Hymedesmia paupertas* |
| *Petrosia ficiformis* | *Phakellia* sp. | *Spongia agaricina* (3,4) |
| *Spirastrella* sp. | *Spongosorites* sp. | *Suberites carnososus* |
| *Suberites* sp. | *Tedania* sp. | *Terpios gelatinosa* |
| Foraminiferans | | |
| *Miniacina miniacea* | | |
| Brachipods | | |
| Brachiopda s.d. | *Gryphus vitreus* | *Terebratulina rettusa* |
| Annelids | | |
| *Filograna implexa* | *Hyalinoecia tubicola* | *Lanice conchilega* |
| *Megalomma vesiculosum* | Polichaetes s.d. | *Protula* sp. |
| *Sabella pavonina* | Sabellidae s.d. | *Serpula vermicularis* |
| Echiuroids | | |
| *Bonellia viridis* | | |
| Cnidarians | | |
| *Acanthogorgia* sp. | *Adamsia carciniopados* (9) | *Alcyonium palmatum* |
| *Amphianthus dohrni* | *Antenella* sp. | *Arachnanthus* sp. |
| *Bebryce mollis* | *Callogorgia verticillata* | *Caryophyllia cyathus* (6) |
| *Cerianthus membranaceus* | *Cerianthus* sp. | *Cervera atlantica* |
| *Clavularia* sp. | *Cornularia cornucopiae* | *Dendrophyllia cornigera* |

| Table 3. Species identified by Oceana on Emile Baudot, Ausias March and Ses Olives. Protected species are indicated in green[42]. | | |
|---|---|---|
| *Edwardsia* sp. | *Epizoanthus arenaceus* | *Eunicella verrucosa* (7,9) |
| *Funiculina quadrangularis* | Hexacorallaria s.d. | Hidrozoa s.d. |
| *Leiopathes glaberrima* (4,6,7) | *Muriceides lepida* | Octocorallaria s.d. |
| *Paralcyonium spinulosum* | *Paramuricea clavata* (9) | *Paramuricea macrospina* (9) |
| *Paramuricea* sp. | *Parerythropodium coralloides* | *Pelagia noctiluca* |
| *Savalia savaglia* (3,4) | *Sertularella* cf. *gayi* | *Sertularella* sp. |
| *Solmissus albescens* | *Swiftia pallida* (9) | *Viminella flagellum* |
| Ctenophores | | |
| Ctenophora s.d. | *Leucothea multicornis* | |
| Bryozoans | | |
| Briozoa sd. | *Caberea ellissi* | *Caberea* sp. |
| *Hornera reticulata* | *Myriapora truncata* | *Reteporella grimaldii* |
| *Smittina cervicornis* | | |
| Echinoderms | | |
| *Antedon mediterranea* | *Antedon* sp. | *Chaetaster longipes* |
| *Cidaris cidaris* | Echinacea s.d. | *Echinaster sepositus* |
| *Echinus melo* | *Hacelia attenuata* | *Holothuria polii* |
| *Holothuria* cf. *sanctori* | *Holothuria forskali* | *Holothuria tubulosa* |
| *Leptometra phalangium* | *Ophiothrix fragilis* | *Ophiothrix quinquemaculata* |
| Ophiuroidea s.d. | *Parastichopus* cf. *tremulus* | *Parastichopus regalis* |
| *Spatangus purpureus* | | |
| Molluscs | | |
| *Charonia lampas* (2,3,4) | *Eledone cirrhosa* | *Erosaria spurca* (3,4) |
| *Fasciolaria lignaria* | Gastropoda s.d. | Pteropoda s.d. |
| *Ranella olearia* (3,4) | *Sepia* sp. | *Sepiola atlantica* |
| Solenogastridae s.d. | | |
| Arthropods | | |
| *Calappa granulata* | *Dardanus arrosor* | *Dardanus* sp. |
| *Derilambrus angulifrons* | *Dromia personata* | *Galathea* sp. |
| *Galathea strigosa* | *Inachus* sp. | *Liocarcinus depurator* |
| *Munida sarsi* | *Munida rugosa* | *Munida* sp. |
| Mysidacea s.d. | *Pagurus prideauxi* | *Palinurus elephas* (3,4) |
| *Paramola cuvieri* | *Periclemenes* sp. | *Plesionika* cf. *antigai* |
| *Plesionika narval* | | |

| Table 3. Species identified by Oceana on Emile Baudot, Ausias March and Ses Olives. Protected species are indicated in green[42]. | | |
|---|---|---|
| Tunicates | | |
| *Ascidia mentula* | *Diazona violacea* | *Halocynthia papillosa* |
| *Pyrosoma atlanticus* | *Rhopalaea neapolitana* | *Salpa maxima* |
| Tunicata s.d. | | |
| Chordates | | |
| *Acantholabrus palloni* | *Anthias anthias* | *Arnoglossus* cf. *rueppelli* |
| *Arnoglossus imperialis* | *Aspitrigla cuculus* | *Aspitrigla* sp. |
| *Aulopus filamentosus* | *Blennius ocellaris* | *Callanthias ruber* |
| *Callyoniums lyra* | *Capros aper* | *Caretta caretta* (1,2,4,5) |
| *Chelidonichthys lastoviza* | *Coelorinchus caelorhincus* | *Coris julis* |
| *Epigonus* cf. *constanciae* | *Epinephelus caninus* (7,8) | *Gadiculus argenteus* |
| *Gobius gasteveni* | *Helicolenus dactylopterus* | *Lapanella fasciata* |
| *Lepadogaster* sp. | *Lepidorhombus boscii* | *Lepidorhombus whiffiagonis* |
| *Lepidotrigla cavillone* | *Lepidotrigla dieuzeidei* | *Lepidotrigla* sp. |
| *Lophius piscatorius* | *Macroramphosus scolopax* | *Merluccius merluccius* |
| *Mullus barbatus* | *Muraena helena* | *Peristedion cataphractum* |
| *Phycis blennoides* | *Phycis phycis* | *Polyprion americanus* (7) |
| *Pontinus kuhli* | *Raja montagui* (7) | *Scomber scombrus* (8) |
| *Scorpaena notata* | *Scorpaena scrofa* (8) | *Scorpaena* sp. |
| *Scorpaena porcus* | *Scyliorhinus canicula* | *Serranus cabrilla* |
| *Synchiropus phaeton* | *Trachinus draco* | *Trachurus trachurus* |
| *Trigla lucerna* (8) | *Trigla lyra* | Triglidae s.d. |
| *Tursiops truncatus* (1,2,3,4,5) | | |

**(1)** Habitats Directive./ **(2)** Spanish Catalogue of Endangered Species./ **(3)** Berne Convention./ **(4)** Barcelona Convention./ **(5)** Bonn Convention./ **(6)** CITES./ **(7)** IUCN Red List./ **(8)** Red List of the Government of the Balearic Island./ **(9)** Proposed by experts.

Apart from the seamount samplings done by Oceana in the Balearic Islands, close to 30 transects were completed including over 60 hours of observation by means of the ROV, at depths between 60 and 250 meters in the Mallorca Channel to collect new information about the area's biodiversity.

Table 4. List of species observed by Oceana in other areas of the Mallorca Channel (excluding the ones found in the infralittoral and upper circalittoral zones)[43].

| | | |
|---|---|---|
| Green algae | | |
| *Caulerpa racemosa* | *Codium bursa* | *Flabellia petiolata* |
| *Palmophyllum crassum* | *Valonia macrophysa* | *Valonia* sp. |
| *Valonia utricularis* | | |
| Red algae | | |
| *Chondracanthus acicularis* | *Chrysimenia* sp. | Corallinacea s.d. |
| *Fauchea repens* | *Gelidium pusillum* | *Gracialaria dura* |
| *Gracilaria* sp. | *Halymenia floresia* | *Halymenia* sp. |
| *Hypnea* sp. | *Kallymenia* sp. | *Lithophyllum cabiochae* |
| *Lithophyllum* sp. | *Lithophyllum stictaeformis* | *Lithothamnion* cf *valens* |
| *Lomentaria* sp. | *Lophocladia lallemandi* | *Mesophyllum* sp. |
| *Mesophylum alternans* | *Neogoniolithon mamillosum* | *Neurocaulon* sp. |
| *Osmundaria volubilis* | *Palmaria palmata* | *Peyssonnelia rubra* |
| *Peyssonnelia* sp. | *Peyssonnelia squamaria* | *Phyllopora crispa* |
| *Phymatolithon calcareum* | *Rhodymenia pseudopalmata* | *Schottera nicaeensis* |
| *Schottera* sp. | | |
| Brown algae | | |
| *Arthrocladia villosa* | *Cutleria multifida* | *Dictyopteris membranacea* |
| *Dictyota dichotoma* | *Halopteris filicina* | *Laminaria rodriguezii* |
| *Nereis filiformis* | *Phyllariopsis purpurascens* | *Sporochnus pedunculatus* |
| Annelids | | |
| *Bispira vlutacornis* | *Filograna implexa* | *Hyalinoecia tubicola* |
| *Lanice conchilega* | *Megalomma vessiculosum* | *Myxicola aesthetica* |
| *Myxicola infundibulum* | Polichaeta s.d. | *Protula intestinum* |
| *Protula* sp. | *Sabella pavonina* | *Sabella spalanzani* |
| Sabellidae s.d. | *Serpula* sp. | *Serpula vermicularis* |
| Terebellidae s.d. | | |
| Poriferans | | |
| *Agelas oroides* | *Aplysina aerophoba* | *Axinella damicornis* |
| *Axinella polypoides* | *Axinella* sp. | *Axinella verrucosa* |

| Table 4. List of species observed by Oceana in other areas of the Mallorca Channel (excluding the ones found in the infralittoral and upper circalittoral zones)[43]. | | |
|---|---|---|
| Axinellidae s.d. | *Chondrosia reniformis* | *Ciocalypta penicillus* |
| *Clathrina* sp. | *Cliona celata* | *Crella elegans* |
| *Crellla* sp. | Demospongiae s.d. | *Dysidea avara* |
| *Dysidea fragilis* | *Geodia* sp. | *Guancha lacunosa* |
| *Haliclona fulva* | *Haliclona mediterranea* | *Haliclona simulans* |
| *Haliclona* sp. | *Hemymicale columella* | *Hexadella racovitzai* |
| *Hymedesmia paupertas* | *Ircinia variabilis* | *Pachastrella monolifera* |
| *Petrosia ficiformis* | *Phorbas tanacior* | *Polymastia mamillaris* |
| *Raspailia* sp. | *Spongia agaricina* | *Suberites domuncula* |
| *Suberites* sp. | *Tethya aurantium* | *Tethya* sp. |
| Cnidarians | | |
| *Adamsia carciniopados* | *Aglaophenia* sp. | *Alcyonium palmatum* |
| *Amphianthus dohrni* | *Andresia parthenopea* | *Antipathella subpinnata* |
| *Arachnanthus nocturnus* | *Arnoglossus imperialis* | *Arnoglossus kessleri* |
| *Arnoglossus* sp. | *Bebryce mollis* | *Bouganvillia* sp. |
| *Calliactis parasitica* | *Caryophyllia cyathus* | *Caryophyllia* sp. |
| *Cereus pedunculatus* | *Cerianthus membranaceus* | *Cerianthus* sp. |
| *Corallium rubrum* | *Dendrophyllia cornigera* | *Epizoanthus arenaceus* |
| *Epizoanthus* sp. | *Eudendrium racemosum* | *Eudendrium* sp. |
| *Eunicella cavolini* | *Eunicella* sp. | *Eunicella verrucosa* |
| *Eutrigla gunarndus* | *Eutrigla* sp. | *Funiculina quadrangularis* |
| *Halecium* sp. | Hidrozoa s.d. | *Hoplangia durotrix* |
| *Hormathia digitata* | *Leptosammia pruvoti* | *Mesacmaea mitchelli* |
| *Nemertesia ramosa* | *Nemertesia* sp. | *Pachycerianthus* sp. |
| *Paralcyonium spinulosum* | *Paramuricea clavata* | *Paramuricea macrospina* |
| *Parazoanthus anguicomus* | *Parazoanthus axinellae* | *Parazoanthus* sp. |
| *Pelagia noctiluca* | *Pennatula phosphorea* | *Pennatula rubra* |
| *Pennatula* sp. | *Phymanthus pulcher* | *Pteroides griseum* |
| *Sagartia elegans* | Scleractinia s.d. | *Sertularella* sp. |
| *Serturalella ellissii* | *Serturalella gayi* | *Serturalella rugosa* |
| *Swiftia pallida* | *Veretillun cynomorium* | *Villogorgia brebicoides* |
| Molluscs | | |
| *Alloteuthis* sp. | *Anamenia gorgonophila* | *Aporrhais pes-pelecani* |
| *Aplysia depilans* | Bivalvia s.d. | *Bulma rugosa* |

| Table 4. List of species observed by Oceana in other areas of the Mallorca Channel (excluding the ones found in the infralittoral and upper circalittoral zones)[43]. | | |
|---|---|---|
| *Calliostoma* sp. | *Cerithium lividunum* | *Charonia lampas* |
| Cardiidae s.d. | *Discodoris atromaculata* | *Facellina* sp. |
| Gastropoda s.d. | *Gastropteron rubrum* | *Hypselodoris fontandraui* |
| *Loligo* sp. | *Octopus vulgaris* | Pectinida s.d. |
| *Phallum granulatum* | *Pleurobranchaea meckelii* | *Pteria hirundo* |
| *Sepia officinalis* | *Sepia* sp. | *Serpulorbis arenarius* |
| *Tethys fimbria* | *Turritella* sp. | Veneridae s.d. |
| Arthropods | | |
| Anomura s.d. | Balanomorpha s.d. | Brachyura s.d. |
| *Calappa granulata* | Caprelidae s.d. | *Conchoderma virgatum* |
| *Dardanus* sp. | *Galathea* sp. | *Inachus* sp. |
| Lepadomorpha s.d. | *Lissa chiragra* | *Lysmata seticauda* |
| *Macropodia* sp. | *Munida rugosa* | Mysidacea s.d. |
| Natantia s.d. | *Pagurus prideauxi* | *Pagurus* sp. |
| *Palinurus elephas* | *Periclemenes* sp. | *Portunus hastatus* |
| Echinoderms | | |
| *Antedon mediterranea* | *Astropecten aranciacus* | *Astropecten bispinosus* |
| *Astropecten irregularis* | *Brissus unicolor* | *Centrostephanus longispinus* |
| *Chaetaster longipes* | *Cidaris cidaris* | *Echinaster sepositus* |
| *Echinus acutus* | *Echinus melo* | *Hacelia attenuata* |
| *Holothuria forskali* | *Holothuria sanctori* | *Holothuria* sp. |
| *Holothuria tubulosa* | *Leptometra phalangium* | *Luidia ciliaris* |
| *Luidia sarsi* | *Marthasterias glacialis* | *Ophiocomina nigra* |
| *Ophioderma longicauda* | *Ophiopholis aculeata* | *Ophiopsila aranea* |
| *Ophiopsila* sp. | *Ophiothrix fragilis* | *Ophiothrix quinquemaculata* |
| *Ophiura albida* | *Ophiura* sp. | *Ophiura texturata* |
| *Peltaster placenta* | *Spatangus purpureus* | *Sphaerechinus granularis* |
| *Parastichopus regalis* | *Stylocidaris affinis* | |
| Tunicates | | |
| *Aplidium elegans* | *Aplidium punctum* | *Aplidium* sp. |
| *Ascidia mentula* | *Ciona edwardsi* | *Ciona intestinalis* |
| *Ciona* sp. | *Clavellina lepadiformis* | *Clavellina nana* |
| *Cystodites dellechiajei* | *Diazona violacea* | *Didemnum* sp. |
| *Diplosoma* sp. | *Ectenoascidia turbinata* | *Halocynthia papillosa* |

| Table 4. List of species observed by Oceana in other areas of the Mallorca Channel (excluding the ones found in the infralittoral and upper circalittoral zones)[43]. | | |
|---|---|---|
| *Microcosmus sabatieri* | *Microcosmus* sp. | *Mulgula* sp. |
| *Phallusia mamillata* | *Polycarpa* sp. | *Polycitor* sp. |
| *Polysynchraton lacazei* | *Pseudodistoma ctynusense* | *Pseudodistoma obscurum* |
| *Pyura* sp. | *Rhopalaea neapolitana* | *Salpa fusiformis* |
| *Salpa maxima* | *Styela* sp. | *Sydnium* sp. |
| *Synoicum blochmani* | *Synoicum* sp. | *Tridemnum* sp. |
| Tunicado s.d. | | |
| Echiuroids | | |
| *Bonellia viridis* | | |
| Brachipods | | |
| Brachiopoda s.d. | *Terebratulina rettusa* | |
| Bryozoans | | |
| Briozoa s.d. | *Caberea boryi* | *Caberea* sp. |
| *Celleporina* sp. | *Hornera frondiculata* | *Myriapora truncata* |
| *Reteporella grimaldii* | *Reteporella* sp. | *Smittina cervicornis* |
| *Turbicellepora magnicostata* | | |
| Foraminiferans | | |
| *Miniacina minacea* | | |
| Phoronids | | |
| *Phoronis australis* | | |
| Chordates | | |
| *Acantholabrus palloni* | *Anguilla anguilla* | *Anthias anthias* |
| *Aspitrigla cuculus* | *Aspitrigla* sp. | *Aulopus filamentosus* |
| *Blennius ocellaris* | *Boops boops* | *Buglossidium luteum* |
| *Capros aper* | *Cepola rubescens* | *Chelidonichthys lastoviza* |
| *Conger conger* | *Coris julis* | Cynoglosidae s.d. |
| *Dactylopterus volitans* | *Dasyatis pastinaca* | *Dentex dentex* |
| *Diplodus vulgaris* | *Gadella maraldi* | Gobiidae s.d. |
| *Gobius gasteveni* | *Helicolenus dactylopterus* | *Labrus bimaculatus* |
| *Lapanella fasciata* | *Lepidotrigla cavillone* | *Lepidotrigla dieuzeidei* |
| *Lophius piscatorius* | *Macrorhamphosus scolopax* | *Merluccius merluccius* |
| *Microchirus* sp. | *Mullus barbatus* | *Mullus surmuletus* |
| *Muraena helena* | Osteichthia s.d. | *Pagellus* sp. |
| *Parablennius rouxei* | *Peristedion cataphractum* | *Phrynorhombus regius* |

Table 4. List of species observed by Oceana in other areas of the Mallorca Channel (excluding the ones found in the infralittoral and upper circalittoral zones)[43].

| | | |
|---|---|---|
| *Phycis phycis* | *Pleuronectes platessa* | Pleuronectiforme s.d. |
| *Raja clavata* | *Raja miraletus* | *Raja montagui* |
| *Raja radula* | *Raja* sp. | *Scorpaena loppei* |
| *Scorpaena notata* | *Scorpaena scrofa* | *Scyliorhinus canicula* |
| *Scyliorhinus stellaris* | *Seriola dumerili* | *Serranus cabrilla* |
| *Serranus hepatus* | *Solea* sp. | Soleidae s.d. |
| *Spicana maena* | *Spicara smaris* | *Spicara* sp. |
| *Symphodus cinereus* | *Syngnathus acus* | *Thorogobius ephittatus* |
| *Thorogobius iphippiatus* | *Trachinus araneus* | *Trachinus draco* |
| *Trachinus radiatus* | *Trachinus* sp. | *Trachurus* sp. |
| Triglidae s.d. | *Trisopterus minutus* | *Zeus faber* |

It should be pointed out that in certain areas of the Mallorca Channel, some species of green and brown algae, that are usually bathymetrically distributed in shallower areas, were identified in deep waters of the circalittoral. For example, some specimens of *Codium bursa, Sporochnus pedunculatus, Arthrocladia villosa* and *Dictyota dichotoma* (or even the invasive species *Caulerpa racemosa* and *Lophocladia lallemandi*) were located at depths over 70 meters.

## Other species of interest in the area

Excluding sturgeon, practically all the fish, crustaceans and molluscs included in the priority species list of the General Fisheries Commission for the Mediterranean (GFCM)[44] are found on these seamounts or are expected to be found, because these locations are within the species' distribution ranges.

The following are included among the species already documented on the seamounts: *Eledone cirrhosa, Lophius piscatorius, Merluccius merluccius, Mullus barbatus, Palinurus elephas, Scomber scombrus* and *Trachurus trachurus*. In addition, the species identified in the Mallorca Channel and expected to be found here include *Anguilla anguilla, Aristaeomorpha foliacea, Aristeus antennatus, Boops boops, Coryphaena hippurus, Eledone moschata, Engraulis encrasicholus, Loligo vulgaris, Lophius budegassa, Micromesistius poutassou, Mullus surmuletus, Nephrops norvegicus, Pagellus erythrinus, Palinurus mauritanicus, Parapenaeus longirostris, Sardinella aurita, Sepia officinalis, Sprattus sprattus, Thunnus alalunga, Thunnus thynnus, Trachurus mediterraneus* and *Xiphias gladius.* Others that are also expected to be identified in this area but have not yet been recorded include *Isurus oxyrhinchus, Lamna nasus, Merlangius merlangus, Pagellus bogaraveo, Pomatomus saltatrix, Prionace glauca, Psetta maxima, Sardina pilchardus* and *Solea vulgaris*

Other species also documented[45] in the southeast area of the Balearic Islands include various cartilaginous fish including *Cetorhinus maximus, Carcharodon carcharias* and *Chimaera monstrosa*, among others. The first two species are included in the list of endangered or threatened species (Annex 2) of the protocol on Specially Protected Areas of Mediterranean Interest (SPAMI).

## Habitats and communities in the Mallorca Channel

The following table includes more than 100 communities and habitats classified by EUNIS[46] that have been identified on these seamounts. At least 50 more that are pending confirmation (indicated with an asterisk) could also be found here.

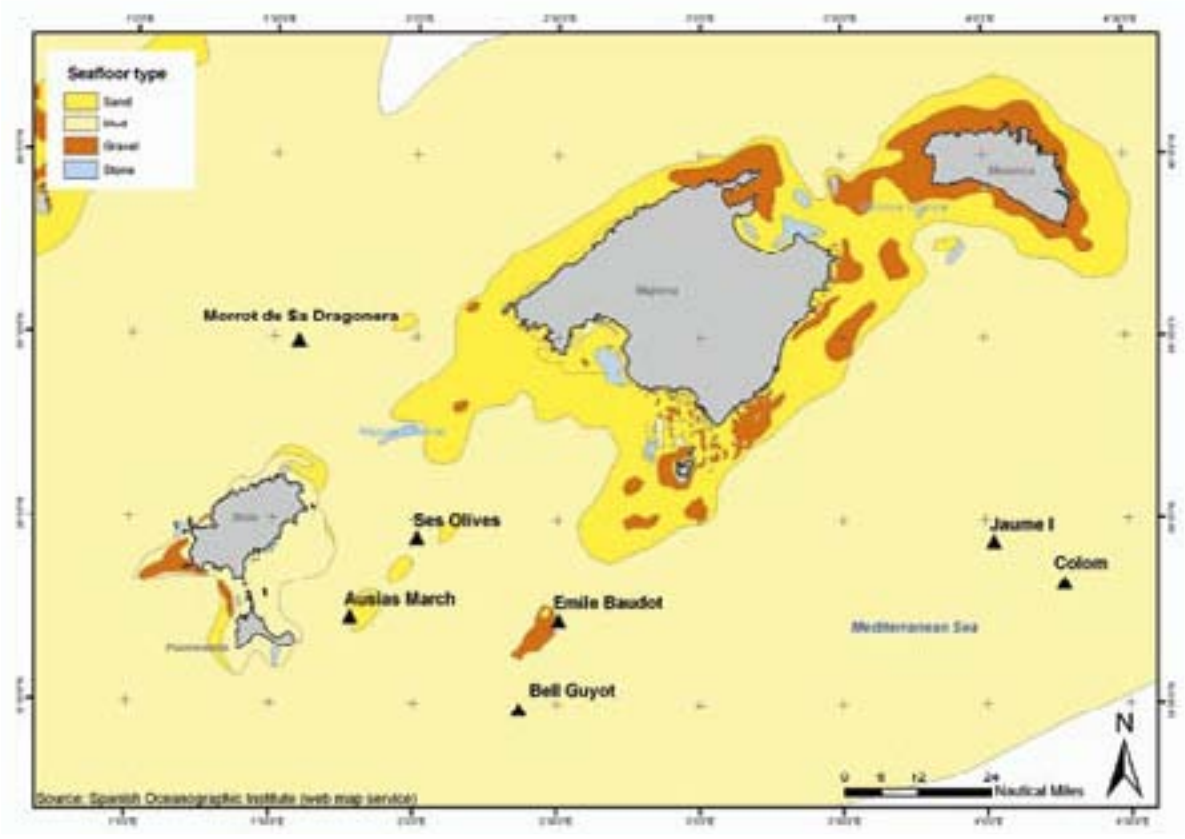



Figure 2. Nature of the seabed of the Balearic Islands.

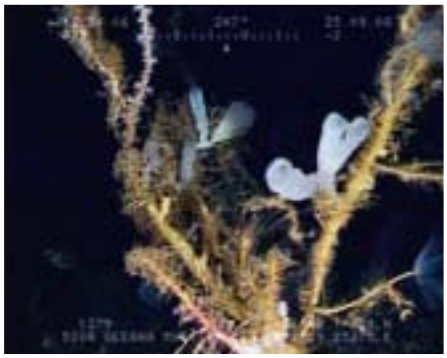
| Table 5. List of marine habitats observed by Oceana classified according to EUNIS | |
|---|---|
| Codes | Marine Habitats |
| A4 | Circalittoral rock and other hard substrata |
| A4.12 | Sponge communities on deep circalittoral rock |
| A4.121 | *Phakellia ventilabrum* and axinellid sponges on deep, wave-exposed circalittoral rock |
| A4.13 | Mixed faunal turf communities on circalittoral rock |
| A4.1311 | *Eunicella verrucosa* and *Pentapora foliacea* on wave-exposed circalittoral rock |
| A4.139* | Sponges and anemones on vertical circalittoral bedrock |
| A4.2 | Atlantic and Mediterranean moderate energy circalittoral rock |
| A4.21 | Echinoderms and crustose communities on circalittoral rock |
| A4.214 | Faunal and algal crusts on exposed to moderately wave-exposed circalittoral rock |
| A4.23* | Communities on soft circalittoral rock |
| A4.232* | *Polydora* sp. tubes on moderately exposed sublittoral soft rock |
| A4.26 | Mediterranean coralligenous communities moderately exposed to hydrodynamic action |
| A4.266* | Association with *Mesophyllum lichenoides* |
| A4.26D | Coralligenous platforms |
| A4.3 | Atlantic and Mediterranean low energy circalittoral rock |
| A4.31 | Brachipod and ascidian communities on circalittoral rock |
| A4.311* | Solitary ascidians, including *Ascidia mentula* and *Ciona intestinalis*, on wave-sheltered circalittoral rock |
| A4.3111* | Solitary ascidians, including *Ascidia mentula* and *Ciona intestinalis*, with *Antedon* sp. on wave-sheltered circalittoral rock |
| A4.3112* | Dense brittlestars with sparse *Ascidia mentula* and *Ciona intestinalis*, on sheltered circalittoral mixed substrata |
| A4.312 | Large solitary ascidians and erect sponges on wave-sheltered circalittoral rock |
| A4.313 | *Antedon* sp., solitary ascidians and fine hydroids on sheltered circalittoral rock |
| A4.32 | Mediterranean coralligenous communities sheltered from hydrodynamic action |
| A4.33 | Faunal communities on deep low energy circalittoral rock |
| A4.7 | Features of circalittoral rock |
| A4.71 | Communities of circalittoral caves and overhangs |
| A4.711 | Sponges, cup corals and anthozoans on shaded or overhanging circalittoral rock |
| A4.712* | Caves and overhangs with *Parazoanthus axinellae* |
| A4.713* | Caves and overhangs with *Corallium rubrum* |
| A4.714* | Caves and overhangs with *Leptosammia pruvoti* |

| Table 5. List of marine habitats observed by Oceana classified according to EUNIS | |
|---|---|
| Codes | Marine Habitats |
| A4.715 | Caves and ducts in total darkness (including caves without light or water movement at upper levels) |
| A4.72 | Circalittoral fouling faunal communities |
| A4.73 | Vents and seeps in circalittoral rock |
| A4.733 | Vents in circalittoral rock |
| A5. | Sublittoral sediment |
| A5.14 | Deep circalittoral coarse sediment |
| A5.146 | Scallops on shell gravel and sand with some sand scour |
| A5.15 | Deep circalittoral coarse sediment |
| A5.25 | Circalittoral fine sand |
| A5.26 | Circalittoral muddy sand |
| A5.262* | Amphiura brachiata with *Astropecten irregularis* and other echinoderms in circalittoral muddy sand |
| A5.27 | Deep circalittoral sand |
| A5.36 | Circalittoral fine mud |
| A5.361 | Seapens and burrowing megafauna in circalittoral fine mud |
| A5.3611 | Seapens, including *Funiculina quadrangularis*, and burrowing megafauna in undisturbed circalittoral fine mud |
| A5.363* | *Brissopsis lyrifera* and *Amphiura chiajei* in circalittoral mud |
| A5.37 | Deep circalittoral mud |
| A5.38 | Mediterranean communities of muddy detritic bottoms |
| A5.381 | Facies with *Ophiothrix quinquemaculata* |
| A5.39* | Mediterranean communities of coastal terrigenous muds |
| A5.391* | Facies of soft muds with *Turritella tricarinata communis* |
| A5.392* | Facies of sticky muds with *Virgularia mirabilis* and *Pennatula phosphorea* |
| A5.393 | Facies of sticky muds with *Alcyonium palmatum* and *Stichopus regalis* |
| A5.44 | Circalittoral mixed sediments |
| A5.441 * | *Cerianthus lloydii* and other burrowing anemones in circalittoral muddy mixed sediment |
| A5.4411* | *Cerianthus lloydii* with *Nemertesia* spp. And other hydroids in circalittoral muddy mixed sediment |
| A5.445* | *Ophiothrix fragilis* and/or *Ophiocomina nigra* brittlestar beds on sublittoral mixed sediment |
| A5.45 | Deep circalittoral mixed sediments |
| A5.451 | Polychaete-rich deep Venus community in offshore mixed sediments |
| A5.46 | Mediterranea animal communities of coastal detritic bottoms |

| Table 5. List of marine habitats observed by Oceana classified according to EUNIS | |
|---|---|
| Codes | Marine Habitats |
| A5.461 | Facies with *Ophiura texturata* |
| A5.462 | Facies with synascidies |
| A5.463 | Facies with large bryozoa |
| A5.47 | Mediterranean communities of shelf-edge detritic bottoms |
| A5.471* | Facies with *Neolampas rostellata* |
| A5.472 | Facies with *Leptometra phalangium* |
| A5.51 | Maerl beds |
| A5.515 | Association with rhodolithes in coarse sands and fine gravels under the influence of bottom currents |
| A5.516 | Association with rhodolithes on coastal detritic bottoms |
| A5.63 | Circalittoral coral reefs |
| A5.631 | Circalittoral *Lophelia pertusa* reefs |
| A6. | Deep-sea bed |
| A6.1 | Deep-sea rock and artificial hard substrata |
| A6.11* | Deep-sea bedrock |
| A6.13* | Deep-sea manganese nodules |
| A6.14* | Boulders on the deep-sea bed |
| A6.2 | Deep-sea mixed substrata |
| A6.21* | Deep-sea lag deposits |
| A6.22 | Deep-sea biogenic gravels (shells, coral debris) |
| A6.31 | Communities of bathyal detritic sands with *Gryphus vitreus* |
| A6.4 | Deep-sea muddy sand |
| A6.5 | Deep-sea mud |
| A6.511* | Facies of sandy muds with *Thenea muricata* |
| A6.512* | Facies of fluid muds with *Brissopsis lyrifera* |
| A6.513* | Facies of soft muds with *Funiculina quadrangularis* and *Apporhais seressianus* |
| A6.52 | Communities of abyssal muds |
| A6.6 | Deep-sea bioherms |
| A6.61 | Communities of deep-sea corals |
| A6.62 | Deep-sea sponge aggregations |
| A6.621* | Facies with *Pheronema grayi* |
| A6.7 | Raised features of the deep-sea bed |
| A6.72 | Seamounts, knolls and banks |
| A6.721 | Summit communities of seamount, knoll or bank within euphotic zone |

| Table 5. List of marine habitats observed by Oceana classified according to EUNIS | |
|---|---|
| Codes | Marine Habitats |
| A6.722 | Summit communities of seamount, knoll or bank within the mesopelagic zone, (i.e. interacting with diurnally migrating plankton) |
| A6.723 | Deep summit communities of seamount, knoll or bank (i.e. below mesopelagic zone) |
| A6.724 | Flanks of seamount, knoll or bank |
| A6.725 | Base of seamount, knoll or bank |
| A6.7251 | Moat around base of seamount, knoll or bank |
| A6.75* | Carbonate mounds |
| A6.8 | Deep-sea trenches and canyons, channels, slope failures and slumps on the continental slope |
| A6.81 | Canyons, channels, slope failures and slumps on the continental slope |
| A6.811* | Active downslope channels |
| A6.812* | Inactive downslope channels |
| A6.813* | Alongslope channels |
| A6.814* | Turbidites and fans |
| A6.82* | Deep-sea trenches |
| A6.9* | Vents, seeps, hypoxic and anoxic habitats of the deep sea |
| A6.91* | Deep-sea reducing habitats |
| A6.911* | Seeps in the deep-sea bed |
| A6.9111* | Cold seep benthic communities of hadal zone |
| A6.912* | Gas hydrates in deep-sea |
| A6.913* | Cetacean and other carasses on the deep-sea bed |
| A6.92* | Deep-sea bed influenced by hypoxic water column |
| A6.93* | Isolated "oceanic" features influenced by hypoxic water column |
| A6.94 | Vents in the deep sea |
| A6.941* | Active vent fields |
| A6.942 | Inactive vent fields |
| A7. | Pelagic water column |
| A7.1 | Neuston |
| A7.11 | Temporary neuston layer |
| A7.12* | Permanent neuston layer |
| A7.3 | Completely mixed water column with full salinity |
| A7.31* | Completely mixed water column with full salinity and short residence time |
| A7.32 | Completely mixed water column with full salinity and medium residence time |
| A7.33 | Completely mixed water column with full salinity and long residence time |

| Table 5. List of marine habitats observed by Oceana classified according to EUNIS | |
|---|---|
| Codes | Marine Habitats |
| A7.8 | Unstratified water column with full salinity |
| A7.81 | Euphotic (epipelagic) zone in unstratified full salinity water |
| A7.82* | Mesopelagic zone in unstratified full salinity water |
| A7.83* | Bathypelagic zone in unstratified full salinity water |
| A7.84* | Abyssopelagic zone in unstratified full salinity water |
| A7.9 | Vertically stratified water column with full salinity |
| A7.91* | Water column with ephemeral thermal stratification and full salinity |
| A7.92 | Water column with seasonal thermal stratification and full salinity |
| A7.93* | Water column with permanent thermal stratification and full salinity |
| A7.A | Fronts in full salinity water column |
| A7.A1* | Ephemeral fronts in full salinity water column |
| A7.A2 | Seasonal fronts in full salinity water column |
| A7.A3* | Persistent fronts in full salinity water column |



*Chelidonichthys lastoviza*. © OCEANA

Black coral (*Leiopathes glaberrima*) with hexactinellid sponges. © OCEANA

Narcomedusa (*Solmissus albescens*). © OCEANA

Pteropod *Cymbulia peroni* in waters of Ses Olives. © OCEANA

## ECONOMIC ACTIVITIES AND THREATS

Numerous species of commercial interest aggregate on or around seamounts. These species are extremely vulnerable to bottom trawling. As such, the most obvious and urgent impact to be taken into account in terms of conservation and management is caused by both commercial and recreational fishing.

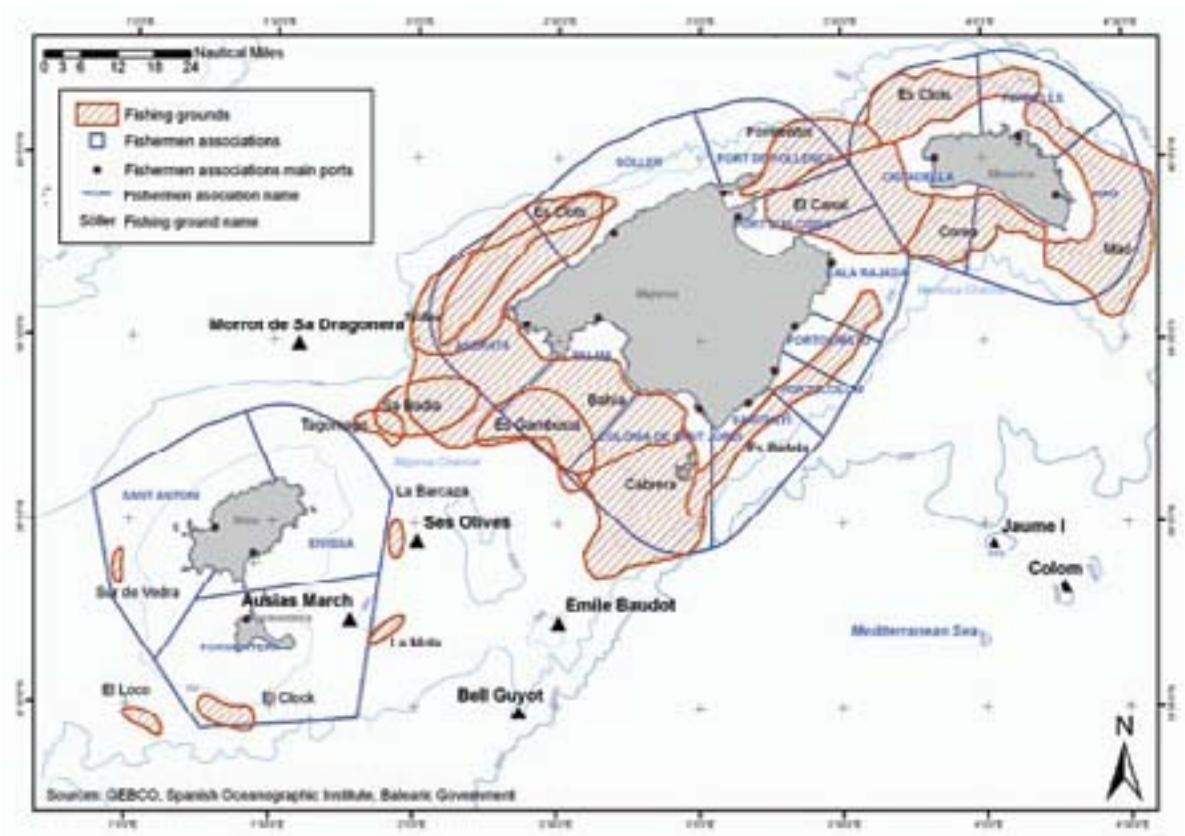



Figure 3. Fishing grounds and fishermen's associations in the Balearic area.

Bottom trawling is one of the most destructive fishing methods for benthic ecosystems. It is widely known that bottom trawling alters ecosystems, reduces the abundance of benthic species and causes mechanical impacts due to the use of heavy doors that can penetrate substrates over 20 cm[47] thick, while also significantly increasing turbidity in the surrounding environment[48].

Seamounts are even more vulnerable because these are areas where species of commercial interest aggregate in all depth ranges, making them a focal point for the extractive fleet. In the Balearic area, despite the existence of a trawling fleet with the potential to exploit the fishing resources of Emile Baudot, Ausias March and Ses Olives, the rocky nature of the bottoms, the distance from major ports and the increased cost of fuel, among other factors, seem to have discouraged exploitation up to now.

The overlying water column around seamounts may also constitute an important pelagic habitat for various tuna and tuna-like species. The seabed's topography and the hydrodynamic characteristics of the area work together to create a habitat that is essential for the reproduction of these species[49]. In the specific case of bluefin tuna (*Thunnus thynnus*), it has been proven that the species prefers to spawn in areas with fronts and eddies, as is the case of the Balearic Islands, one of the most important spawning areas for this species in the Mediterranean[50].

The Spanish Oceanographic Institute has developed various oceanographic campaigns in the Balearic area (TUNIBAL). The results of these campaigns shed light on the importance of the Balearic promontory as a spawning area for species like bluefin tuna (*Thunnus thynnus*), albacore (*Thunnus alalunga*), bullet tuna (*Auxis rochei*) and swordfish (*Xiphias gladius*). Specifically, high levels of larval concentration have been detected in the Mallorca Channel[51] and, in particular, the area around the three seamounts that are the subject of this document.

Little information is available about the real extent of fishing activities targeting tuna and tuna-like species around the Ausias March, Ses Olives and Emile Baudot seamounts, apart from seining and longlining during the summer months. Oceana has observed the seabeds of the three seamounts and concludes that, although they are all being affected by more or less intense fishing activities, they have yet to be fully exploited and conserve highly valuable ecosystems.

While carrying out sampling activities, Oceana observed various fishing operations that had different effects on the water column and benthic communities and species.

The strongest impact on the area was caused by bottom trawling, a fishery that has left its mark on the Ausias March peak. These observations were compared to other sources that confirm the presence of bottom trawling on this seamount at different depths from the peak to the base, probably depending on the targeted species and with marked seasonal variability, where the seamount's base was the most intensely targeted by trawling.

Sponge on coralligenous bed. © OCEANA

Flat fish (*Arnoglossus* sp.). © OCEANA

The most intense trawling in the area occurs in the red shrimp fishing grounds known as "la Mola" located approximately between 440 and 600 meters deep[52] on the elevation's eastern slope. Therefore, studies at greater depths could reveal the strong impact on this seamount's benthic ecosystems. Trawling activities seem to take place in shallower areas in winter and spring.

Although there is a red shrimp trawling fleet in the Pitiusas, the fleet that operates on Ausias March most likely comes from peninsular ports like La Vila Joiosa, Santa Pola or Xávea, authorised to operate in these red shrimp fishing grounds at isobaths over 400 m[53]. Nevertheless, trawling marks that may have been caused by the local trawling fleet, have also been identified in shallower areas.

In the case of Ses Olives, fishing activities consist of traps to catch Plesionika shrimp and surface longlines for large migratory species like swordfish (*Xiphias gladius*). Lost fishing gear, mainly lines, were also documented on these seabeds.

Emile Baudot was in fact subjected to bottom trawling during the 80's to target shrimp (*Aristeus antennatus*), although this activity ceased when new management measures limiting fishing effort entered into force, such as the implementation of time restrictions for fishing, which made the fleet abandon this fishing ground because it was located too far away.[54]

Today, the most important fishing activity on Emile Baudot is recreational fishing targeting large species such as wreckfish and groupers (*Polyprion americanus*, *Epinephelus* spp.). Oceana observations have however, revealed that some of the larger rocks are completed covered by fishing gear, including nets and lines.

As mentioned above, fishing constitutes one of the main threats to the conservation of seamount ecosystems. Thus, specific management measures must be implemented for these areas, not only to conserve biodiversity, but also to conserve the live resources these seamounts harbour. Taking into account the importance of the ecosystems in these areas and the role they play in the different stages of the life cycles of overexploited commercial species, these measures must necessarily include partial or total restriction of fishing activities, depending on the type of fishing gear used and the different impacts the activity has on the exploited area.

As indicated by the Food and Agriculture Organization of the United Nations (FAO)[55], fishing is not the only threat to vulnerable marine ecosystems; waste dumping, contamination, mineral drilling/exploitation and climate change must also be taken into account.

The most obvious anthropogenic effects identified on these seamounts are remnants of waste and fishing gear (buoys, lines, nets, hooks, etc.)- plastics, food packaging, bottles, fabrics, jars, canisters, metal waste, etc.

Although there is no data available on how the communities present on these seamounts are affected by this waste, one of the most serious threats may be acidification. Ses Olives is an area where an important presence of pteropods has been observed, a taxa that is extremely vulnerable to changes in sea water pH. Important coral and gorgonian communities have also been observed on both Emile Baudot and Ausias March, species that are very sensitive to modifications in sea water chemistry and temperature.

In fact, important extensions of dead corals were identified on Emile Baudot between 250 and 350 meters deep, although their cause of death is unknown.

Longliner in Balearic waters.
© OCEANA/ Carlos Suárez

Garbage found on the seabeds of the Mallorca Channel. © OCEANA

Tug boat with bluefin tuna cages in the spawning area in Balearic waters.
© OCEANA/ Keith Ellenbogen

Red calcareous algae. Balearic Islands. © OCEANA/ Carlos Suárez

# THE IMPORTANCE OF PROTECTING SEAMOUNTS

All international organisations involved in marine issues and biodiversity conservation are developing strategies to protect seamounts worldwide because of their ecological importance in maintaining global marine biodiversity and their socio-economic importance for industries like high seas fisheries. Traditionally, seamounts have always been areas of intense maritime traffic of large vessels, including those dedicated to fishing and other important extractive industries like mining.

Seamounts are seriously threatened marine ecosystems because they harbour species with slow growth rates and late sexual maturity, making them highly vulnerable to anthropogenic impacts. As such, more and more initiatives are been undertaken to set up a global network of protected seamounts, as the only possible way of guaranteeing their conservation and recovery.

Currently, only a few seamounts have been designated marine protected areas (MPAs) with the goal of conserving the biodiversity they harbour. In 2008 for example, 2,350 km² around "El Cachucho" a seamount 36 nm off the coast of Asturias, were declared as a MPA by the Spanish government once the importance and complexity of the communities that live there was proven. Other examples include the Tasmanian Seamounts Marine Reserve in Australia, protected since 1999 and currently part of a much larger marine reserve; and Bowie seamount, which makes up a unique habitat on the high seas because it rises from the seabed at 3,100 meters and almost reaches the surface, 180 km off the western coast of Canada.

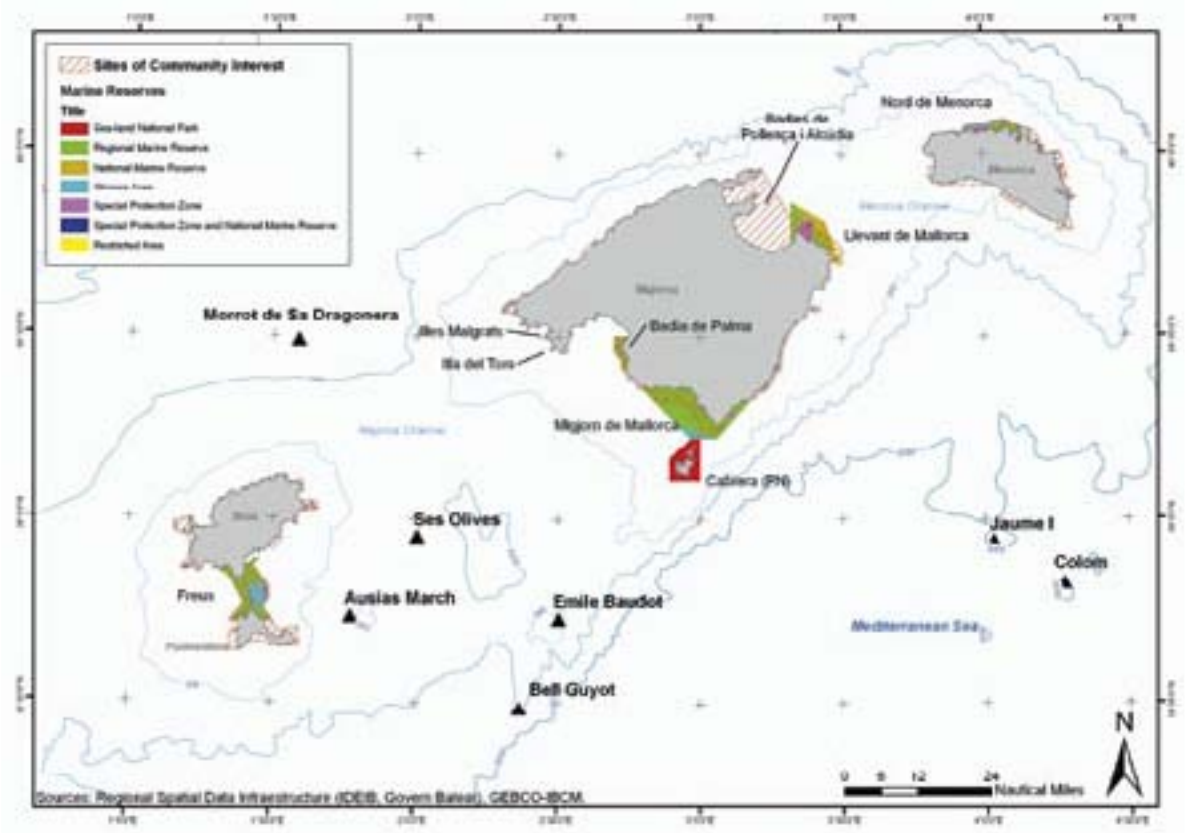



Figure 4. Marine protected areas.

Black coral (*Leiopathes glaberrima*). © OCEANA

Boarfish (*Capras aper*). © OCEANA

Furthermore, other protection treaties are being applied to seamounts and focus mainly on recovering fish stocks. Recently, various regional fishing organisations around the world have temporarily or permanently prohibited bottom trawling and other aggressive fishing techniques on seamounts, as a precautionary measure due to the imminent depletion of stocks or as a result of it. These measures are focused on halting the destruction and contributing to the recovery of habitats that are essential for overexploited fishing resources, such as deep sea coral or sponge beds, commonly found on seamounts.

On a global scale, the protection of seamounts is based on only a few legislative tools that obligate countries around the world to halt the negative effects of their activities at sea, particularly the effects of fishing, mining and transportation.

- In 1995, the **FAO** published the Code of Conduct for Responsible Fisheries to guide governments towards the sustainble use of marine live resources by protecting and conserving marine ecosystems.

- In resolution A/57/141 on oceans and the law of the sea of 2003[56], the **United Nations General Assembly** urges the most important international organisations involved in marine[57] affairs to improve the management of risks that maritime activities pose to marine biodiversity associated with seamounts, within the framework of the United Nations Convention on the Law of the Sea. Consequently, resolution 61/105[58] was adopted in 2006, by which Member States are required to adopt immediate measures to protect vulnerable marine ecosystems, seamounts included, from destructive fishing activities, acknowledging the importance and value of the ecosystems they harbour.

- The **United Nations Convention on Biological Diversity**[59] (CBD; Rio de Janeiro, 1992), an international treaty for the conservation of world biodiversity, establishes the requirement to protect at least 10% of world marine ecoregions before 2012. The main objective is to halt the loss of biodiversity and for this, the protection of world hotspots of biodiversity, i.e. seamounts, is essential.

In the EU, there are a variety of directives that are directly related to the conservation of marine species and habitats, and these must be applied and developed by all Member States. These include:

- The **Marine Strategy Framework Directive**[60], which establishes the objective of integrating and improving all EU policies concerning the management of the oceans. Among its main objectives is the creation of a network of marine protected areas that comply with all European and international agreements, conventions and legislations.

- Annex I of **Directive 92/43/CEE**[61] **on the Conservation of Natural Habitats and Wild Species of Fauna and Flora** (Habitats Directive) includes the types of habitats of community interest whose conservation requires the designation of Special Areas of Conservation (SAC). Unfortunately, of the 230 habitats included for protection, only five are marine habitats: sandbanks which are slightly covered by sea water all the time, Posidonia beds, reefs, submarine structures made by leaking gases, fully or partly submerged caves. All submarine structures are considered reefs according to the *Interpretation Manual of European Union Habitats* and as such, seamounts are habitats of community interest whose conservation requires their designation as MPAs. In addition, annexes II, IV and V, list animal and vegetable species of community interest, and Member States are required to designate special areas for their conservation or establish management measures. Of these, only 30 are marine species, and some are found on seamounts including the bottlenose dolphin (*Tursiops truncatus*) and the loggerhead turtle (*Caretta caretta*).

- The **Birds Directive**[62] also lists dozens of marine species including some found in the Mallorca Channel, as indicated above, and the endangered Balearic shearwater (*Puffinus mauretanicus*).

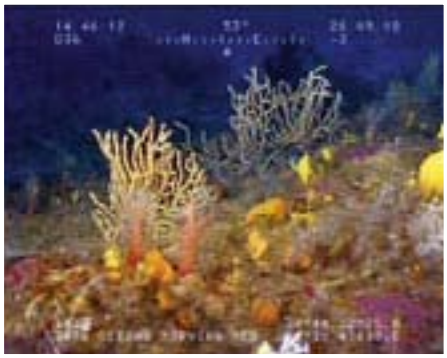
At the Mediterranean level, there are various international conventions and agreements that have been transposed into European law. Mediterranean coastal Member States are required to strengthen the protection of the marine environment, including seamounts among other ecosystems.

- The **Barcelona Convention for the protection of the marine environment and the coastal region of the Mediterranean**, in its Protocol on Specially Protected Areas and Biological Diversity, also contemplates the protection of highly valuable natural areas, representative marine ecosystems that are important for marine biodiversity and habitats that are essential for the survival, reproduction and recovery of endangered and endemic species of fauna and flora. Seamounts are globally acknowledged as hotspots of marine biodiversity, areas of high primary production and elevated rates of speciation due to their isolated location. They are therefore essential environments for countless marine species and conserving them is essential for maintaining biodiversity in the Mediterranean Sea.

- The **Agreement on the Conservation of Cetaceans of the Black Sea, Mediterranean Sea and Contiguous Atlantic Area** (ACCOBAMS) indicates that "Parties will make an effort to create and manage specially protected areas for cetaceans corresponding to the areas which serve as habitat and/or which provide important food resources for them," thereby increasing the possibility that seamounts may be considered MPAs.

- The **General Fisheries Commission for the Mediterranean** (GFCM)[63] is responsible for managing fisheries resources in the Mediterranean, according to FAO directives. For this, it requires the parties, including Spain, to establish fisheries restricted areas to protect sensitive deep-sea habitats. Until now, only three habitats have been protected under this designation, including one of the tallest seamounts in the Mediterranean, the Eratosthenes. Furthermore, as indicated above, the commission classifies over one hundred fish, molluscs and crustaceans as priority species and seven of these have already been documented on these submarine structures, while roughly 40 species include these areas within their distribution range.

Gorgonian (*Callogorgia verticilata*). © OCEANA



Coralligenous bed. © OCEANA

At the national level, apart from the laws and conventions mentioned above and with which Spain must comply, there are also various laws and texts that establish the urgent need to include seamounts in the Spanish network of marine protected areas.

- The **Ley del Patrimonio Natural y la Biodiversidad**[64] (Law on Natural Heritage and Biodiversity) of 2007, includes the designation MPA in Spanish law, complying with EU directives and creating a network of marine protected areas. Since then, only one area, "El Cachucho" off Asturias, has been declared a marine protected area, affording protection to a wide variety of marine species, many of which are listed as protected.

- **La Estrategia Española para la Conservación y el Uso Sostenible de la Diversidad Biológica**[65] (the **Spanish Strategy for the Conservation and Sustainable Use of Biological Diversity**) acknowledges that, with roughly 80,000 taxa, Spain is responsible for conserving the widest range of diversity on the European continent. It also specifically mentions the marine environment and indicates the importance of complying with national, European and international conservation agreements as "an urgent requirement", including the designation of SCI's, and with the commitments established by the IV Protocol of the Barcelona Convention on the Protection of the marine environment and the coastal region of the Mediterranean and the Agreement for the Protection of Small Cetaceans in the Mediterranean, within the framework of the Bonn Convention; among others.

- The **Ley de la Red de Parques Nacionales[66] (Law on the Network of National Parks)**, approved in 2007, lists in its annexes the marine ecosystems that should be included in the protection network, expressly mentioning "large seamounts and submarine caves, tunnels and canyons" among other criteria that correspond to the Balearic seamounts (see below).

- The results of different research projects focused on defining the ecology of the seamounts show that they harbour most of the ecosystems included in the law's annex, and large seamounts themselves are one of these ecosystems. Since its approval, no seamount has been included in this network. Of the 14 Spanish national parks, only three include a marine environment, though they are limited in reach and are always associated with land:

  - Doñana National Park in the Gulf of Cadiz: with only 3,700 marine hectares legally protected as part of the park's terrestrial zone, it leaves important marine fauna unprotected outside its limits.
  - The National Park of the Atlantic Islands in Galicia, where 7,285 marine hectares around the islands harbour extraordinary biological richness. Numerous sandbanks close to the islands also harbour high levels of diversity of endangered marine fauna and flora, although these are located outside the limits of the park and are therefore not protected.
  - The Cabrera Archipelago National Park, in the Balearic Islands, includes 8,703 marine hectares in its protected area. Again, important habitats like kelp forests, rhodolith beds and gorgonian gardens or protected species like red corals (*Corallium* spp.) and the knobbed triton (*Charonia lampas*) are not protected because they are outside the park's limits.

Dying jellyfish (*Pelagia noctiluca*). © OCEANA

Echinoderm (*Holothuria tubulosa*). © OCEANA

Rattail (*Coelorinchus caelorhincus*). © OCEANA

## Other laws protecting biodiversity

As indicated in table 3, 25 of the species identified so far on the seamounts of the Mallorca Channel are included in conventions, directives, laws or lists of endangered or protected species of fauna and flora.

Apart from those already mentioned, other important laws that can be applied in this case include:

- Law 4/1989 on the Conservation of Natural Spaces and Wild Species of Flora and Fauna[67] and subsequent modifications, through the **National Catalogue of Threatened Species**[68], includes more than 50 marine species in its lists, especially birds and mammals, but also invertebrates like the knobbed triton (*Charonia lampas*) found on Ausias March or the sea urchin (*Centrostephanus longispinus*) present in the Mallorca Channel.

- Concerning protected habitats, the **Comprehensive Management Plan for the conservation of fishery resources in the Mediterranean**[69] establishes in its article 5 that "fishing with trawling nets, dredges or seining nets over *Posidonia oceanica* beds or any other seagrass beds, coralligenous and maerl beds is prohibited". These last two ecosystems are abundant on the seamounts of the Balearic Islands.

- The **Convention on the Conservation of European Wildlife and Natural Habitats** or the Berne Convention lists roughly 130 marine species in its annexes (and dozens of birds), including all cetaceans and sea turtles, anthozoans like *Savalia savaglia* (present on Ses Olives), the carnivorous sponge *Asbestopluma hypogea* (found on Ausias March), the sponge *Spongia agaricina* (documented on Emile Baudot and Ausias March), etc.

- The **Convention on Migratory Species** (CMS)[70] or the Bonn Convention. Apart from ACCOBAMS (see above), which depends on this convention, its annexes include many species of birds, mammals, reptiles and elasmobranchs present or potentially present on these seamounts.

- The **Convention on International Trade in Endangered Species of Wild Fauna and Flora** (CITES)[71] or the Washington Convention: although it only regulates international trade, CITES clearly indicates which species are endangered and are hence in need of management measures. Various species listed in its annexes are found on the seamounts of the Mallorca Channel, including black corals (*Antipathes* spp., *Leiopathes glaberrima*) and button cup corals (*Caryophyllia* spp). It also lists various vertebrates commonly found in the Mallorca Channel, including birds, turtles, mammals and fish.

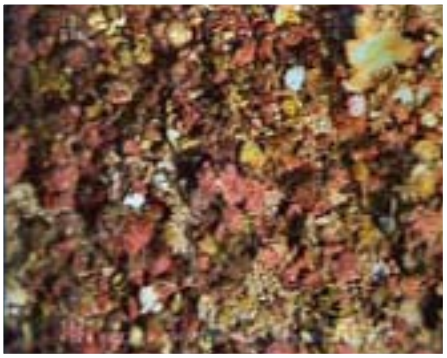
- We should also mention the various **red lists** of fauna and flora, such as the one compiled by the International Union for Conservation of Nature (IUCN)[72] or the one compiled by the Regional Government of the Balearic Islands[73] which lists 8 species found on the seamounts of the Mallorca Channel.

Red tube worm (*Serpula vermicularis*). Balearic Islands.
© OCEANA/ Juan Cuetos

# CONCLUSION AND PROPOSAL FOR A NATIONAL MARINE PARK OF THE SEAMOUNTS OF THE MALLORCA CHANNEL

All marine areas currently protected in the Balearic Islands are located on the coasts or are related to archipelagos, islands or islets, so the habitats and communities they harbour are not usually found outside the infralittoral zone.

This proposal aims to include these three seamounts within the Natura 2000 network so they may be subsequently included in the Network of National Parks. The seamounts of the Mallorca Channel are located within the territorial sea (Ausias March), in the contiguous area (Ses Olives) and in the fishery protected zone (Ses Olives and Emile Baudot). Declaring this a marine protected area would would allow it to fall under various types of conservation designations, including the combination of National Park with other national and international designations (Marine Reserve, SPAMI, etc.). Taking into account the oceanographic and biological characteristics of these seamounts and the species they harbour, described in this report, the proposed area is also an ideal candidate for protection by the GFCM as a fisheries restricted area in order to protect deep-sea vulnerable habitats. This would mean the Spanish government is actively promoting marine conservation away from the coasts and shallow areas, establishing a precedent for environmental protection of the seamounts and deep waters of the Mediterranean.



Rhodolith beds. © OCEANA

Lobster (*Polinurus elephas*). © OCEANA

Yellow tree coral (*Dendrophyllia cornigera*). © OCEANA

Wreckfish (*Polyprion americanus*). © OCEANA

The designation of a national park of the seamounts on the high seas of the Mallorca Channel would substantially increase the ecosystemic diversity of the protected spaces, including almost fifty habitats and marine communities, and hundreds of species. In addition, apart from complying with Law 42/2007 on Natural Heritage and Biodiversity[74], the "Cibeles" priorities of the Spanish government to halt the loss of biodiversity[75], the Order ARM/143/2010 for the establishment of a Comprehensive Fishery Plan for the Mediterranean[76] and the draft bill on the Law of Maritime Fishing and Aquaculture of the Balearic Islands[77], the proposal to create this protected area would also respond to 11 of the 13 natural Spanish

marine systems to be represented in the network of national parks, according to the law[78] . Only seagrass beds and communities of photophilic or laminarian algae would be left out of the bathymetric distribution range of these seamounts and would not meet the criteria to create a national park (except species like *Laminaria rodriguezii* and possibly *Phyllariopsis purpurascens*, not yet identified on these structures). The rest would be:

- Systems associated with submarine gas seeps.

  Found in the mud volcano fields north of Emile Baudot. These systems may also be found in other areas because both Emile Baudot and Ausias March are of volcanic origin.

- Detritic and sedimentary bottoms.

  All of the walls and bases of these seamounts are heavily covered by sediments. In fact, most of the peak of Ses Olives is covered by soft sediment. The deeper area, especially the slope, is dominated by planktonic sediment generating a mud bottom with biogenic material with strong presence of foraminiferans like *Orbulina universa*[79].

- Deep-sea coral beds.

  Some deep areas of Emile Baudot show high concentrations of deep-sea scleractinian corals, sometimes alive, but also large extensions of dead colonies. Furthermore, the shallow areas of both Emile Baudot and Ausias March harbour important communities of soft corals or gorgonians that should be protected. We should also mention the presence of large black corals (*Leiopathes glaberrima*) on the walls of Ses Olives.

- Maerl beds.

  This type of coralligenous bed has been documented on both Emile Baudot and Ausias March, covering large extensions between 80 and 130 meters depth.

- Coralligenous communities.

  Like maerl beds, coralligenous communities cover large areas of Emile Baudot and especially Ausias March, and some coralline algae can be found close to 150 meters depth.

- Pelagic passing areas, spawning areas or areas with regular presence of cetaceans or large migratory fish.

  Apart from the fact that the Mallorca Channel is an important spawning ground for large pelagic species like bluefin tuna (*Thunnus thynnus*), albacore (*Thunnus alalunga*) and swordfish (*Xiphias gladius*), cetaceans are also commonly found around these seamounts. During the samplings completed by Oceana, groups of bottlenose dolphin (*Tursiops truncatus*) were often seen around Ses Olives; and a dolphin skull was found on Emile Baudot. Other species of cetaceans can also be found in this channel including striped dolphins (*Stenella coeruleoalba*), pilot whales (*Globicephala melas*), etc.

  Although not specifically mentioned in any law, other highly migratory species also present on these seamounts, like sea turtles, should also be taken into account.

- Large seamounts, submarine caves, tunnels and canyons.

  The three structures can be considered seamounts and banks and can be included within this category. Caves, tunnels and other cavities can also be found on seamounts.

- Large filtering communities: Sponges, ascidians and bryozoans.

  The three seamounts harbour important and abundant communities of poriferans, creating sponge fields on coralligenous or maerl beds in some areas. These are also common on other substrates. The presence of some species protected by international conventions should also be mentioned, including *Spongia agaricina, Axinella polypoides* and *Asbestopluma hypogea* (although this last is not a filter feeder, but a carnivorous "hunter").

  Ascidians and bryozoans, although less abundant, are also present.

- Communities on hard substrates with populations of photophilic or shade-tolerant algae.

  As indicated above, sunlight reaches the shallower parts of Emile Baudot and Ausias March, allowing the development of algal communities, coralligenous communities and other sciaphilic species.

- Shoals and sharp escarpments.

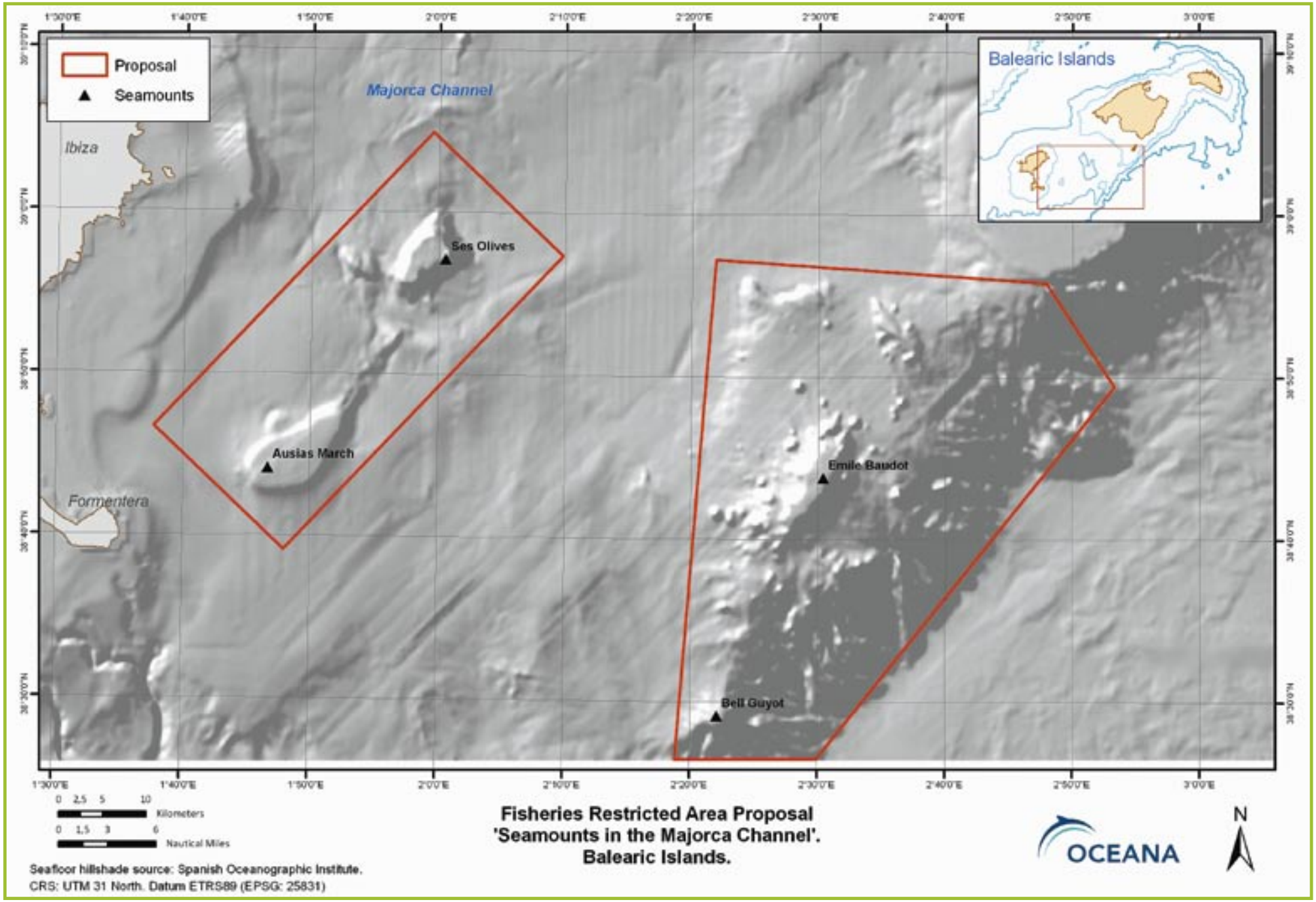
  The Emile Baudot escarpment is possibly the largest and deepest one in the Spanish Mediterranean. The shoals and smaller escarpments of the other seamounts in this channel should also be taken into account.

- Rocky banks.

  By nature, seamounts are rocky banks and, in addition, their bottoms are comprised of hard substrates perfect for the development of a wide variety of communities (gorgonian gardens, sponge fields, deep-sea corals, etc.).

  As we have explained in this document, because seamounts are unique habitats of biological importance included in agreements and conventions on marine conservation, a marine protected area should be created in the Mallorca Channel. This area should be considered a National Park.

Map 3. Proposal for the marine protected area "Seamounts of the Mallorca Channel".▸


Proposal
Seamounts
Majorca Channel
Ibiza
Formentera
Ses Olives
Ausias March
Emile Baudot
Bell Guyot
Balearic Islands
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1°40'0"E
1°50'0"E
2°0'0"E
2°10'0"E
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0 2,5 5 10
Kilometers
0 1,5 3 6
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Seafloor hillshade source: Spanish Oceanographic Institute.
CRS: UTM 31 North. Datum ETRS89 (EPSG: 25831)
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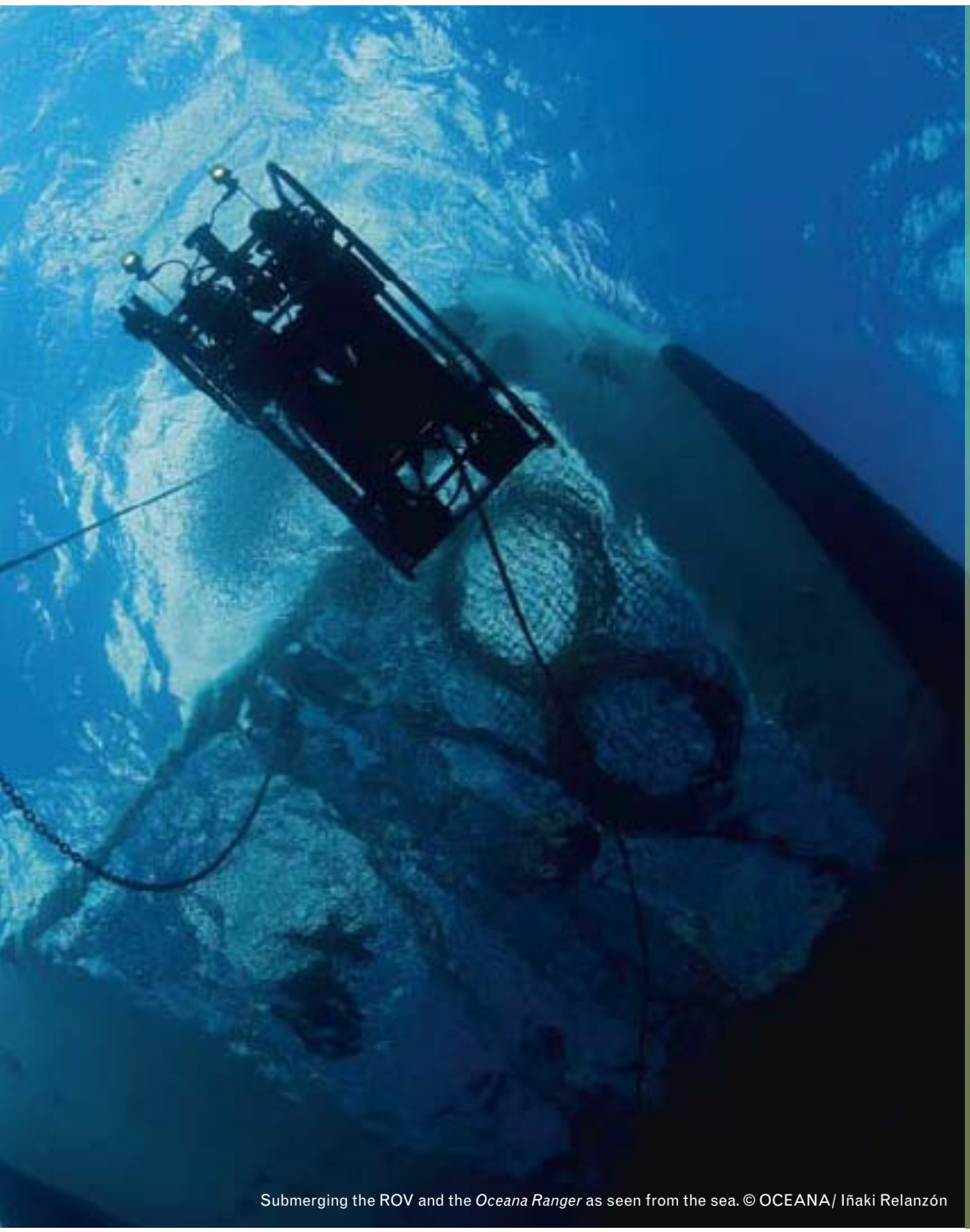

Submerging the ROV and the *Oceana Ranger* as seen from the sea. © OCEANA/ Iñaki Relanzón

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## THE IMPORTANCE OF PROTECTING SEAMOUNTS

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## CONCLUSION AND PROPOSAL FOR A NATIONAL MARINE PARK OF THE SEAMOUNTS OF THE MALLORCA CHANNEL

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