Initial Assessment

MSP oriented

Western Mediterranean

September 2018

Final Version

Supporting Implementation of Maritime Spatial Planning in the Western Mediterranean region

Grant Agreement: EASME/EMFF/2015/1.2.1.3/02/SI2.742101

Component: C 1.1 Initial Assessment: Developing an Overview

Sub-component: C 1.1.1 Develop a basin scale analysis/initial assessment strongly MSP oriented

Deliverable Lead Partner: **CORILA**

Start Date of Project: 01/01/17

Duration: 24 Months

Version: 1.3

Dissemination Level		
PU	Public	
PP	Restricted to a group specified by the consortium (including the Commission services)	
RE	Restricted to other programme participants (including the Commission services)	
CO	Confidential, only for members of the consortium (Including the Commission services)	

Document Information

Deliverable Title	C 1.1.1 Develop a basin scale analysis/initial assessment strongly MSP oriented
Coordinator	Pierpaolo Campostrini - CORILA
Authors **Contributors:**	IUAV Elisabetta Manea, Niccolò Bassan, Francesco Musco, Elena Gissi, Federico Fabbri, Denis Maragno, Alberto Innocenti CORILA Marianna Morelli, Andrea Rosina, Pierpaolo Campostrini CNR ISMAR Giulio Farella, Chiara Venier, Alessandro Sarretta, Andrea Barbanti CNR IAS Davide Di Blasi, Francesca Garaventa IMELS Oliviero Montanaro, Matteo Braida, Silvia Sartori, Alessandro Celi, Mariagrazia Eleuteri, Biancamaria Rizzo IEO Cristina Cervera-Núñez, Monica Campillos-Llanos, Maria Gómez-Ballesteros, Olvido Tello CEREMA Giret Olivier, Coraline Moirano MALTA PA Michelle Borg, Saviour Formosa, Omar Hili
Recommended Citation	Campostrini, P., Manea, E., Bassan, N., Fabbri, F., Farella, G., Di Blasi, D., Morelli, M., Montanaro, O., Gomez-Ballesteros, M., Borg, M., Giret, O., Maragno, D., Innocenti, A., Cervera-Nuñez, C., Rosina, A., Venier, C., Sarretta, A., Barbanti, A., Braida, M., Sartori, S., Celi, A., Eleuteri, M., Rizzo, B., Garaventa, F., Campillos-Llanos, M., Tello, O., Moirano, C., Formosa, S., Hili, O., Musco, F., and Gissi, E. (2018). Develop a basin scale analysis/initial assessment strongly MSP oriented for the Western Mediterranean. EU Project Grant No.: EASME/ EMFF/2015/1.2.1.3/02/SI2.742101. Supporting Implementation of Maritime Spatial Planning in the Western Mediterranean region (SIMWESTMED). CORILA. 193 pp. DOI: 10.5281/zenodo.2590100

Version History

Date	Document Version	Reviewer	Revision
02/03/2018	1.1	IEO and CEDEX	Suggestions and comments on structure and contents of the document
18/03/2018	1.1	SHOM	Suggestions and comments on structure and contents of the document
28/06/2018	1.2	IMELS	Suggestions and comments on structure and contents of the document
02/07/2018	1.2	IEO and CEDEX	Suggestions and comments on structure and contents of the document

INDEX

* AREA-BASED IS CONCERNING THE LEVEL OF DETAIL OF THE CHAPTERS

1. INTRODUCTION

Figure 1. Member states (in blue) and related partners of the SIMWESTMED project.

This Report has been created thanks to the collaboration of all the Member States involved in the SIMWESTMED project (Figure 1) that have been invited to complete the Country Fiche (CF), a document that has leaded to the development of shared knowledge regarding the marine area considered in the project. Thus, the aim of this Report is to entail a collection of information across the European countries of the Western Mediterranean region and the Strait of Sicily, including Malta waters. The Initial Assessment (IA), in fact, provides an initial overview of the area's characteristics and this report is the harmonized output of all available information including the description of marine environment, maritime activities, key sectoral and socio-economic trends and emerging pressures, legal and transboundary issues, and governance aspects. The assessment uses existing information by organizing them in a comparable way in order to carry out a previous analysis on the main driver and issues that need to be considered for future MSP processes. The IA is based mainly on desk-based reviews, in order to build a shared synthetic view on the Western Mediterranean region, identifying key issues (main activities and priority conservation issues) and data gaps that are synthesized in the following report.

2. STATE OF ART / GENERAL DESCRIPTION

2.1 NATIONAL JURISDICTIONS and MSP PROCESSES (COUNTRY-BASED) - STATE OF IMPLEMENTATION

2.1.1 Italy

Italy has defined the baselines from which its territorial sea is measured in 1977 (D.P.R. 26/04/1977, n. 816). Considering its position in the middle of the Mediterranean, Italy has concluded several delimitation agreements among the Mediterranean Coastal States in particular: Territorial sea in the Strait of Bonifacio with France in 1986; Continental shelf with Tunisia of 1971; Continental shelf with Spain of 1974.

Regarding the line dividing the fishing areas on the boundary between Italy and France near Ventimiglia/Menton, as provided for in the draft bilateral fishing convention of 1892, this is customarily recognized by the Parties as the delimitation of the territorial sea, though the fishing convention itself was never signed. An agreement for the delimitation of all maritime spaces between Italy and France was signed in 2015 but it is not yet in force.

Regarding marine delimitation with Malta, Italy has been repeatedly proposing to Malta to revive negotiations on the delimitation of the continental shelf. The modus vivendi of 1970 between the two Parties, which is not in line with the UNCLOS provisions, is not considered satisfactory by Italy.
The main elements of the Italian marine waters can be summarized as follows: Size of internal waters (to the baselines): 39,339 km^2; Territorial sea (12 nm zone): 81,528 km^2; (including 4,330 km^2 islands, not included in water areas).

Regarding the EEZ Italy has not yet declared any exclusive economic zone but it established in 2011 an ecological protection zone in the North-Western Mediterranean, in the Ligurian and in the Tyrrhenian seas (D.P.R. 27/10/2011 n. 209).

The implementation of Directive 2014/89/EU has been transposed in Italy through the Legislative Decree 17 October 2016 n. 201. An Inter-Ministerial Coordination Table (TIC) has been designed to work on the elaboration of guidelines on MSP, adopted by Decree of the President of the Council of Ministers of 1 December 2017, providing that a Technical

Committee is in charge of defining the maritime spatial plans for each maritime area identified (Western Mediterranean Sea; Adriatic Sea; Ionian Sea and Central-Western Mediterranean Sea). The Italian Ministry of Transport has been designed as the Competent Authority of the MSP implementation. In particular its functions is related to: initial recognition of the Acts and Orders of the Maritime Authority, the planning and management processes at regional, national, European or international level; forwarding to the European Commission and the other Member States a copy of the maritime management plans and related updating of Directive fulfilment; transmission to the European Commission of the information set out in the Annex to Directive 2014/89/EU and the related amendments; reporting annually to Parliament on the activities carried out in pursuit the objectives set out in the above mentioned Decree; monitoring, with the Technical Committee, the state of implementation of maritime spatial management plans; ensuring the consultation and the active participation of the public in the processes of processing; reviewing the proposals for management plans and forward to central and decentralized administration; publication on website of maritime spatial management plans; supporting transboundary cooperation among Member States for MSP implementation.

2.1.2 France

Through the order n° 2016-1687 of 8 December 2016, the French Republic claims in Mediterranean Sea internal waters, a territorial sea, a contiguous zone and an economic exclusive zone. In accordance with the United Nations Convention on the Law of the Sea, the territorial sea and the contiguous zone respectively have an extent of 12 and 24 nautical miles from the baselines. Those baselines are composed with normal and straight baselines which are defined in the French Republic's decree n° 2015-958 of 31 July 2015. Internal waters correspond to the maritime space beyond those baselines. The limits of the economic exclusive zone are explicitly described in the French Republic's decree n° 2012-1148 of 12 October 2012.

In the Mediterranean Sea, France shares maritime boundaries with three countries: Italy, Monaco and Spain. The ratified bilateral agreements concern Monaco and Italy. The maritime boundary between France and Monaco is defined in the French Republic's decree n° 85-1064 of 2 October 1985 (agreement of Paris of 16 February 1984). The maritime boundary agreement between France and Italy only concerns the Strait of Bonifacio between Corsica and Sardinia. An agreement for the delimitation of all maritime spaces between Italy and France was signed in 2015 but it is not yet in force as said above. It is defined in the French

Republic's decree n° 89-490 of 12 July 1989 (agreement of Paris of 28 November 1986). Disputed areas EEZ claims of France and Spain are overlapping in the Gulf of Lion.

The Directive 2014/89/EU establishing a framework for maritime spatial planning has been transposed in France through the Law 2016-1087 of 8 August 2016, on the restoration of nature and biodiversity (article 123) and the Decree 2017-724 of 3 May 2017 integrating the maritime spatial planning and the sea action plan in the sea basin strategic document. The competent authority has been individuated in: one couple of terrestrial and maritime Prefects (called Coordinating Prefects) on the Mediterranean Sea basin at the scale of the sea basin and the Central Government coordinates the policies. To date there is no approved marine spatial plan.

The marine areas, for which maritime spatial plans should be defined, have been identified and correspond to the 4 French sea basins (Eastern channel and North Sea; Northern Atlantic; Southern Atlantic; Mediterranean Sea).

The governance national framework for MSP can be described as it follows:

- Implementation of the strategic documents is leaded by coordinating prefects (maritime and region prefects)
- The Ministry in charge of maritime affairs has duties to: look after coherence of strategic plans at national scale; consult national committee for sea and coastline which brings together stakeholder's national representatives; report strategic plans to European Commission.
- Coordinating prefects has duty to consult stakeholders.
- Ministry in charge of the Sea and the Ministry of foreign affairs and coordinating prefects have duties to inform neighbouring countries and to look after coherence with their respective plans.

2.1.3 Spain

For defining internal waters, the territorial sea, the contiguous zone and the economic exclusive zone, Spain follows the United Nations Convention on the Law of the Sea (UNCLOS). The territorial sea is claimed by the Law 10/1977 of February 4, on territorial sea and it has an extent of 12 nautical miles from the baselines. These baselines are composed with normal and straight baselines, which are defined in the Royal Decree 2510/1977 of August 5, establishing the straight baselines for the delimitation of Spanish territorial waters and jurisdictional waters. Internal waters correspond to the maritime space beyond those baselines and the Autonomous Regions have some competences on them like aquaculture or fishing (art 148.11 Spanish Constitution). The contiguous zone has an extent of 24 nautical miles from the baselines. The limits of the economic exclusive zone in the Mediterranean Sea

are explicitly described in the Royal Decree 236/2013, of April 5, establishing the Exclusive Economic Zone of Spain in the north-western Mediterranean. No agreement has been reached with France regarding the EEZ limits in the area of the Gulf of Lion. Besides an agreement with Italy was reached in 1974 to define the boundary of the continental shelf (Instrument of Ratification of the Convention between Spain and Italy on the delimitation of the Continental Shelf between the two States, done at Madrid on 19 February 1974).

The MSP competent authority was individuated in the Ministry of Agriculture and Fisheries, Food and the Environment, General Directorate for the sustainability of the coast and the sea through the Royal Decree 363/2017, of April 8. There is no approved Maritime Spatial Plan to date.

The Inter-ministerial Commission for Marine Strategies, in June 2015, agreed to create a working group to draft the RD for the transposition of Directive 2014/89 / EU with representatives of the Departments of Development, Defence, Industry, Energy and Tourism, Economy and Competitiveness, Foreign Affairs and Cooperation, Health, Social Services and Equality, Finance and Public Administration, Education, Culture and Sports, Agriculture and Fisheries, Food and Environment and Cabinet of Presidency of the Government. In March 2017, it was agreed that this group should be transformed into a Working Group on Maritime Spatial Planning. The group is scheduled to meet regularly from autumn 2017.

The marine areas, for which maritime spatial plans should be defined, have been identified and a plan for each of the five Spanish marine demarcation will be developed (Northern Atlantic; Southern Atlantic; Canary basin; Strait and Alboran; Levantine and Balearic). The General Directorate for the Sustainability of the Coast and Sea will draw up a plan for each marine demarcation. They will be sent to the Inter-Ministerial Commission of Marine Strategies for their assessment after consulting the Committees of follow-up of the Marine Strategies, the autonomous communities, the Advisory Council on the Environment and the ministerial departments concerned. They will then be approved by the Council of Ministers.

2.1.4 Malta

Malta has defined the extent of its territorial sea, contiguous zone and the Fisheries Management Conservation Zone (FMCZ) through the Territorial Waters and Contiguous Zone Act, Cap. 226. The area of the Continental Shelf extends to a boundary as defined by Article 2 of the Continental Shelf Act (Cap. 535).

The Directive 2014/89/EU establishing a framework for maritime spatial planning has been transposed through the Maritime Spatial Planning Regulations of 2016, under the provisions

of the Development Planning Act of 2016 (Cap. 552) and the Planning authority of Malta was designated as the competent authority for MSP.

Malta is the only country of the SIMWESTMED project that has already an approved Maritime Spatial Plan (Strategic Plan for the Environment and Development, 2015) approved by the Government of Malta.

Besides the implementation of ICZM in Malta started in 1992 through the spatial planning process, efforts were ongoing to minimize user conflicts within the coastal zone of the Maltese islands that extends up to 12nm. In parallel, the adoption of the EIA procedure has guided decision making for development proposal to reduce environmental impacts as much as possible.

2.2 DESCRIPTION OF THE AREA - PHYSICAL, BOUNDARIES, GEOPOLITICAL

The marine waters considered in SIMWESTMED project correspond to the Western Mediterranean going from the Balearic Sea to the Maltese islands, crossing through the Gulf of Lion, the Corsica and Sardinia seas, the Ligurian Sea and all the Tyrrhenian up to the Strait of Sicily. The Spanish marine area corresponds to the Balearic Sea located between the Balearic Islands and the Spanish peninsular coast, surrounded by the Balearic Promontory (BP). BP is a structural elevation containing four major islands (tectonic blocks): Ibiza, Formentera, Mallorca and Menorca. The peninsular coast stretches between the Cape of Creus (Northeast of the Iberian Peninsula) and Cape of Gata (SE). Its length is of about 2400 km along the Algerian and Provenzal Basins and it is rugged, surrounded by coastal mountain ranges, with some narrow coastal plain as in the Gulf of Valencia. The Ibiza and Formentera shelf is conditioned mainly by tectonic processes that clearly mark its limits; it presents a lot of sedimentary landslides and areas with high concentration of pockmarks. In the insular margin of the BP there is also the South Mallorca Volcanic Field, with seamounts such as Ausias Marc, Ses Olives and Emile Baudot, and canyon systems (Menorca Canyon and canyon systems to the SE of Mallorca). The continental margin of the Spanish Mediterranean between Cape of Gata and Cape of Creus is divided into two sectors: the Iberian continental margin and Costero-Catalan continental margin. The Iberian continental margin is divided in the Northern arc, intermediate margin that extends from the cape of the Nao to the end of Palos, and in the Southern Arc, abrupt margin which extends from the cape of Palos to the end of Gata. The Costero-Catalan continental margin is subdivided in turn in two domains. The Coastal-Catalan domain presents important fluvial and delta deposits, an extensive submarine volcanic field from which Columbretes islands origin, and diverse submarine canyons and slides in the slope, as well as the Turbiditic System of the Ebro. The second domain is that of the Gulf of

Valencia, with prodeltaic deposits that generate lobulations along the coastline, cliffs of neotectonic influence, and a slope occupied by the Valencia Trough and the Channel of Valencia with abundant landslides and pockmarks.

Moving eastward from the Spanish marine area, there is the plateau located beyond Languedoc-Roussillon and the Bouches-du-Rhône that does not extend beyond 100 km of coast. In general, the plateau is followed by an increasingly brutal slope going east: it goes from 200 to 2000 m depth in less than 10 km off Toulon, while it takes 75 km to go from 200 to 2000 m depth at the boundary between France and Spain. The eastern part of the French marine subregion ends on a plateau in the north-east of Corsica. The west coast of Corsica and the coast located at the East of Toulon extend offshore by an abrupt slope, overpassing the depth of 2000 m in 10-20 km. In general, and particularly in the Gulf of Lion, the continental slope is characterized by numerous canyons. The deepest seabed areas reach between 2000 and 3000 m and show no significant irregularities. Many canyons along the slope (i.e. Var Canyon) can undergo morphological changes due to the sedimentary material and the seismic conditions that generate instability. The French Mediterranean region is marked by a great morphological disparity. In the West, the Gulf of Lion presents a well-developed plateau origin from the deposition and accumulation of sediments. In the East, the margin of Provence presents a very narrow platform that favours the movement of the sediments towards greater depths. The margin of Corsica presents on the contrary a plateau almost non-existent in the west and a plateau developed on its eastern facade. Within the French marine area, the vertical structure of the seabed presents four large assemblages with a much greater thickness than in the other regions: (1) the bedrock, inherited from the opening of the Liguro-Provencal basin and the latest tectonic movements; (2) a lower sedimentary unit; (3) a layer of evaporite deposited about 6 million years ago, composed of marine salts deposited during the 1500 m drop in sea level; (4) the upper sedimentary unit shaped by changes in sea level due to glacial episodes, and the emplacement of submarine canyons. In this latest unit, the distribution of sediments is mainly controlled by currents (general circulation and swells), by the contributions of the major rivers and by the major sedimentary processes such as coastal erosion and gravity flows.

The Italian Tyrrhenian coastal and marine waters comprise the area from Liguria Region to the Sicilian southern coast, including Sardinia. The Ligurian Sea presents a very narrow continental shelf, 8 km wide. The slope is furrowed by a series of canyons that converge in a main canyon SW oriented, where the basin reaches the depth of 2200 m. In the Tyrrhenian Sea, the shelf has variable widths, rather wide in the north-east in correspondence of the

Tuscany and Lazio coasts, medium in correspondence of the Campania, Sicily, and Sardinia coasts, and narrower along the Calabria coasts. The continental slope is quite extensive, discontinued by non-stable tectonic sedimentary basins and canyons. The central-southern Tyrrhenian presents an extent bathyal zone that reach high depth (about 4000 m) with a number of volcanic features. In northern part of Sardinia, the shelf is wide in proximity of Bonifacio mouths, become narrower in the NW side of the island and it is newly wide in the western and southern sides. Particularly in these last sides, the slope is rough. A ridge (Ichnusa seamount) extends in the southern fraction in proximity of the Sardinian-Sicilian canyon. The Mediterranean Sicilian section is characterized by a very wide shelf, which is connected to the African shelf and Malta shelf.

The Maltese Archipelago, aligned in a NW-SE direction, is located on the southernmost extremity of the Malta platform. The topography of the continental shelf in this area is characterised by a plateau in the middle part, with an average depth of 150 m. The shelf is flanked by a submarine ridge, which protrudes as a submerged extension of Cape Passero and embraces the shelf area along the eastern and southern perimeter. The Maltese Islands represent the emerged part of this ridge while Hurd Bank to the north east of Malta shallows to a depth of just over 50 m. To the southeast a series of relatively shallow areas, notably the Medina Bank, maintain an average depth of less than 300 m. On the southern coast of Sicily, the shelf is bounded by two wide (approx. 100 Km) and shallow (100 m) banks on the western (Adventure Bank) and eastern extremities (Malta Channel area), while it narrows down considerably along its middle part. The shelf is interrupted from its extension towards the west by the relatively deep Gela Sicilian basin separating it from Adventure Bank. On its eastern extremity, it deepens abruptly into the deep Ionian Sea with a very sharp escarpment (known as the Malta Escarpment). The Malta Trough (referred to as 'Malta Graben') to the south west of Malta forms part of a cluster of flat bottomed depressions reaching a depth of around 1650 m. The islands are very close to the shelf break and flanked by a very steep bathymetry in the South. On a more local scale, information on geomorphology and substrate types pertains mainly to coastal waters. The North-eastern coast of the Maltese Islands is characterised by a gently sloping shore, which continues underwater as a gently sloping rocky bottom. Further offshore, a change in seabed type from rock to sand occurs. The latter substratum is generally highly heterogeneous and may be characterised by a mosaic of substrata, which apart from bare sand would include sand intermixed with cobbles/pebble/shingle, small boulders and patches of bedrock covered by a thin layer of sand. In contrast, most of the Southwestern coast of the Maltese Islands is characterised by cliffs and boulder screes. The seabed adjacent to the coastline within these sites is characterised by vertical drop-offs with boulder fields at their base. The seabed within the

area extending from offshore north Gozo to south-east Malta covers the bathymetric depth range of 5–250m and is mainly characterised by flat to gently sloping seafloor. A steep escarpment at a depth of 120–130 m divides the seafloor into two parts: (i) the 'shallow' part, at depths less than 45 m is mostly covered by *Posidonia oceanica* meadows colonising both coarse grained sediment and bedrock. At greater depths, this part is mainly characterised by maerl associated with sand and gravel, however it also comprises areas characterised by medium-fine sands. (ii) The 'deeper' part of the seafloor is a smooth, featureless surface almost entirely composed of medium to fine sand. Overall, the least extensive natural seafloor composition class is non-vegetated bedrock.

The water masses that can be differentiated in the water column of the Western Mediterranean Sea has an Atlantic origin and they are been transformed by processes of evaporation, mixing and convection, and by the time of residence in this sea. Along the Spanish coast, the general model of circulation in this sector is cyclonic, with two permanent currents: the Northern Current and the Algerian Current. The first one, which transports Atlantic Water with a long period of residence in the Mediterranean, colder and more saline, affects the peninsular coasts to the north of the Ibiza Channel and the northern coast of the islands (Balearic Sea), also affected by the semi-permanent current called Balearic Current. The Algerian Current, formed by recent Atlantic Water, affects the southern coast of the islands and the peninsular coast of the Cape of Gata. Along the French coasts the swells oblique to the shore cause a transit of the sediments. The currents thus generated are dependent on the orientation of the ribs and will be able to present opposite orientations. The direction of this coastal drift thus presents an original variability compared to the other marine sub regions. This current played a major role in the redistribution of fluvial sediments that origin from coastal erosion. Such hydrodynamic characteristics favour and the construction of natural barriers and the natural protection of the shoreline. More offshore, the platform currents present a complex organization, especially around the periphery of Corsica. On the continental slope of the Gulf of Lion, the Liguro-Provençal current circulates permanently from east to west. The main horizontal sea currents have anticlockwise directions. The zones in where they reach higher intensity, annual mean speed >0.250 m/s, are the Ligurian Sea (cyclonic direction), the central Tyrrhenian Sea east of Bonifacio (cyclonic direction), south-west Sardinia (north-south direction), and the Strait of Sicily (NW-SE direction). The seasonal trends show a rise of the speed during the summer and autumn. The upwelling phenomena, the vertical currents that move and interchange surface and deep waters, are due to the combination of currents and wind, and the Ligurian Sea, the north-central Tyrrhenian Sea, the north-western Sicily, the Strait of Sicily are the most exposed

areas. However, the presence of the Maltese Islands with their characteristic topography and bathymetry, influence the flow of water in the central area of the Strait of Sicily. This influence plays a crucial role in the passage of the superficial and intermediate water masses in transit between the eastern and the western Mediterranean sub-basin, also preventing the direct mixing of the water masses from the deep and bottom layers of the two sub-basins.

3. MARINE ENVIRONMENT – GENERAL DESCRIPTION OF MAIN ECOSYSTEM CHARACTERISTICS

3.1 GENERAL DESCRIPTION

The Mediterranean Basin is considered one of the most important seas in the world for its great ecological value. The region comprises a vast set of coastal and marine ecosystems that deliver valuable benefits to all its coastal inhabitants, including brackish water lagoons, estuaries, or transitional areas, coastal plains, wetlands, rocky shores and nearshore coastal areas, seagrass meadows, coralligenous communities, frontal systems and upwellings, seamounts, and pelagic systems. 87% of all Mediterranean species occur in the western basin, including flagship charismatic species such as cetaceans, turtles and seabirds.

One of the most studied and ecologically important habitats in the Western Mediterranean Sea is represented by **seagrass meadows**. This is a key habitat in the context of coastal areas for its diffused distribution, as well as for its fundamental ecological role being habitat of nursery, protection and foraging for several marine organisms. Five species of seagrasses have been listed in the Mediterranean: *Cymodocea nodosa, Halophila stipulacea, Posidonia oceanica*, *Zostera marina* and *Zostera noltii*. These are marine flowering plants that form vast underwater meadows between zero and 50 m depth in the open sea and in lagoons. Several studies have documented the negative effects of human pressures on seagrass habitat. Among the main drivers of impact on this habitat there are bottom trawling, anchorages, aquaculture, ports, breakwater and artificial beaches. Seagrasses are highly sensitive to environmental changes and they are considered among the best indicators to assess the health of the underwater coastal ecosystems.

Other highly important benthic habitats are those formed by calcareous bio-constructions such as **coralligenous and maërl**. **Coralligenous** is considered as the second benthic habitat in the Western Mediterranean in terms of biodiversity. It is estimated that it includes around 1700 species, among them 1300 algae, 1200 invertebrate species, in particular the well-known Mediterranean red coral (*Corallium rubrum*) and more than hundred fish species. The

coralligenous is the result of an edification process due to the precipitation of carbonated calcium present in seawater thanks to the action of several benthic organisms, such as the coralline algae. This process is more or less rapid depending on the season and the environmental conditions that are present in a particular site. However, it is estimated that several thousand years are necessary to the edification of these complex biogenic structures. Its geographical distribution remains badly known at regional level. Still, the available studies show that this habitat and the related ecosystem are directly threatened by specific human activities such as trawling or the exploitation of the red coral by prohibited gears. It seems also to be subjected to indirect effects and be vulnerable to climate change impacts. These threats affect the stability of this ecosystem and strongly mortgage its future maintain.

Maërl beds are another specific type of representative calcareous bio-constructed habitat with high ecological importance in the Western Mediterranean region. Mediterranean maërl beds are sedimentary bottoms covered by a carpet of free-living calcareous algae (Corallinaceae or Peyssonneliaceae) that develop in dim light conditions. Both coralligenous and maërl beds main threats are trawling, artisanal and recreational fishing, anchoring, invasive species, global warming, waste water discharges, aquaculture, changes in land use and coastal infrastructure construction and urbanization, recreational activities (e.g. scuba diving), mucilaginous and filamentous algal aggregates.

Macroalgae species also form representative habitats of the Western Mediterranean coastal area, the most representatives being *Cystoseira* forests and *Lithophyllum* rims. The various forms of brown algae of the *Cystoseira* genus can occupy large areas in the marine ecosystems, where they form highly productive communities with remarkable biodiversity. *Lithophyllum* is a genus of calcareous algae typically found on medio littoral rocky environments. These species thriving in shallow-water zones are among the most strongly affected since they are located in a boundary environment, exposed to impacts of both terrestrial and marine origin. They are threatened by contaminants, nutrient enrichment, sediment loads, increase in seawater temperature, habitat alteration resulting from coastal urbanisation, introduction of non-indigenous species or increased herbivore activity due to alterations in the trophic chain.

Marine caves are another habitat typical of the Western Mediterranean Sea, which offers unique habitats especially due to the especial conditions generated by lack of light.

Besides the highly biodiverse coastal benthic habitats already mentioned, other relevant benthic ecosystems can be found at greater depth, among these, **deep-water coral reefs** are

recognized as ecologically highly important. Indeed, deep-water coral ecosystems are biodiversity hotspots. They harbour rich ecosystems and provide shelter to a huge variety of organisms, including commercial species, which use them as nursery grounds. This habitat can be found from depth higher than 50 m up to 700 m. Despite the fact that over half of the coral species known to date are found in deep waters, they have been poorly studied. Still it is known that they are generally located on sloping topography and at topographic heights such as along the continental shelf, slopes, and flanks of submarine canyons and seamounts, areas which boast accelerated currents and hard substrates, which are needed by the coral larvae to settle. The main threats identified for this habitat and the related ecosystem are bottom trawling, hydrocarbon-mineral exploration and climate change.

While benthic habitats host strictly bottom dependent ecosystems, **pelagic habitats** include the water column features and their associated organisms. Pelagic habitats are fundamental in the context of the Western Mediterranean Sea, hosting hundreds of different organisms including bacteria, phytoplankton, zooplankton, fishes, reptiles, mammals and birds which are linked by energy and nutrient flows, interacting with each other and with the physical environment. Pelagic ecosystems and their biological components are harmed by several impact drivers, such as shipping, fishing, pollution and climate change.

Aside from all the key ecosystems previously identified, there are **single animal species** which have particular relevance in the context of the Western Mediterranean Sea for their key role in the ecosystem functioning, their high sensibility to specific impacts and in most cases for showing a highly migratory behaviour and therefore a wide and heterogeneous spatial distribution. This group of animals include seabirds, cetaceans (e.g. whales, dolphins, sperm whales), sharks and other elasmobranchs, bony fishes and some invertebrate species. Each of these animal species is threatened by several factors. Cetacean species are harmed by incidental by-catch in fishing gear, exposure to pollutants, collisions with shipping vessels, underwater noise, overfishing and habitat degradation. Sea turtles are threatened by incidental by-catch from fishery and collision with boats, ingestion or accidental entanglements in plastic material. Shark species in the Mediterranean are highly threatened by fishing activity, thus the high by-catch rate has driven most autochthonous shark species to a severe decline. Seabirds are threatened mainly by habitat degradation and accidental by-catches.

The Western Mediterranean Sea is also an important area for fishing target species of **fish and invertebrate species (e.g. crustaceans, molluscs, etc.), with commercial interest.**

Fish stocks in the whole Mediterranean Sea are generally fully exploited or overexploited by fisheries. This condition is leading to heavy risks of collapse of the stocks, urging the needs of proper regulation of the exploitation of the resources and sustainability of the adopted gears.
In addition to fishing, other pressures are identified as potential threats for fish population in the Western Mediterranean Sea. These are: selective extraction of species, including incidental non-target species; contamination by hazardous substances; interferences with hydrological processes, potentially affecting the spawning, breeding and feeding areas and migration routes of fish; underwater noise.

3.2 SPATIAL DISTRIBUTION

Posidonia oceanica is the predominant forming habitat seagrass species in the Western Mediterranean Sea. Its distribution goes from the Spanish coast, where it covers 633.16 km2 in Balearic Islands, 22.94 km2 in Catalonia, 320.72 km2 in Valencian Community, 112.86 km2 in Murcia Region and 69.18 km2 in Andalusia (Figure 2). Cymodocea nodosa is the other dominant seagrass species that extends along the Spanish coast (Figure 3) for 13.66 km2 in Balearic Islands, 28.82 km2 in Catalonia, 83.73 km2 in Valencian Community, 89.36 km2 in Murcia Region and 66.65 km2 in Andalusia. A minor coverage related to Zostera noltii meadows is also present (2.74 km2 in Catalonia and 0.03 km2 in Murcia Region; (Figure 4). A fragmentation and regression of the upper and lower limit of P. oceanica habitat has been observed within its distribution areas in Balearic Islands and in Catalonia.

This information has been collected thanks to projects: LIFE-POSIDONIA BALEARES (LIFE00/NAT/E/7303. 2001 July 5); LIFE CONSERVACIÓN DE LAS PRADERAS DE POSIDONIA OCEANICA EN EL MEDITERRÁNEO ANDALUZ (LIFE09 NAT/E/5341. Enero 2011- 30 Noviembre 2015) and Project to develop the "
Sea-grass atlas of Spain" Ruiz, J.M., Guillén, J.E., Ramos Segura, A. & Otero, M.M. (Eds.). 2015. Atlas de las praderas marinas de España. IEO/IEL/ UICN, Murcia-Alicante-Málaga, 681 pp.

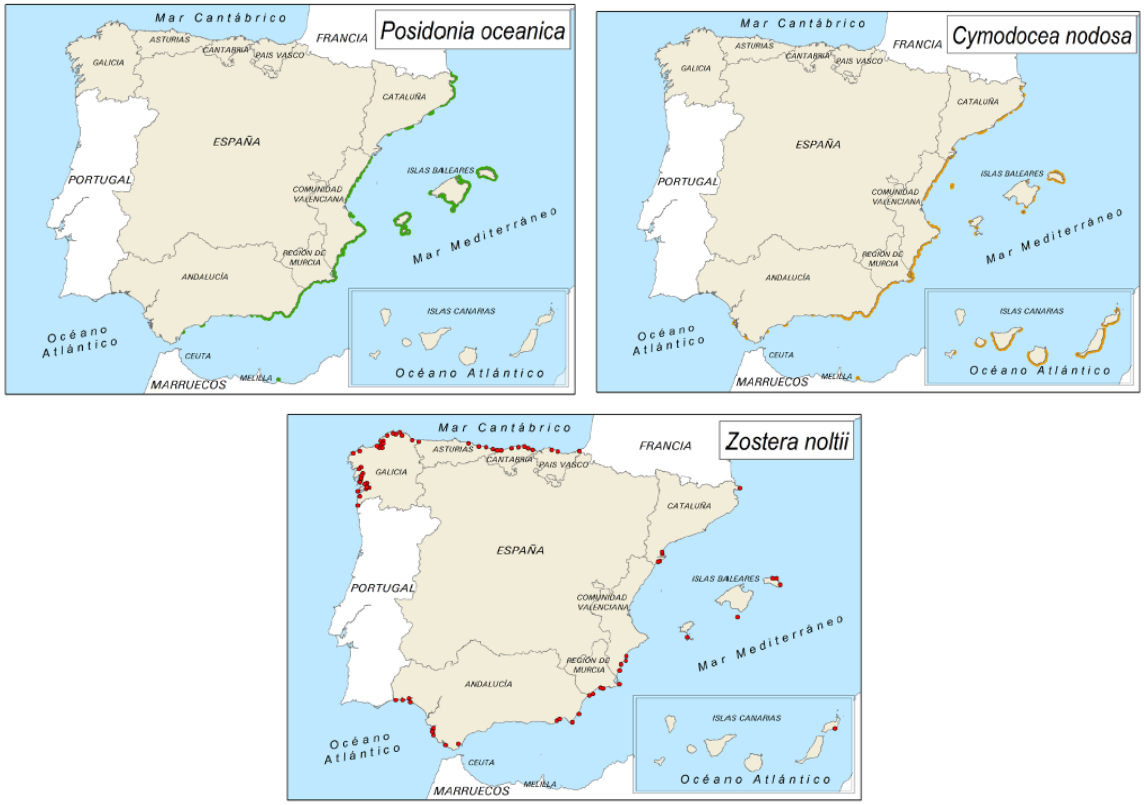


Figure 2,3,4 Distribution on the Spanish coasts of *Posidonia oceanica, Cymodocea nodosa, Zostera noltii. Sea grass atlas of Spain.*

Along the French Mediterranean coast, the *Posidonia* meadows are considered a key habitat, especially in the infralittoral area where they cover around 900 km2 (ca. 5% of the continental shelf) primarily distributed in Corsica and in the Provence-Alpes-Côtes d'Azur (PACA) region (Figure 5). In more sheltered areas (lagoons and bay bottoms), *Cymodocea nodosa* and *Zostera marina* seagrass meadows also develop. Specific data gaps on the French marine areas are not specified.

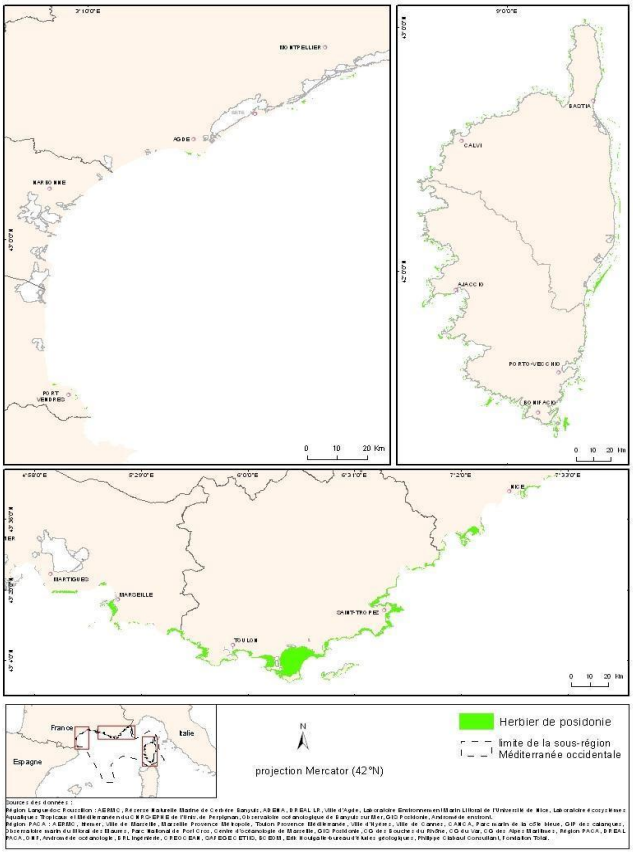


Figure 5 Distribution of *Posidonia* meadows in the French coasts

Proceeding toward South-East along the Western Mediterranean coast, seagrass beds are present mainly ranging between 0 and 35 m depth. In the Ligurian Sea, *Posidonia oceanica* meadows show decreasing trends between 0-15 m and 25-35 m depth, likely due to anthropogenic pressures exert in correspondence to Genoa and Savona cities, and the presence of two major river mouths sited in the Gulf of Tigullio. In general, the limited development of the lower limit of *Posidonia* beds distribution is due to the increasing turbidity of the water column and the construction works carried out along the Ligurian coasts in the last decades. In the Tuscan Archipelago, seagrass meadows, represented by *Posidonia oceanica* and *Cymodocea nodosa*, cover 201,4 km^2 presenting partially unstable conditions in terms of distribution near the urban and industrial sites and near the Arno river mouth. On the contrary, around the Archipelago (Elba, Giglio, Pianosa, Capraia and Gorgona islands), where the human impact is very limited, they mainly present a good status. Along the Central Tyrrhenian coasts *P. oceanica* and *C. nodosa* beds cover 156,33 km^2, extending from Torre Flavia to Tuscany and from the Tor Paterno MPA to Sperlonga and Torre Astura and around the Pontine islands (Ponza, Zannone, Palmarola, Ventotene and S. Stefano). Also in the North part of the Volturno river mouth and around Ischia Island seagrass meadows are present. The habitat conditions are very heterogeneous, with unstable trends in particular

near the urban and industrial-agricultural sites and near the ports and river mouths (Tevere, Volturno, Garigliano, Sarno, Rialto, Sele, Alento, Lambro, etc.). On the contrary, a stable trend is detected related to Lazio and Campania archipelagos where human pressures are limited. In Sardinia Island seagrass meadows, mainly constituted by *P. oceanica*, covered almost 871,5 km^2 of southern coastal area. They extend from the Gulf of Oristano southward, as well as along the Eastern side and Western side of the Sulcis islands (S. Antioco and S. Pietro). Here the conditions of this habitat are mainly stable, as it is in Capo Carbonara and Cavoli Island in the South-Eastern side. On the contrary, regression trends are observed from the Gulf of Cagliari to the Gulf of Teulada and Palmas. No distribution maps are available related to seagrass meadows distribution in Italian Tyrrhenian waters. On the Italian coast information gaps relate mostly to the lack of updated information on habitat distribution, extend and condition cartography and dataset that are not enough updated.

Southerly, around Malta Islands, *Posidonia oceanica* beds develop mainly in littoral and shallow sublittoral sediments, covering a total area of 168 km^2 (Figure 6).

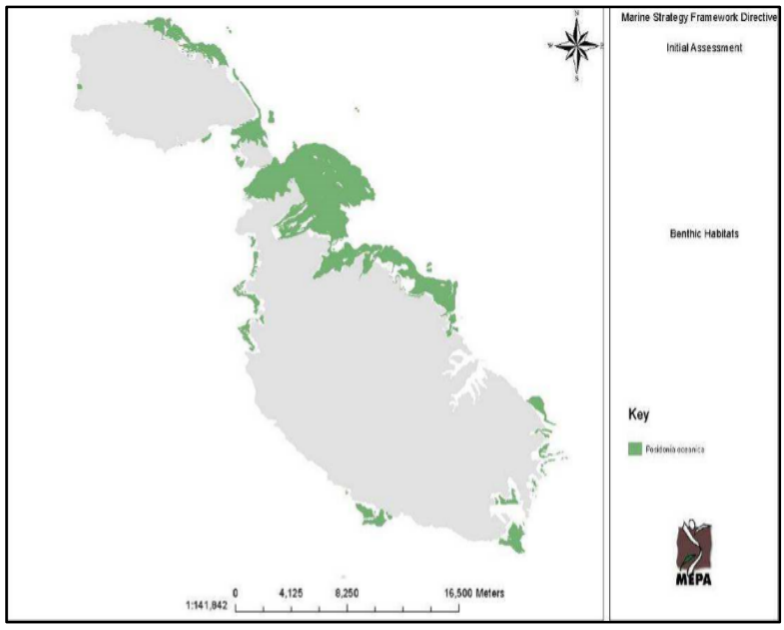


Figure 6 Distribution of *Posidonia oceanica* meadows in the Maltese coasts

Specific monitoring surveys (side scan sonar, multibeam and R.O.V.) and macro structural, functional and ecological investigations should be planned for a better understanding of seagrass population estate and trends.

Calcareous bio-constructions are present through the Spanish coast, where circalittoral and/or coralligenous substrata within 50 m depth, extends for 0.90 km2 in Murcia Region,

32.47 km2 in Valencian Community, 30.42 km2 in Catalonia and also develops on the continental shelf of Balearic Islands where it covers 68.80 km2.

Moving easterly, coralligenous is well represented on specific spots in the French coastal area of the Gulf of Lion and on the waters adjacent to Corsica island coastline mainly on the west side (Figure 7).

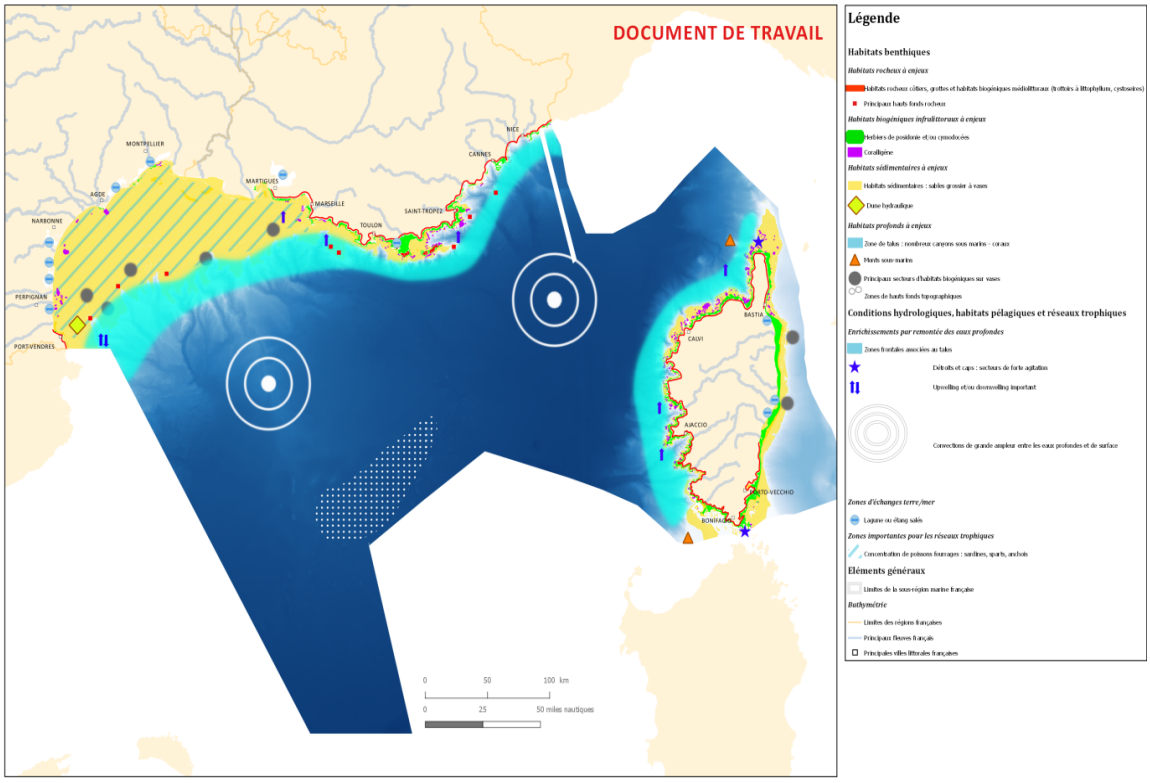


Figure 7 Distribution of benthic habitats in the French waters

In the Ligurian Sea this habitat is found on rocky bottoms and extends for about 10 km along the coast (Portofino 8 km; La Spezia 2 km) on a depth ranging between 16 and 104 m (on average 40-50 m). In this area regressions trends have been observed near areas of intense human activities (e.g. ports), while negative impacts from fishery (trawling, trammels and long lines) have been observed in offshore sites. Restricted information is available for this area on the distribution and extension of coralligenous beds, practically unknown it is the structure and dynamics of the deeper coralligenous communities, sited in the twilight zone, generally present on rocky outcrops, and extending up to 120 m depth. Inside the Portofino Marine Protected Area, this habitat has been studied in terms of distribution, structure, dynamics, age, fishing impact and biodiversity while for the other sites accurate field studies must be urgently done.

In the Tuscan Archipelago about 9 km2 are covered by coralligenous at a depth ranging from 23 m to a lower limit estimated to exceed 100 m.

In the Southern Tyrrhenian Sea, the coralligenous habitat extends for an estimated surface of 103 km2 in all types of hard substrates on a depth ranging between 30 and 135 m (on average 40-50 m) in Calabria. In Southern Sardinia, it extends for about 67 km2 reaching a depth estimated to exceed 100 m. In the central Tyrrhenian Sea, this habitat covers around 9 km2 at a depth range of 25 to 100 m (lower limit estimated at 160 m).

For the marine areas of the Tuscan Archipelago, the Southern Tyrrhenian Sea, Southern Sardinia and Central Tyrrhenian Sea the available data on coralligenous beds are insufficient both in terms of distribution and habitat conditions, since no dedicated-on field activity has been carried out along the Italian coasts. These information gaps should be addressed with the development of specific and standardized protocol for the collection and analysis of the data. Moreover, it is important to investigate the sensitivity of this habitat to human-induced impacts.

In Malta coralligenous beds are also found but no data have been provided on its distribution and trend.

In the Spanish Levantino-Balear Demarcation, maërl beds (within 50 m depth) are found in Region of Murcia where they cover 39.21 km^2 and southerly in Balearic Islands, where they extend for 25.54 km^2 with stable population trends.

Along the Spanish coast there is a deficit of cartography of biological communities present on rocky and sedimentary infralittoral and medio littoral habitats due to dispersed and very site-specific studies. For both sedimentary and rocky circalittoral and bathyal habitats the data is only an approximation, and for bathyal and abyssal depth the studies are very limited. Moreover, there aren't studies on size distribution about all benthic taxa. There are only few studies about structure and functionality of benthic ecosystems and a shortage of studies on susceptible and opportunistic species. In general, there is lack of studies on habitats modelling, and the data about pressures need more precision.

Combinations of maërl and other crust-forming algae are primarily present in Corsica and in the Hyères roadstead, and in smaller areas elsewhere in the PACA region, on detritic bottoms down to 40 m depth.

Hard substrata on the French coast host “three-dimensional” reefs that provide habitats for a whole range of animal species. A number of species dependent on rocky environments represent conservation challenges due to their vulnerability: corb, dusky grouper, ribbed Mediterranean limpet, Mediterranean slipper lobster and date shell. These species are all protected by regulations prohibiting their extraction. Reef biocenoses of Corsica and some

parts of the PACA coastline offer particularly good and well-preserved examples of these habitats.

In Liguria, maërl beds cover around 10 km of coastal marine bottom, mainly in the area in front of Portofino Promontory (8 km) and La Spezia (2 km), ranging from a depth of 16 to 104 m depth (on average 40-50 m) on rocky bottoms. In this area regressions trends have been observed where intense human activities (e.g. ports) are localized, while negative impacts from fishery (trawling, trammels and long lines) have been observed in offshore sites. Restricted information is available for this area on the distribution and extension of maërl beds, practically unknown it is the structure and dynamics of the deeper maërl communities in the twilight zone, generally present on rocky outcrops, up to 120 m depth. Inside the Portofino Marine Protected Area, this habitat has been studied in terms of distribution, structure, dynamics, age, fishing impact and biodiversity, while for the other sites accurate field studies must be urgently done.

The extension of maërl beds in the Tuscan Archipelago have been estimated to be around 592 km2, mainly in the area from Elba Island to Piombino coast and from Elba Island to the western limit of the assessment area of the Tuscan Archipelago where the depth range starts from 32 up to 114 m depth.

In the Central Tyrrhenian Sea, the extension of this habitat is estimated to be around 42 km2 ranging between 36 and 91 m depth. For the area of Western Sicily there are no available data on the extent of maërl habitat, however its presence has been recorded and its depth range is estimated to be between 34 and 47 m depth. In North Sardinia maërl extends for an estimated surface of 202 km2 between 43 and 79 m depth. For the marine areas of the Tuscan Archipelago, the Central Tyrrhenian Sea, Western Sicily and Northern Sardinia the available data on maërl beds are insufficient both in terms of distribution and habitat conditions, since no dedicated-on field activity has been carried out along the Italian coasts. These information gaps should be addressed with the development of specific and standardized protocol for the collection and analysis of the data. Moreover, it is important to investigate the sensitivity of this habitat to human-induced impacts.

The major maërl beds in Malta covers an estimated seabed area of 20 km2 off the north-eastern coast, at 30-100 m depth.

Seaweeds dominant coastal areas are also well represented in the Western Mediterranean Sea.

Caulerpa sp. coastal habitat, covers 0.02 km2 in Andalusia, 100.65 km2 in Valencian Community and 0.69 km2 in Balearic Islands.

In the Gulf of Lion, hard substrata are commonly covered by overhangs or "pavements" of *Lithophyllum lichenoides* made by crust-forming algae and belts of red algae (*Rissoella verruculosa*) in the medio littoral zone, *Cystoseira* sp. populations in the infralittoral and medio littoral zone, *Laminaria rodriguezii* in the infralittoral zone and coral in the infralittoral and circalittoral zones. No available data were provided on seaweeds community on the Italian coast. In Malta, *Cystoseira* sp. communities cover 66% of the rocky coastline, while photophilic macroalgae extension is estimated at 38.1km2 mainly on shallow sublittoral sediment (Figure 8). No data were provided on the trends of seaweed species in the entire study area.

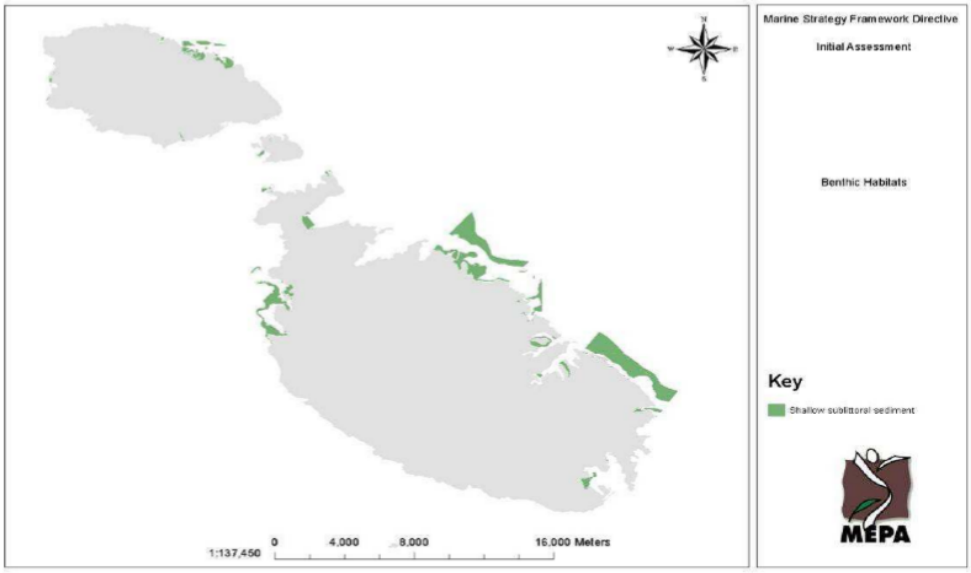


Figure 8 Distribution of communities associated with shallow sublittoral sediment in Maltese waters

Within the French marine jurisdiction there are relevant **deep habitats** on the continental shelf slope as several submarine canyons (Lacaze-Duthiers, Cassidaigne, Porto and Valinco) and seamounts (Asinara and Cap Corse), which offer highly diverse fixed fauna on rocky areas (white, yellow, red and black coral, gorgonian coral, sponges and oysters). Deep silty areas (the Petit Rhone, Couronne and Saint Florent canyons) also exhibit diversified fauna like that one observed on the shelf (pennatulas, gorgonian coral and crinoids). Biogenic habitats on the sedimentary bottoms also exhibit vulnerable biocenoses of pennatulas, *Isidella elongata* gorgonian coral and crinoids (or feather stars) on silted up sectors of the shelf beyond depths of 40 m. The French abyssal plain is composed of fine sediments, its central part is made of "topographic highs" formed by accumulation of salts. The ecosystems associated with the

plain and these reliefs are not known. Deep habitat distribution in Italian waters is not available.

In Malta, it was reported the presence of biogenic reefs with unknown distribution**.** Species detected were: *Lophelia pertusa* (found at depths of 453-576m) and *Madrepora oculate* (found at depths of 453-612m), *Desmophyllum dianthus* (found at depth of 395m-617m). The white coral community is associated with *Corallium rubrum* (detected at depth of 585-819m) and other gorgonians.

A currently ongoing (expected to be completed in June 2018) EU Funded project - LIFE Bahar designed to survey offshore benthic habitats, detected in Maltese waters the presence of areas with extensive and diverse living coral assemblages (300–1000m depth), including white, black, red (deepest known presence at 1016 m) and gold corals.

For the marine area surrounding Malta, the majority of the existing data pertains to inshore waters, with only sporadic data available for deeper offshore habitats, with respect to the distribution, extent and conservation estate. The uneven data distribution on marine habitats is attributed to the fact that ecological surveys in Malta throughout the past years focused on depths that could be reached by SCUBA diving and/or inshore areas subject to coastal developments. Deeper waters have only recently started being scientifically investigated. Data gaps for Maltese benthic habitats associated with shallower waters pertain mainly to trend data and information on the species associated with the habitat types, the latter required for assessment of habitat condition. Due to limitations in trend data, the MSFD Initial Assessment for Malta was mainly based on an aggregation of snapshot data collected throughout the past years as well as extrapolated data. Data on reference conditions, as well as extent and nature of impacts, is also limited, as a result of which this assessment was strongly based on expert-judgement. Overall quantitative data as well as data on impacts of native communities is lacking, with only recent published literature documenting new records providing quantification of abundance and mapping distributions.

Data on marine caves are limited, and good examples such habitat are indicated only for the Balearic area, in the Bouches du Rhône *département* and Corsica.

Among the **benthic animal species** of particular relevance, the **noble pen shell** (*Pinna nobilis*) is well represented in the entire Western Mediterranean basin, principally in coastal areas between 0.5 and 60 m depth, on soft sediments colonized by seagrass meadows. The typical density of this species is 1 individual every 100 m^2, the overall population trend for the area is not known. *P. nobilis* is characteristically found in association with seagrasses. There is severe lack of information on this species ecology, population trends and distribution within

Italian coastal waters despite the fact that it is protected and it is diffused with several conspicuous populations.

The **ribbed Mediterranean limpet** (*Patella ferruginea*) is typically found in the high mesolittoral, and less commonly in the supralittoral and low mesolittoral. It was originally distributed through the whole Western Mediterranean, but currently its presence is reduced to few coastal areas in the western basin. Nowadays populations of *P. ferruginea* can be observed along the coasts of Sardinia, Tuscan Archipelago, Pantelleria and the Strait of Sicily. Although the populations in Sardinia are in clear decline, the presence of this species has been reported in three MPAs (Tavolara-Punta Cavallo, Asinara and Penisola del Sinis-Isola di Mal di Ventre), the Maddalena archipelago and the harbour of Arbatax. Overall, the spatial distribution, abundance and status of *P. ferruginea* along Italian coast remain largely unknown. Along the Italian coast there is scarce information on the ecology, distribution and harvesting rates of *P.ferruginea*, to fill this knowledge gap further investigations and specific monitoring programs are required. In the Western Mediterranean Sea, the animal species of particular relevance with highly migratory behaviour comprehend seabirds, cetaceans, sea turtles, sharks and fishes (e.g. bluefine tuna). Within the Alboran Sea and the Levantino Balearic region there are 22 fish species, 3 reptile species and 7 marine mammal species that are prioritized for conservation. In this area, data on distribution of species do not exist with the exception of some cases, while data on trends have not been provided. The Gulf of Lion, in French waters is a major concentration zone for marine avifauna (Figure 9), such as shearwaters, terns, storm petrels and yellow-legged gulls, in the summer, and to a lesser extent in the winter. The offshore zone exhibits lower concentrations of marine species, apart from storm petrels and little gulls in winter. Lagoons, islands and islets in this subregion provide important nest-building areas for marine avifauna. This gives the sub-region a significant role in the conservation of 8 marine species (storm petrels, yelkouan and Scopoli's shearwaters, Audoin's, slender-billed and yellow-legged gulls, gull-billed terns and European shags) along with the Kentish plover in the coastal zone. The Camargue region is also an internationally important wintering site for anatidae and waders. Data on avifauna population distribution, abundance and trends on French coastal and marine areas were not provided.

The **mediterranean shag** (*Phalacrocorax aristotelis desmarestii*) in Tuscan archipelago has a breeding population of less than 100 pairs. In Circum-Sardinian seas the breeding population is higher than 1500 pairs (among the highest population number within the global range of this subspecies). In both areas, the distribution is relatively well known, the location of colonies varies between years and data on demographic parameters are insufficient to evaluate trends. Among future needs to improve the knowledge on this species within Italian

coasts a national monitoring program during the breeding season must be implemented and knowledge gaps on demographic trends and importance of pressures should be filled.

The **yelkouan shearwater** (*Puffins Yelkouan*) breeding distribution in Tuscan archipelago is mainly confined to two islands (Montecristo and Capraia). The location of its colonies does not vary between years, unless a site is abandoned as for the case of Giannutri Island, and partial surveys in the area suggest decreasing population trend. In Circum-Sardinian seas the breeding population is estimated at 10000-14000 pairs, of which 9900-13400 in the Tavolara MPA (nearly half of the known world population), other breeding sites are in small islands and three areas of coastal cliff. Local trends are decreasing in the long term and some sites have been abandoned in the past. On Italian coasts, insufficient or not analysed data prevent a safe assessment of demographic trends and important pressures for this species. To achieve this goal capture/recapture analysis should be done.

The **scopoli's shearwater** (*Colonectris Diomedea*) in Tuscan archipelago presents a breeding population that amount to at least 1500 pairs. The allocation of colonies is shared between four islands and it does not vary between years, unless a site is abandoned. Data on demographic parameters collected so far are insufficient for trend analysis, but probably the population increased following rat eradications in the last two decades at two major sites (Giannutri and La Scola). In Circum Sardinian seas the breeding population amount to at least 3000 pairs. The allocation of colonies is shared between several small islands and three areas of coastal cliffs, and it does not vary between years, unless a site is abandoned as for the case of Isola Rossa. Data on demographic parameters and pressures collected so far are insufficient for trend analysis.

The **audouin's gull** (*Larus audouinii*) in Tuscan Archipelago has breeding population of approximately 100 pairs (wintering population <10 inds.). An overall negative trend has been observed with local trends very variables and some case of re-colonization of abandoned sites. The breeding distribution is shared between few islands and is variable on a year-to year basis. Raw data on demographic analysis are available and need to be analysed. In Circum-Sardinian seas the breeding population amount to approximately 900 pairs (wintering population <100 inds.), an overall fluctuating trend have been observed with local trends very variable: from marked decrease and local extinction to increase. Breeding distribution is shared between small islands, coastal lagoons and occasionally coastal cliffs. Raw data on demographic analysis are available and need to be analysed. On the coasts and islands of Latium and Campania, the breeding population amount to approximately 100 pairs (wintering population <100 inds.), an overall fluctuating trend have been observed with local trends very variable: from marked decrease and local extinction to increase. Breeding distribution in Latium is shared between islands and cliffs on the mainland coast (Gaeta and

Palinuro). The location of colonies is variable on a year-to-year basis. Raw data on demographic analysis are available and need to be analysed. Within the entire Italian coast insufficient or not analysed data prevent a safe assessment of demographic trends and importance of pressures for this species. To achieve this goal capture/recapture analysis should be done.

In Malta aggregations of **seabird species** are regularly observed on coastal waters during spring and autumn migrations or during winter and offshore feeding birds occur regularly. Coastal cliffs and screes, which predominate along the Southwestern coast of the Maltese Islands, provide shelter and a breeding habitat to offshore pelagic feeding birds, namely Scopoli's Shearwater, *Calonectris diomedea* (IUCN: Least concern), *Yelkouan Shearwater* (IUCN: Vulnerable), and the European Storm Petrel, *Hydrobates pelagicus* (IUCN: Least concern). Malta is deemed to be an internationally important breeding location for all three species. Coastal cliffs are also important for the Yellow Legged Gull, *Larus michahellis* (IUCN: Least concern) an inshore feeding bird that breeds and occurs in significant numbers around the Maltese Islands. Trends and abundance data on marine avifauna in Maltese coastal marine areas have not been provided. Other classes of highly migratory species including cetaceans, sea turtles and sharks have great ecological relevance in the study area and are well represented by different species.

Indeed, Mediterranean French waters are recognised as an Important **Marine Mammals** Area (IMMA). Several species have been regularly observed in surveys: deep-diving species (fin whales and sperm whales), striped dolphin, Risso's dolphin. The main concentrations of the common bottlenose dolphin, a primarily coastal species, are in the Gulf of Lion, Cap Corse, the Strait of Bonifacio, and to a lesser extent in the PACA region (Figure 9). Beaked whales are also found in this area, but little is known on their distribution and abundance. Offshore waters are also visited by loggerhead **sea turtles** in summer. The functional zones where these species are found are dependent on the pelagic habitats.

Moreover, some **elasmobranchii** species with highly unfavourable conservation status on an international level are present (Figure 9) in the marine sub-region (e.g. white skate, sawback angel sharks and devil fish, gulper sharks, porbeagles, basking sharks and blue sharks).

A catch zone for long nosed skate (also threatened) has also been reported to the east of Corsica. These species present very significant conservation issues.

Data on trend, distribution and abundance of marine mammals, sea turtles and marine birds have not been provided for French waters.

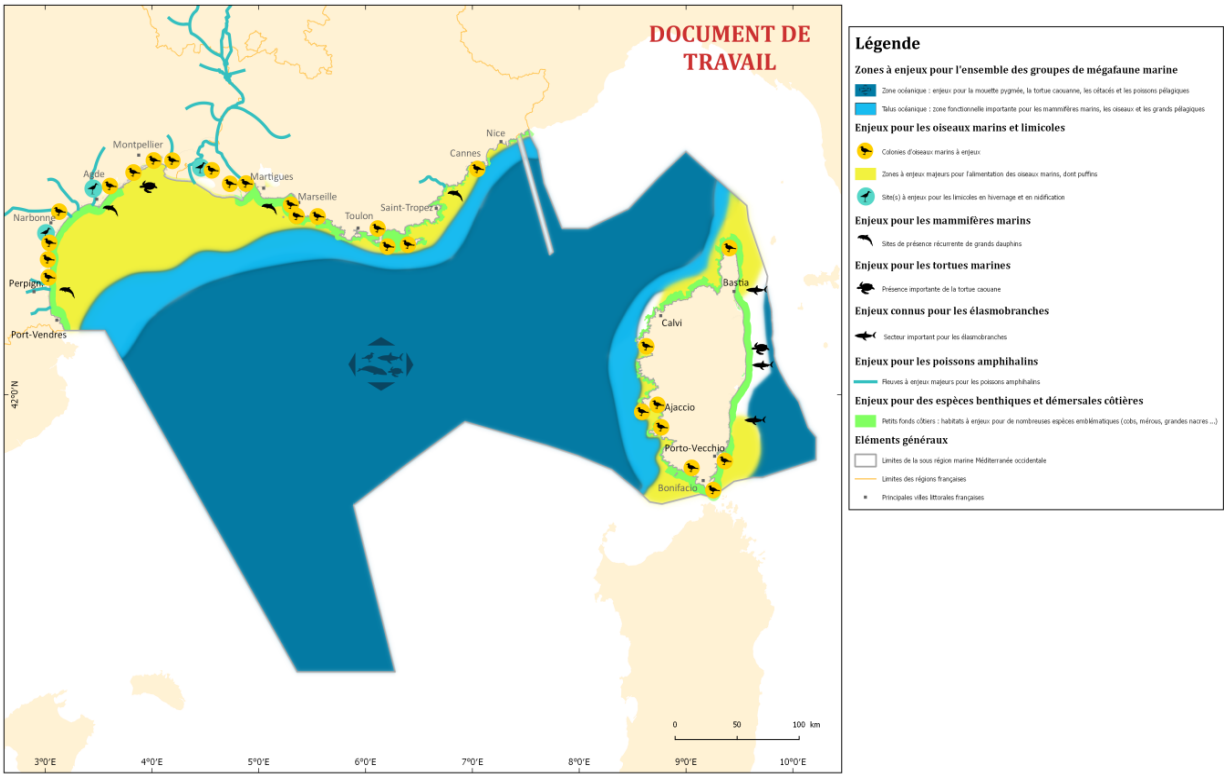


Figure 9 Distribution of the main marine species in French waters

The **fin whale** (*Balaenoptera physalus*) distributes in the Italian-Provence-Corsican basins with a minimum estimated abundance of about 400 individuals. The Ligurian Sea and the Gulf of Lion are important summer feeding grounds, while the Tyrrhenian Sea is a potential corridor. There are no sufficient data in the area to infer population trend.

The **striped dolphin** (*Stenella coeruleoalba*) distributes for the entire area of the Italian-Provence-Corsican basins with a minimum estimated abundance of about 88000 + 40000 individuals. Most sightings for this species are in pelagic waters and there are no sufficient data in the area to infer population trend although there is some evidence that the species relative abundance is increasing in a portion of the Ligurian Sea.

The **common bottlenose dolphin** (*Tursiops truncatus*) distribute for the entire area of the Italian-Provence-Corsican basins with a minimum estimated abundance of about 1600 individuals, this species distribute mainly in coastal areas of the continental platform (depth < 100 m), however given the limited extent of the continental shelf platform, cases of overlap of the bottlenose dolphin primary habitat with areas with high anthropogenic pressure are evident, thereby suggesting the potential existence of habitat fragmentation. There are no sufficient data to infer trends.

The **Curvier's beaked whale** (*Ziphius cavirostris*) distributes for the entire Italian-Provence-Corsican basins. The local population of the Ligurian Sea is estimated at about 100 individuals while there is no estimation for the local population of the Tyrrhenian Sea. This species typically distributes in pelagic areas (depth >600m), with preference for areas with slope and submarine canyons. Two important areas have been identified for this species: the northern part of the Ligurian Sea and an area in the north-central Tyrrhenian Sea (between Tuscany, Latium and Sardinia). There are no sufficient data to infer trends.
To understand population trends, abundance and migratory patterns of these four species the data sets collected by different studies, must be homogenized and a systematic monitoring programme should be implemented through initiatives of international cooperation.

The **loggerhead sea turtle** (*Caretta caretta*) distributes for the entire Italian-Provence-Corsican basins with a minimum estimated abundance of 61805 individuals. There are no available data on population trend, however it is estimated that 50% of the population migrates from Greece, Central Turkey and Libya and the pressures on this species in the Western Mediterranean basin can affect the population trend of this species in the Eastern Mediterranean. In order to better understand population trends, abundance and migratory patterns of *C. caretta* in this area need further studies with particular attention to the anthropogenic impacts sensibly affecting the estate of conservation of this species (e.g. fishery).

All eight **cetacean species** regularly occurring in the Mediterranean region have also been recorded in the waters surrounding Malta Island. Historic records of other species exist including records of the killer whale, (*Orcinus orca*), the false killer whale (*Pseudorca crassidens*) and the rough-toothed dolphin (*Steno bredanensis*). The occurrence of such a relatively high number of cetacean species in the marine waters surrounding the Maltese Islands could be partly attributed to the location of the archipelago in the centre of the Mediterranean, with Malta constituting part of the channel connecting the western and the eastern Mediterranean basins.
Data related with the distribution of the Common dolphin (*Delphinus delphis*; IUCN: Least Concern) in Malta is limited to recent campaigns (BirdLife Malta for 2007/2008 and 2012) thus suggesting that this dolphin is more common off the Northern and North-eastern coasts of Malta and seems to be more common in spring. However, these observations would need to be verified through long-term monitoring. A 2012 survey encountered 6 individuals in groups of 1-3 individuals of Risso's Dolphin **(***Grampus griseus*; IUCN: Least concern). Sightings of this

species in Malta are not frequent. At this stage, the range and population characteristics of this species in Malta are not known.

Five **marine turtle** species are reported in Malta waters: Loggerhead Turtle (*Caretta caretta,* IUCN: Vulnerable), Leatherback Turtle (*Dermochelys coriacea,* IUCN: Vulnerable), Green Turtle (*Chelonia mydas,* IUCN: Endangered), Hawksbill Turtle (*Eretmochelys imbricate*, IUCN: Critically Endangered), Kemp's Ridley Turtle (*Lepidochelys kempii,* IUCN: Critically Endangered), *Chelonia mydas*, *Lepidochelys kempii* and *Eretmochelys imbricata* are known from single records while *Dermochelys coriacea*, which has been recorded on several occasions particularly between the 1970s and 1980s, is not considered a Mediterranean species. Out of the five recorded species, *Caretta caretta* is considered the most 'abundant' species and it is the only species of marine turtles which is regarded as a true member of the Maltese fauna, hence representative of the marine turtle species group in Malta.

Regarding **species of commercial interest for fishery**, spawning sites of white hake (*M. merluccius*), red mullet (*Mullus barbatus*), and red striped mullet (*Mullus surmuletus*) are known to be located in Delta del Ebro.

Other relevant commercial species which are common in Spanish waters and do not have specific spawning sites include demersal species such as *Micromesitius potassou, Octopus vulgaris, Lophius budegassa, Lophius piscatorius, Aristeus antennatus* and *Squilla mantis* and pelagic species such as *Sardina pilchardus, Engraulis encrasicolus, Trachurus trachurus, Trachurs mediterraneus, Trachurus picturatus, Sardinella aurita, Scomber scombrus* and *Scomber colias*.

In the Iberian coast an increasing trend in the amount of catches of large fishes was observed, while in Balearic Islands the trend was clearly in decline although non-significant.

In general, abundance and biomass of target species in this area has decreased since 1994 (the start of the historical dataset) but has been stable at low levels for the last 2-3 years.

Within the Levantino-Balear region there is a lack of detailed information on feeding interactions among species relevant for fishery. For better management of fishing target species further work on food web interactions should include: incorporating additional datasets on biological compartments that are not currently included (e.g. benthos, mammals, or birds); investigating the influence of various anthropogenic pressures (fishing, pollution, invasive species etc..); exploring finer geographic scales; and further defining assessment values.

A better understanding of relationships between all human pressures and their impact on the full Levantino-Balear demersal fish community (not just the commercial stocks) is needed.

The latest studies on the Levantino-Balear Region revealed a decrease in abundance and

biomass of fish and shellfish of commercial interest, still data to obtain the biological reference points are only available for few species. There is no information yet on the impact of increasing sea temperatures on marine resources and there are site specific and disaggregated catch and effort data in this region.

The Gulf of Lion is also an area of major importance for nursery and spawning grounds of **pelagic fish** (sprats, anchovies, sardines, jack mackerels, hake, tuna) and demersal fish (sole, gurnard, red mullet, etc.). In this area, the edges of the continental shelf slope are particularly attractive for hake, jack mackerels and langoustines.
Offshore waters are also visited by pelagic fish (bluefin tuna and swordfish) as well as small pelagic fish (sardines, sprats, anchovies), which are key species within the trophic networks on which many species depend directly to complete their life cycle.
The Rhone outfall provides an important transition zone for some amphihaline species such as river herrings and lampreys. For French waters no data on trends, abundance and distribution of fishing target species have been provided.

In the Italian Western Mediterranean area, the situation is away from sustainable fishing levels and far from the target of exploiting stocks at maximum sustainable yield (MSY) by 2020. Scientific assessments on major fish stock reported in the Italian National Triennial Fishing and Aquaculture Programme 2017-2019 confirm a situation of excessive exploitation, although the situation is not homogeneous in the different geographic sub-areas (GSAs). Specifically, *Merluccius merluccius* is in a state of overexploitation in all the 7 Italian GSAs. Most of the stocks are in a state of overfishing, and only three stocks result under sustainable fishing regimes, the deep-water rose shrimp (*Parapenaeus longirostris*) in GSA 9, the Norway lobster (*Nephros norvegicus*) and the European pilchard (*Sardina pilchardus*) in GSA 16. The states of large pelagic fishes, such as Atlantic bluefin tuna (*Thunnus thynnus*) and swordfish (*Xiphias gladius*), assessed for all the Mediterranean area, without division in GSAs due to their migratory habits, are valued as overexploited. Also relevant are the landings of red mullet (*Mullus barbatus*), and the cephalopods common octopus (*Octopus vulgaris*), common cuttlefish (*Sepia officinalis*), and horned octopus (*Eledone cirrhosa*). No data gaps have been addressed on fishing target species for the Mediterranean waters under Italian jurisdiction. In Maltese waters fish and elasmobranchs species with existing or potential commercial value found at depth ranging between 50 m and 800 m, showed different trends in biomass (increasing, stable or declining trend) depending from the species. With regard to Maltese fish stocks, data gaps are mainly in relation to the fish functional groups as defined by the MSFD Commission Staff Working Paper, other than the 'Demersal fish' and 'Demersal

Elasmobranchs', on which data with respect to species representative of such groups is either very limited or completely lacking. With respect to 'Demersal fish' and 'Demersal Elasmobranchs', data limitations are mainly due to the fact that the main source of data for these two functional groups, the MEDITS surveys, are focused on target species which have an existing or potential commercial value. Other non-target species for which biological parameters are not measured in relation to the MEDITS protocol may also be representative of the functional groups in question. Current data on large pelagics in Malta is restricted to stock assessments of the main commercial species (*Thunnus thynnus* and *Xiphias gladius*) carried out at the regional scale in the framework of the International Commission for the Conservation of Atlantic Tunas (ICCAT). Maltese ecosystem functions and the spatial and temporal distribution of the selected species should be further analysed. Such knowledge is currently limited, thus also limiting the interpretation of the results of this analysis. Information on spawning sites in Malta is either very limited or not available.

4. MAJOR USES AND ACTIVITIES (AREA/USE-BASED) – DESCRIPTION OF THE MAIN SOCIO-ECONOMIC ACTIVITIES, TRENDS AND NATIONAL STRATEGIES

4.1 EXTRACTION OF LIVING RESOURCES

4.1.1 Fish and shellfish harvesting (professional, recreational)

Fish and shellfish harvesting is among the most representative marine human activities within the Mediterranean context for their historical, cultural, social and economic value, they are spread across the entire basin and they are carried out through different extractive techniques depending from the species harvested and the local traditions. The fishing sector plays a key role in the context of the Western Mediterranean Sea accounting for 19 % of the total Mediterranean fishing fleet.

In the most occidental side of the Western Mediterranean, Spain, with a coastline of almost 8,000 km, is home to the biggest fishing industry in the EU. The majority of fisheries activities are carried out in the coastal regions of Spain. Positioned at the far south-west corner of Europe, the country enjoys entry points into both the Atlantic Ocean and the Mediterranean Sea. Spain produces over 1.2 million tonnes of fisheries products per annum, more than any other EU country. Of this production 70 % comes from sea fishing, 29 % from aquaculture and a mere 1 % from inland fishing. Spain has excellent environmental and climatic conditions with availability of adequate sea areas located at reasonable distance from the coastline. As a country of age-old marine traditions, it is the largest producer of fish in the EU by volume and the largest consumer market for fisheries and aquaculture products.

The fishing fleet is made up of 9408 vessels, making it the 3rd largest in the EU. Galicia represents almost 50 % of all vessels, followed by Andalusia (15 %), Catalonia (9%), and the Canary Islands (9 %). In terms of value, the most important fish species are tuna-like species and needlefish followed by coastal fish: cod, hake, herring, sardines, and anchovies. Crustaceans and molluscs consisting of prawns, shrimp, squid, cuttlefish, and octopus are ranked third. Fishing provides employment to roughly 41500 people (0.24 % of the total employed in Spain). Besides its production Spain is one of the largest markets for fish and seafood consumption in Europe. In recent years, the national average apparent consumption of fisheries and aquaculture products has been generally stable, reaching 46.2 kg per capita in 2014 (live weight equivalent). Spain had the largest apparent consumption of mussel products among other Mediterranean countries at 3.33 kg per capita in 2014, due to its large

production. In Spanish Mediterranean waters, the total income from fishing activities in 2015 accounted for 303,3 million euros.

In this context, in Spain, the marine reserves are protected spaces that among others aims, supports traditional artisanal fishermen who, on a regular basis, perform fishing activities in those established marine reserves. This essential support is the basis to protect these reserves from users outside the census of traditional artisanal fishermen. The surface of each marine reserve is divided into smaller sections in relation to their permitted uses. Within marine reserves the development of small scale fisheries carried out by local professionals is allowed and considered a core reserve activity. In each marine reserve, there is at least one declared integral part where no use is authorized. Therefore, in the marine reserves, traditional methods by local artisanal fishermen are supported. These fishermen not only observe the local prohibition of fishing inside the integral reserve, but also self-regulate their activity with more strict criteria than in fishing-grounds adjacent to reserves.
Regulation in a marine reserve, outside the integral reserve, consists broadly in the creation of the marine reserve boundaries followed by a census of authorized professional artisanal fishing vessels that can fish in its waters. The professional fishermen who prove to have regularly fished in the zone for at least two years preceding the creation of the marine reserve are those who are listed on the census. Only the development of artisanal fishing is allowed, leaving other gear such as trawling completely prohibited in marine reserves.

On the basis of Regulation (EU) No 1380/2013 of the European Parliament and of the Council on the Common Fisheries Policy, if the assessment of the annual capacity of the Spanish national fleet shows that fishing capacity and fishing opportunities are not in balance, an action plan shall be prepared and included in the Annual Report for those segments of the fleet that have structural overcapacity. The action plan will set the adjustment targets and the means to achieve the balance as well as the timeframes for implementation of the plan (Article 22).

Another legislation has been adopted to regulate small scale fisheries in Mediterranean area regarding the species, location and different periods during the year. This is Order AAA / 2808/2012 of 21 December establishing an Integral Management Plan for the conservation of fishery resources in the Mediterranean affected by fisheries involving purse seines, trawls and fixed and minor gears, for the period 2013-2017. In the action plan of small scale fisheries in the Mediterranean area done in 2016 was concluded that fish with pots is in balance, that in the fishing with dredges or hooks there are overexploited species and that it is necessary an

action plan to manage this issue. In fishing with gillnets there is a low profitability so an action plan is also needed. The employment rate of this activity in the Mediterranean Spanish waters in 2016 was about 1.392 workers on land and 1.467 workers on board. The fishing fleet in Spain giving support to this activity in the Mediterranean is made up of 1.151 vessels.

The following maps illustrate (Figure 10, 11, 12) the geographical distribution of these vessels in the different ports. The number of vessels used for trawling in Spain is of 530 in the Levantino-Balear marine district. The geographical distribution of the bottom trawling fishing effort in Spain is illustrated below (Figure 13).

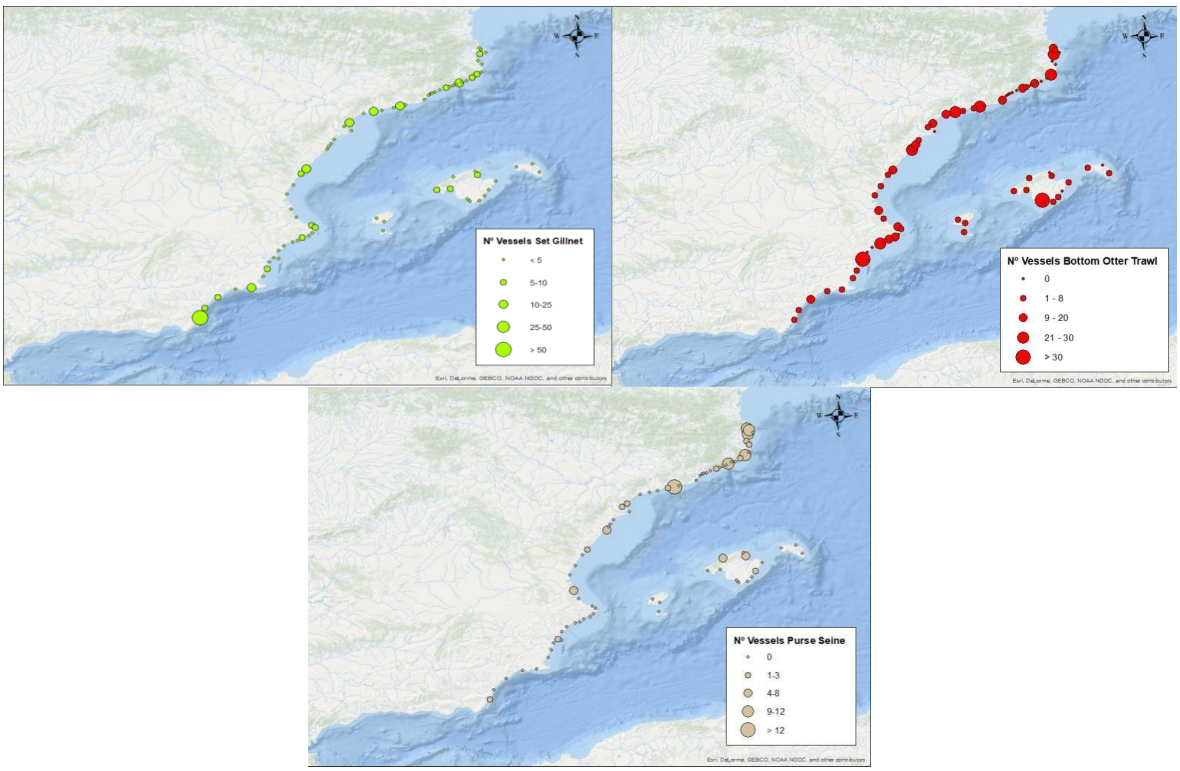


Figure 10, 11, 12 Distribution of Gillnet, Otter Trawl and Purse Seine fishing vessels in Spanish waters

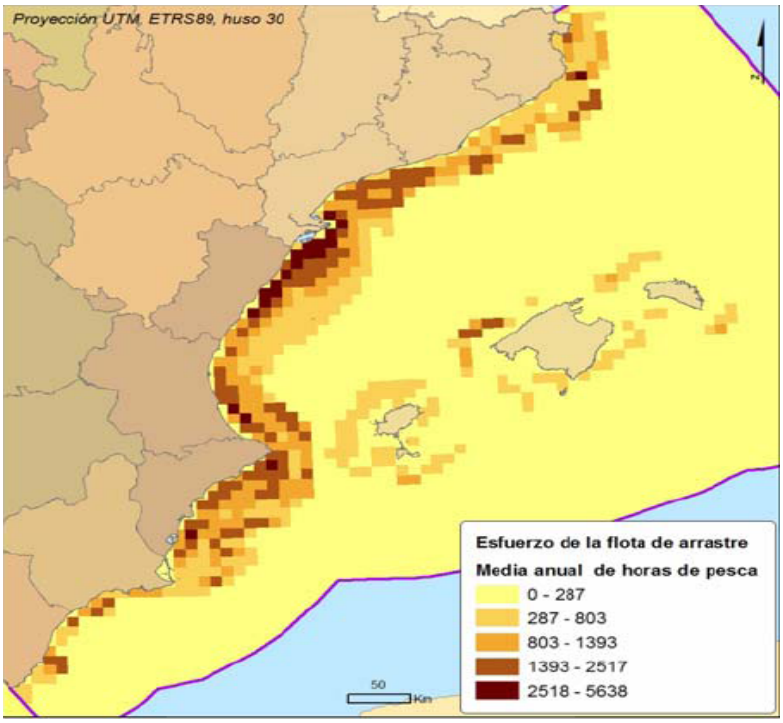


Figure 13 Geographical distribution of bottom trawling fishing effort in Spanish waters.

Mono-specific fisheries in this area are very rare and are largely limited to deep shrimp fisheries on muddy slope bottoms. Demersal fish (also called groundfish) stocks have traditionally provided the most important catches in economic terms, and several species have a very high commercial importance at the local level.

The most important species fished with trawling in Spanish Mediterranean waters are mud mullets, shrimp, octopus, stripe, sepia, squid, hake, monkfish, turbot, sole, crayfish, squid rooster, halibut, and cod. Another species of particular commercial interest in the Mediterranean area is red shrimp.

In Spain, there isn't a specific national strategy for the trawling activity, but a piece of legislation has been adopted to regulate trawling in Mediterranean area regarding the species, location and different periods during the year. This is the Royal Decree 1440/1999, of 10 September, regulating the practice of bottom trawling in the national fishing grounds of the Mediterranean. While Order AAA / 2808/2012 of 21 December established an Integral Management Plan for the conservation of fishery resources in the Mediterranean affected by fisheries involving purse seines, trawls and fixed and minor gears, for the period 2013-2017.

The purse seine, which came to Spain from the United States around 1880 to replace the traditional "sardines", or traditional gillnets that, with little efficiency, caught sardines on the Spanish coast, is represented in the Spanish Mediterranean area by 160 vessels based on different ports along the coast.

This fishery typically takes place at night, not far from the coast in areas with depth between 60 and 150 meters. The purse seine vessels are of a minimum length of nine meters in the Mediterranean. A commercially important selective fishery is the Bluefin tuna fishery which typically catch the animals with purse seine and tows them to farms where are regularly fed until they reach the target size of around 250 Kg. Fishing of Bluefin tuna with purse seine is considered to be one of the most sustainable gear as it ensures the absence of small fish and allows reproduction even once caught. Spanish purse seine fleet in the Mediterranean area have 6 vessels working in the fishing of wild Bluefin tuna with 78 fishermen working on board. In Spain, there isn't a specific national strategy for the purse seine activity, but some specific legislations have been adopted to regulate purse seine, quotas and fleets. In the action plan of purse-seine fishing in the Mediterranean area done in 2016 was concluded that it is necessary to follow up on the measures already taken to restore the biologic balance of the national fleet and a management is recommended in the sardine fishery. Also, economic control over 24-40 segments is necessary. Longline is another prevalent technique in the area. In the Spanish Mediterranean Sea operate 114 longline fishing vessels, 49 bottom set longline vessels and 65 drifting longline vessels. The geographical distribution of the longline fleet in Spain is illustrated below (Figure 14, 15)

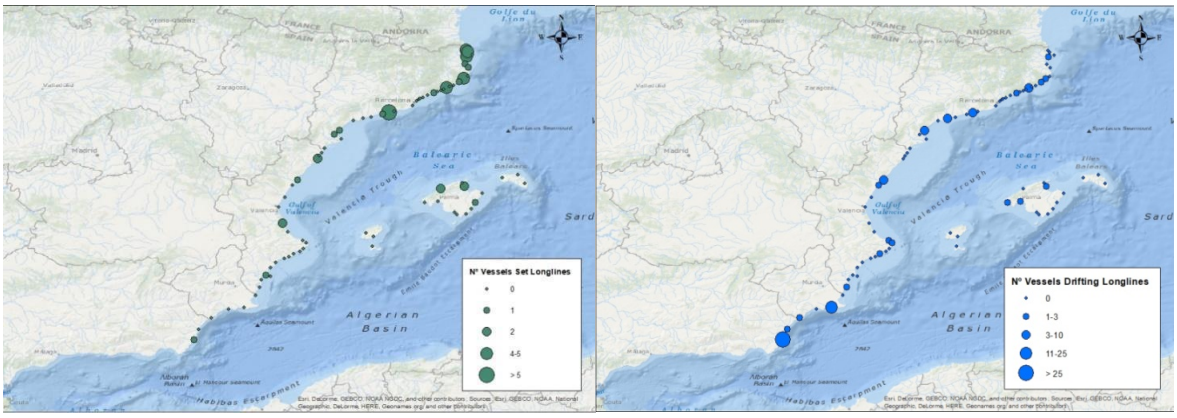


Figure 14,15 Geographical distribution of the longline fishing fleet in Spanish waters.

The number of employees is 1625 in bottom set longline fishery and 325 in drifting longlines fishery approximately. In Spain, there isn't a specific national strategy for the longline activity,

but a piece of legislation has been adopted to regulate longlines in Mediterranean area regarding the species, location and different periods during the year.

An action plan has been adopted in 2016 to regulate longline fisheries in Spanish Mediterranean where it was concluded that is necessary to take appropriate measures to restore the balance in 18 to 24 meters and 24 to 40 meters segments and that in the 18-24 meters segments is necessary to introduce limitation on access to vessels that normally do not fish in the Mediterranean area, limiting the amounts of licenses.

Recreational sea fishing in Spain has reached an important development in the coastal zones with a greater incidence in the catches of marine species. Due to this circumstance, the Fisheries Administration has considered that a normative regime, with enough range, that regulates the development of this activity must be established. For this reason, in 2011, Royal Decree 347/2011, dated 11 March, was drawn up to regulate recreational sea fishing in offshore waters, dictated by the authorization contained in Article 36 and the provision of the Final second of Law 3/2011, of March 26, on State Maritime Fishing. This Royal Decree is intended for the management of recreational sea fishing in Spanish offshore waters, considered as non-commercial fishing activity that exploits living aquatic resources for leisure-recreational purposes, prohibiting the sale or transaction of catches obtained. The Royal Decree also regulates the different forms of recreational sea fishing, which can be from land, boat and underwater (spearfishing), requiring for the exercise of these activities a license of issued by the corresponding bodies of the Autonomous Communities of the coast and the cities of Ceuta and Melilla. A positive list of species of fish and cephalopods likely to be caught in the exercise of recreational sea fishing is established in Annex I of the Royal Decree, respecting the minimum sizes and other technical requirements that are regulated in the specific regulations of each species. In Annex II, a list of species subject to measures of differentiated protection is included. When the fishing activity is directed to these species, a specific license issued by the Autonomous Region (Comunidad Autonoma) will also be required, as well as an authorization of the General Directorate of Fisheries Resources and Aquaculture of the General Secretariat of Fisheries. The holders of these authorizations must complete and submit a statement of catch or catch and release so that the Directorate General of Fisheries Resources and Aquaculture has control of the fishing effort of this user group on the species in Annex II. Special attention is paid to the Bluefin tuna (*Thunnus thynnus*). Recreational fishing has become an area of economic interest, halfway between the fishing sector where management, recovery and conservation measures valid for sustainable fishing has to be respected and tourism. This activity, that has been analysed in depth and has experienced an extraordinary expansion in recent years, has brought the General Secretariat of Fisheries, to develop a specific program of analysis of this new economic reality, which

evaluates the impact and potential of recreational fishing and its viability for the growth of competitiveness and the social dimension of the areas in which it develops. In fact, The General Secretariat of Fisheries, planned to carry out reports on the socio-economic benefits arising from recreational fishery for each individualized area in Spain, and one of them is the Mediterranean area. Recreational fishing is an activity that generates and sustains a considerable number of adjacent industries and services, creating, in short, a large number of jobs in these sectors. Its social importance lies therefore in a double aspect: leisure for those who practice it and economic development for the activities it induces and the areas in which it is deployed. For the Spanish Mediterranean area, it was estimated that the annual income from the activities related to recreational fishing (i.e. construction and repair of pleasure boats, rent of means of navigation, management of recreational ports) accounted in 2003 for a total of 165.764 euros and that 1.434 people were employed through these activities.

In Spain, there is no specific strategic plan for recreational fishery, but there are different regulations regulating quotas, fleets and recreational sport fishing.

Across the whole continental shelf of the Gulf of Lion and the Southern part of Corsica drag net fishing is a common technique. The distribution of fishing activity in the French Mediterranean area can be seen in Figure 16 and Figure 17. Overall very limited information was provided for this area.

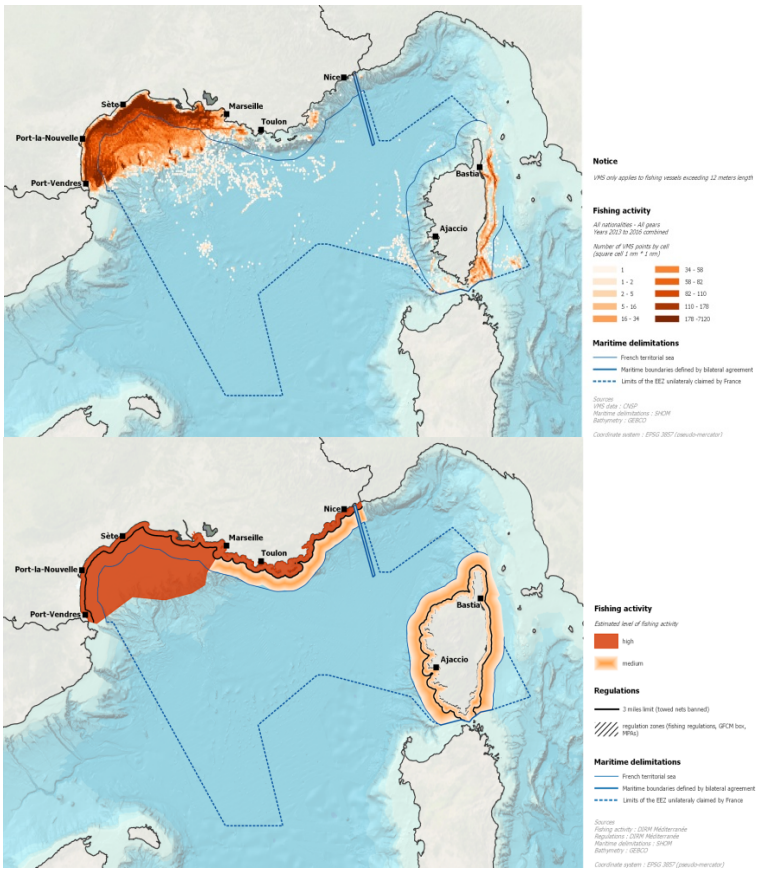


Figure 16,17 Geographical distribution of the fishing fleet in French waters.

The Italian Western Mediterranean is comprised within the FAO Area 37.1.3 "Mediterranean and Black Sea – Subarea Western Mediterranean – Division Sardinia", with the exception of South-Western Sicily, which belongs to the Area 37.2.2 "Division Ionian". In all the GSAs (Geographical sub-areas) compromised in the SIMWESTMED area, professional fisheries are highly heterogeneous and widely dispersed along the coasts, with fleets dominated by small-scale vessels. Four main types of fisheries can be identified: (i) the industrial fishery for large pelagic fish (e.g. tunas and swordfish), mostly carried out by highly technical and powerful vessels using purse seines and longlines; (ii) fishery for small pelagic fish (e.g. anchovies and sardines), mostly by small to medium-sized purse seiners and pelagic trawlers; (iii) a multispecies demersal fishery, carried out by small to medium-sized vessels using a wide variety of gear types including trammel nets, gillnets, traps, pots, handlines, longlines and bottom trawls; and (iv) fishery for deep sea crustaceans (mostly deep sea shrimps and Norway lobsters) and fish (mostly hakes) with a fleet of small to medium-sized bottom trawlers.

The western part of the Italian Mediterranean Seas includes several high fishing capacity ports in terms of number of vessels, gross tonnage (GT) and engine power (kW). The higher fishing capacity is concentrated in Sicily, Sardinia, Campania and also Calabria, while Liguria, Tuscany, and Lazio have lower overall fishing capacity (Figure 18 and 19).

The analysis of the total days of activity for the principal types of fishing gears (2012, Figure 20) allows to the individuation of the more important sectors by region. In Liguria, Tuscany and Lazio, the small-scale fishing is the most important, even if its value is low when compared with those of the majority of the other regions, followed by trawling, passive multi-purpose gears, and purse-seine fishing. Campania fleet shows high numbers of small-scale fishing vessels, medium-low for trawling, relatively high values both for purse-seine fishing and for passive multi-purpose gears. Furthermore, Lazio and Campania are the only regions of the considered area in which it is practiced fishing with hydraulic dredges, even if its consistency is very low if compared with those of the Adriatic regions. In Calabria, considering together Tyrrhenian and Ionian sectors, small-scale fishing has very high importance, trawling has medium value and passive multi-purpose gears have relatively high value. In Sardinia, small-scale fishing and passive multi-purpose gears have very high value, while it is relatively low the one of trawling. In Sicily data show the highest national values of small-scale fishing, trawling, passive multi-purpose gears, purse-seine fishing, and longline fishing.

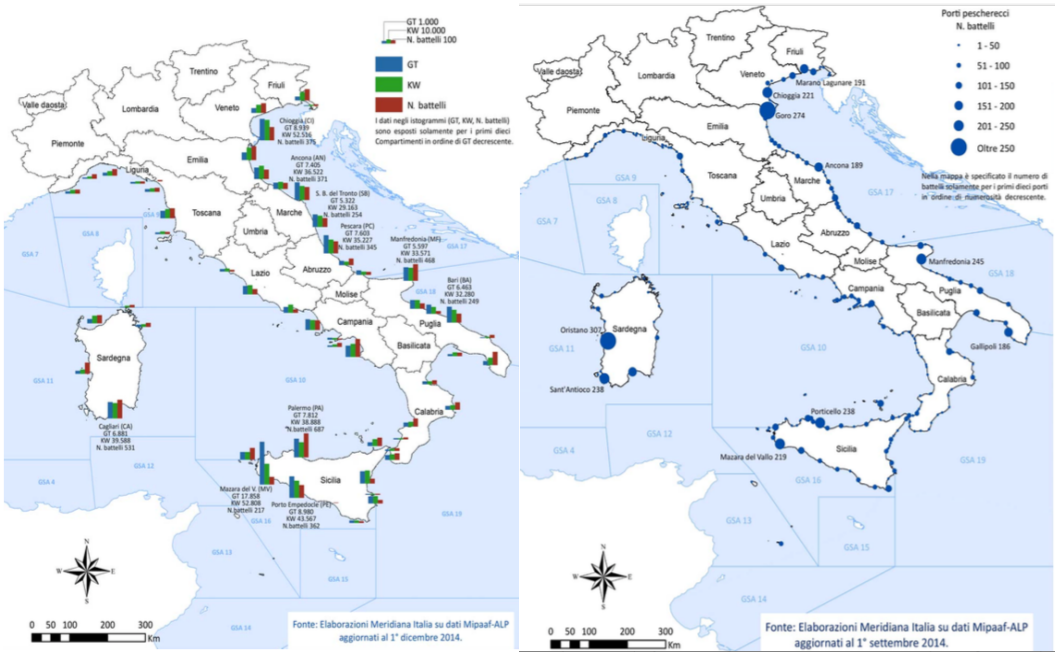


Figure 18,19 Geographical distribution of the fishing fleet in Italy.

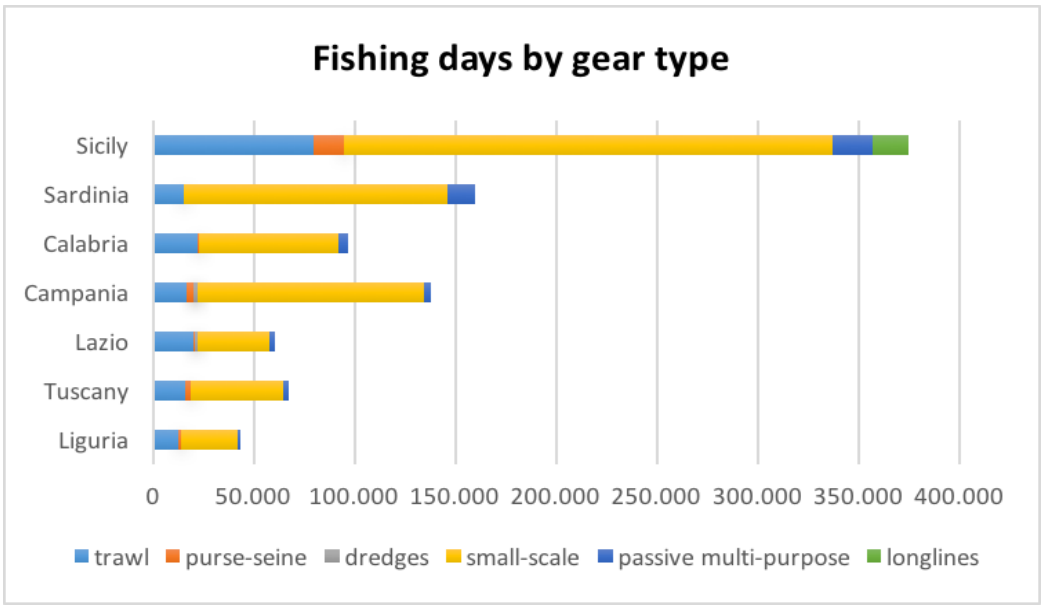


Figure 20 Total days of activity for the principal types of fishing gears in Italy

The status of exploitation of each stock is estimated by the ratio between fishing mortality (F) and the fishing mortality level that allows to produce the maximum sustainable yield (FMSY): the value of a good exploitation has to be < 1, which means F < FMSY. In the Italian western Mediterranean area, the situation is away from sustainable fishing levels and far from the target of exploiting stocks at maximum sustainable yield (MSY) by 2020. Scientific assessments on major fish stock reported in the Italian National Triennial Fishing and

Aquaculture Programme 2017-2019 confirm a situation of excessive exploitation, although the situation is not homogeneous in the different geographic sub-areas (GSAs). Specifically, *Merluccius merluccius* is in a state of overexploitation in all the 7 Italian GSAs, with a current mortality far above the FMSY sustainability proxy. Most of the stocks are in a state of overfishing, only three stocks result under sustainable fishing regimes, the deep-water rose shrimp (*Parapenaeus longirostris*) in GSA 9, the Norway lobster (*Nephros norvegicus*) and the European pilchard (*Sardina pilchardus*) in GSA 16. The states of large pelagic fishes, such as Atlantic bluefin tuna (*Thunnus thynnus*) and swordfish (*Xiphias gladius*), assessed for all the Mediterranean area, without division in GSAs due to their migratory habits, are valued as overexploited. Also relevant are the landings of red mullet (*Mullus barbatus*), and the cephalopods common octopus (*Octopus vulgaris*), common cuttlefish (*Sepia officinalis*), and horned octopus (*Eledone cirrhosa*). In the Mediterranean, the overall management of all fisheries is done in the framework of the General Fisheries Commission for the Mediterranean (GFCM-FAO).

Following national trends, fishing sector is in steady decline, due to several factors and the decrease of fishing capacity, requested by the Common Fisheries Policy measures. The decline has not been coupled by an improvement of the conditions of the biological resources. This is due to the overcapacity of the fleets compared to the available resources, illegal fishing, effects of climate change on the species, inefficient shared management policies, lack of technological improvements.

Artisanal small-scale fisheries in the area result the most weakened in the last years by the increase in intermediate costs and fuel price, the decrease in production level, and the implementation of restrictive management measures. The higher fishing capacity is to be attributed to the trawlers, which operate with a fishing system considered as one of the major factors of pressure for the sea bottom. As in the rest of Italy, efforts are done to reach a level of sustainability of the commercial fishing, to reduce overexploitation phenomena. Based on European Council Regulation (EC) No 1967/2006, the Italian Regulation adopted several national management plans for fishery activities. National management plans for bottom trawling, purse seine, hydraulic dredge and other gears, have been adopted. Within the European Maritime and Fisheries Fund - Operational Programme for Italy (FEAMP), in the period 2004-2015, fishing fleet capacity decreased by 17% in terms of number of boats, 26% in terms of tonnage and 21% in terms of engine power (kW). Over the next few years, with the implementation of the FEAMP 2014-2020, a further reduction in industrial fishing capacity is expected. The Italian National Triennial Fishing and Aquaculture Programme 2017-2019 shares the aim to reduce the fleet and the overall fishing effort (obtained both with reduction of fishing fleet, with catch limits, the application of selective systems and by fixing a total

allowable catch, TAC). At the moment, with the exception of large pelagic fishes and some other particular fisheries, fishery management in Italy is not based on catch control via TACs and quotas. It is instead based on regulations of total fishing effort through limited licenses and technical measures, such as closures, gear limitations, and limited landed sizes. Some of these measures are not without socio-economic impacts, for example since 2010, EU has banned derogation for small-scales fisheries targeted to "bianchetto" (juvenile of *Sardina pilchardus*), "rossetto" (*Aphia minuta*) and "cicerello" (*Gymnammodytes cicerelus*), prohibiting small trawling boats using mesh size < 40mm, these fisheries had a long history at the local level in some areas of the western Italian Mediterranean (e.g. Liguria).

A fisheries data collection framework for Italy is in place, mainly focused on professional fishery activities, but there is low data availability for artisanal fisheries and recreational fisheries. According to the Triennial Programme, management choices must be based on a reliable database and on the circulation of useful information to correlate with local economic development processes, taking into account also the integrations between fishing and other activities with significant social and economic implications. The availability of data on all components affecting biological resources, which is detailed, homogeneous and shared, especially at the international level, is a goal not yet fully achieved.

Sports fishers in Italy are only allowed to use fishing line and none of the other designed commercial fishing gears, and fish caught cannot be sold. There is also a daily 5 kg bag limit, with the harvesting of mussels for recreational purposes limited to 3 kg each day. In Italy, recreational fishery is regulated by the same rules that apply to sea fishing Regulations such as respecting of fishing periods and minimum size of the fish, must be followed by Italian recreational fishermen. In 2010, the Italian Ministry for Food, Agriculture and Forestry has signed an agreement protocol with the Italian Fishing Federation (FIPSAS) aiming to set up a census of recreational fishermen and a comprehensive control system. No official data are available about recreational catches. Restrictions to recreational fisheries are in force within all the MPAs of the considered area.

Fisheries in Malta are typically artisanal, predominantly non-industrial and mostly distributed along the coast. Maltese fisheries are also considered as multi-species and multi-gear fisheries, whereby fishers alter between fishing gears throughout the year, depending on the species targeted. Trawling in Malta is regulated and carried out in designated areas (Figure 21).

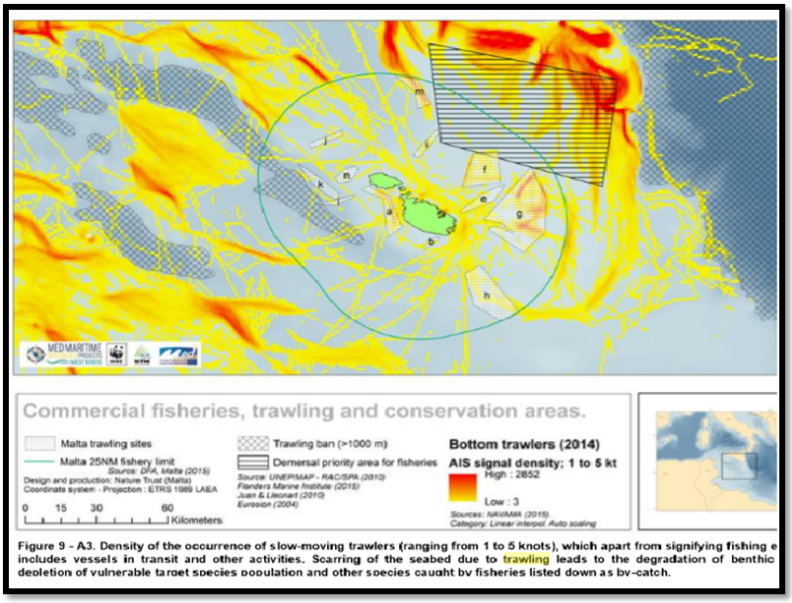


Figure 9 - A3. Density of the occurrence of slow-moving trawlers (ranging from 1 to 5 knots), which apart from signifying fishing e includes vessels in transit and other activities. Scarring of the seabed due to trawling leads to the degradation of benthic depletion of vulnerable target species population and other species caught by fisheries listed down as by-catch.

Figure 21 Distribution of the trawling area in Maltese waters.

The social and cultural importance of the Maltese fishing industry far outweighs its negligible economic contribution to the national Gross Domestic Product. According to the National Statistics Office data published in 2016, as of 2014 the Maltese fishing fleet was composed by 2943 fishing vessels. Out of the total number of registered fishing vessels, professional fishing vessels operating on a full-time basis (MFA category) account for 13.6% and professional fishing vessels operating on a part-time basis (MFB category) account for 20.9%. The largest percentage of registered fishing vessels, amounting to 65.5% of the fleet, are non-commercial fishing vessels (recreational) and amount to 1927 vessels. The Maltese fisheries are described as multi-species and multi-gear fisheries, whereby fishermen switch between fishing gears several times throughout the year. As such the Maltese fleet is known to land a variety of species, often exceeding 80 species in number. The total annual landings for 2014, reached 867 tons indicating a constant decrease since 2010 when total annual landings were 1303 tons. The wholesale value of fish landings at the official market in 2014 amounted to 5,419,000 €. The majority of these landings consisted of 7 species, namely shrimp, stone bass, dolphin fish, dogfish, swordfish, Bluefin tuna and bogue.

No strategic plan has been formally published for Maltese fishery management and coordination; however, the sector is managed through the implementation of Council Regulation (EC) No 1967/2006 concerning management measures for the sustainable exploitation of fishery resources in the Mediterranean Sea. This regulation applies to the conservation, management and exploitation of living aquatic resources and constitutes a number of provisions including the regulation or prohibition of specific fishing activities on

protected or sensitive habitats, in particular *Posidonia oceanica*, coralligenous habitats, mäerl beds and corals. Provisions in this regulation are also related to regulation of mesh sizes, hook sizes, and specification of minimum sizes of marine organisms that are caught. The regulation also calls for the establishment of Fishing Protected Areas in which fishing activities may be banned or restricted in order to conserve and manage living aquatic resources or to maintain or improve the conservation status of marine ecosystems and for the adoption of management plans for specific Mediterranean fisheries by each EU Member State (Article 19). Malta has submitted 'Fisheries Management Plans' for three types of fisheries (Lampuki Fish Aggregating devices (FAD) fishery, 'Lampara' fishery (use of strong lights and purse seine) and bottom otter trawling. These regulations adopt a 25 Nm Fisheries Management Zone around the Maltese Islands, stipulates provisions regulating fishing within this zone and prohibits fishing for dolphinfish within the 25 Nm Fisheries Management Zone by FAD from 1 January to 5 August each year. It further stipulates that the number of vessels for dolphinfish fishery shall not exceed 130. The regulation also sets the authorized trawlable areas within the 25 Nm Fisheries Management Zone (Annex V). Malta's Fisheries Management Plans however indicate that the Maltese authorities are currently studying the possibility of relocating part of these authorized trawlable areas due to a rationalization exercise that has led to the closure of parts of the areas due to protected habitats present in the zones. Specifically, the management plans point out that the authorized trawling zones as per Annex V of regulation 1967 of 2006 include areas which are found within the 3 Nm zone, which areas should be reconsidered to protect coastal resources from trawling activities and to give priority to artisanal fisheries. No long-term strategy exists for the management of Maltese fisheries and there is lack of systematic long term monitoring. Fisheries in Malta are mainly artisanal and are considered as having a socio-economic value at the local level in view of the cultural characteristics attributed to this industry. Traditional fishing villages have over time been marketed as a tourism attraction. According to the MSFD Initial Assessment for economic purposes, the Gross Value Added for Fisheries and Aquaculture for 2012 in Malta was given at €17,674,000, with an employment rate of 928 full time equivalent (FTE). Among the opportunities for this sector in Malta there are diversification of the sector, synergy with aquaculture/environment and tourism/recreation, further there is potential to improve the research in the area. In general, in the entire Mediterranean the high marketability of small fish in many countries encourages the targeting of the juvenile fraction of some species, often in violation of laws regarding minimum sizes.

For what concerns extraction of living resources other than for consumption, Red Coral (*Corallium rubrum*) extraction is practiced in the Mediterranean. Red coral is distributed

throughout the Mediterranean and Eastern Atlantic, from the south of Portugal to the north of Senegal, including the Canary Islands and Cape Verde. In the Mediterranean, it is mainly in its western slope, although it is also present in the Adriatic, Greece, Turkey and Cyprus. The main red coral banks are located in the Alboran Sea and Algerian basin (Alboran Sea, Algerian and northern coasts of Tunisia, Sicily, Sardinia and the Balearic Islands). It is also common in the Gulf of Lion and the Ligurian Sea. Its distribution is scattered, irregular, discontinuous and contagious. Almost all of the populations are overexploited and depleted.

Due to its low dispersion capacity, if the species has disappeared from an area, it will not naturally colonize it again. On the other hand, due to the slow growth of the colonies, highly exploited populations will take a long time to recover. In Spain, there is a national strategy for collecting red coral (*Corallium rubrum*), which aims to regulate this activity in waters under Spanish sovereignty or jurisdiction, with the exception of inland waters, as well as the authorization procedure for obtaining the corresponding licenses.

Mediterranean fisheries management is therefore a complicated task. There are no quotas in the trawl fishery and generally speaking management is based on number of vessels (by limiting the number of licenses or permits issued), size of engine, spatial-temporal closures, and minimum landing sizes (Lucchetti et al., 2014).

4.1.2 Fish and shellfish processing

The fish and shellfish processing activity include all those activities carried out to process the marine species harvested, before they get to the market and delivered to the final consumer.

Spain is home to the largest fish processing industry in Europe, with a turnover of around €4.6 billion and total employment estimated at 18,390 in 2014. Historically, it was focused on salted and canned fish and shellfish due to the large size of the country. However, since the 1950s, it has become one of the most diverse and large industries internationally. The industry is mainly composed of medium-sized companies, mostly in the canning sector and to a lesser extent in fresh and frozen processed seafood sectors. The canning sector has the highest production volume.

Tuna is the most important species, amounting to 241,500 tons, while other key species include sardines and anchovies. In the past few years, the Spanish fish processing sector has seen mixed trends due to economic constraints in the country, but the canning industry has kept its position in production of fish and seafood products, both for domestic and international markets, by acquiring niche markets and maintaining premium-prices. Considering the large capacity of the fish and seafood markets and coverage of its

consumption needs, Spain relies highly on imports, predominantly from third countries. The country is also a large exporter, mainly to the EU, which absorbs two-thirds of its exports. The total import of fisheries and aquaculture products reached 1,584,700 Ton in 2016, about the same level as in 2010. In terms of value, imports of fisheries and aquaculture products amounted to over €5.8 billion, an increase of €0.4 billion. Spanish imports were predominantly composed of crustaceans, molluscs, and cephalopods, which made up to 40 % in value of the total fisheries and seafood imports. The total export of fisheries and aquaculture products was stable from 2010–2016, amounting to 1,040,843 Ton in 2016. Spain exports its fisheries and aquaculture products to a wide range of countries with Italy (20 %), Portugal (16 %), and France (11 %) as the main destinations. In 2016, these countries all together were responsible for nearly half of Spanish exports. Yellowfin tuna was the top exported species, mostly to Mauritius and the Seychelles for manufacturing purposes. In Spain, there are 640 companies of processing and preserving of fish, crustaceans and molluscs with an employment rate over 18400 employees. Mainly the companies are located in in the Atlantic Coast of Spain, the following map (Figure 22) shows the number of companies of processing and preserving of fish in the Balearic Levantine marine district.

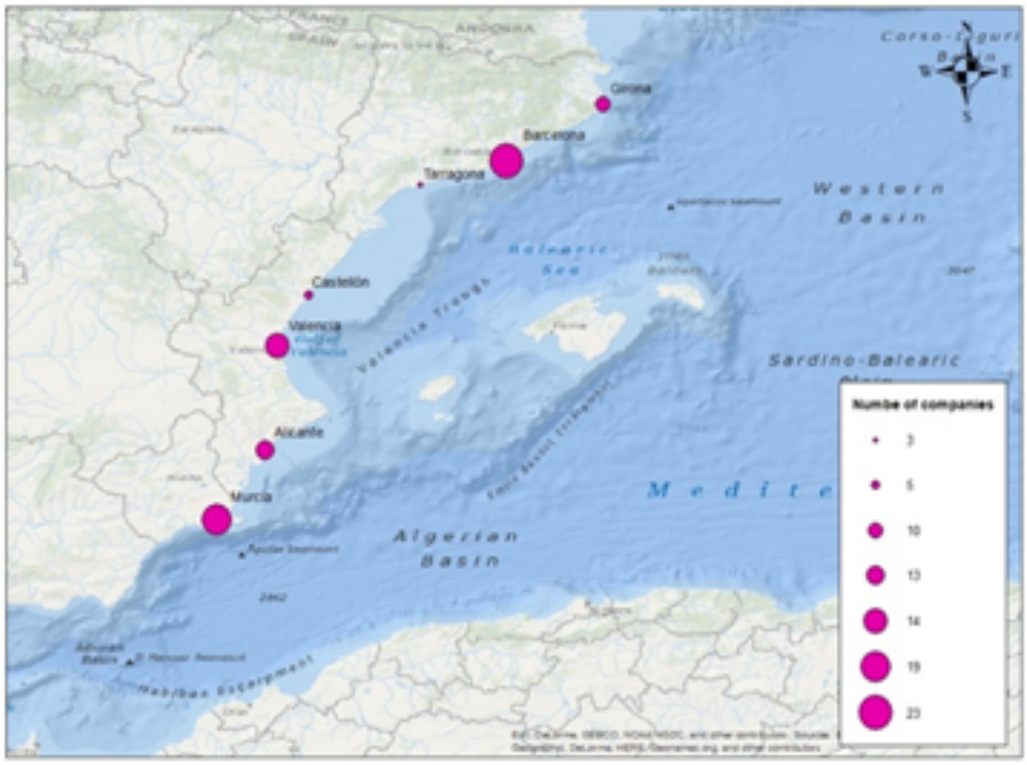


Figure 22 Geographical distribution fish processing and preserving companies in Spain.

In relation to consumption, Spanish households spend 13.3% of their food expenditure to fishery and aquaculture products and their processed products. The per capita consumption

in Spanish households of fishery products is 25.6 kg / inhabitants. The distribution of consumption by products is: fresh fish 45.2%, frozen fish 10.7%, fresh shellfish 15.4%, frozen shellfish 8.9%, cooked shellfish 2.4%, preserved and prepared fish and shellfish 17.4%

In Spain, there isn't a specific national strategy for the shellfish processing activity, but a piece of legislation has been adopted to regulate this activity. There isn't any transboundary interaction identified for this activity in Spanish area.

Internationalization is a priority aspect of the future to promote the development of the sector, both from the point of view of the commercialization of products and the assurance of raw materials. The main internationalization routes for companies in the fisheries, aquaculture and fish processing sector are: exports, investments in third countries, cooperation and alliances. No specific knowledge gaps have been identified for this activity in Spanish area.

In **Italy** enterprises devoted to fisheries products processing as main activity present in the study area represent 60.6% of the total Italian enterprises of the same sector, 55.4% in number of employees and 51.7% in terms of revenue (Calabria and Sicily partially cover other seas outside the study area). This amount is represented by 356 enterprises that generate job for 3484 employees and at about 1.180 million € of revenue (Figure 23-25) (Itafishstat – Mipaaf, 2013). The economy of this sector is strongly dependent on the fisheries trend. The trend of fishing activities and the adoption of an improvement policy of the sector could represent the main driver influencing the state of fish and shellfish processing activities in the Italy. The European Maritime and Fisheries Fund shall foster marketing and processing by pursuing specific objectives, such as the improvement of market organization for fishery and aquaculture products and encouragement of investment in the processing and marketing sectors. These funds may support investments in the processing of fishery and aquaculture products that: contribute to energy saving or reduce the impact on the environment, including waste treatment; improve safety, hygiene, health and working conditions; support the processing of catches of commercial fish that cannot be destined for human consumption; relate to the processing of by-products resulting from main processing activities; relate to the processing of organic aquaculture products; lead to new or improved products, new or improved processes, or new or improved management and organization systems (Reg. EU No 508/2014). Specific legislations are in place regarding shellfish fishing activities (D.M. 22/12/2000) and related to the healthy foodstuff and relative controls intended for human consumption (respectively Reg. CE 853/2004 and 854/2004). No transboundary interactions of the activities are in place, due to their typical local characteristics.

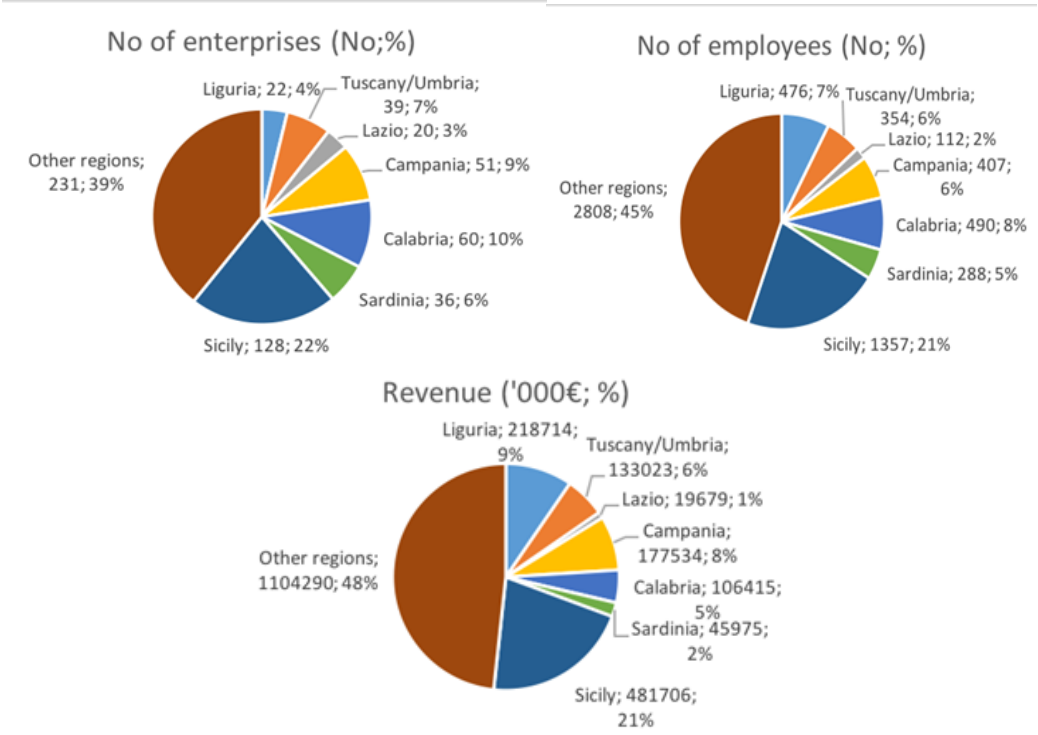


Figure 23-25 No of enterprises, employees and revenue of fisheries products processing in Italy.

No information was provided on this activity for **Maltese and French** area.

4.2 CULTIVATION OF LIVING RESOURCES

4.2.1 Aquaculture, including infrastructures

Aquaculture is the breeding of marine species, both animals and plants, within a controlled environment, the breed species are grown and harvested for commercial purpose. It is often developed on coastal areas both at sea (mariculture) and on specific tanks on land, off-shore maricuture is also practiced mainly for the breeding of pelagic fish species (e.g. tuna). Taking into account, on the one hand, the limited resources and the pressure to which the marine environment is affected and, on the other hand, the continuous growth of the world population and the consequent food demand, aquaculture, in the Mediterranean, is presented as a strategic sector with great potential for development. The Union's Common Fisheries Policy recognizes it and sets out a series of guidelines to promote its development in European countries. One identified objective of the European Union is to increase employment and territorial cohesion by pursuing the promotion of economic growth, social inclusion and job creation, and providing support to employability and labour mobility in

coastal and inland communities which depend on fishing and aquaculture, including the diversification of activities within fisheries and into other sectors of maritime economy.

Spain is the country of the European Union with greater aquaculture production. In 2014 the total production of the sector of aquaculture was 307,179 tons, with a notable increase (22.5%) in production compared to the previous year (250,742 tons in 2013). The 95.1% (292,193 tonnes) of national production in 2014 was marine aquaculture production, with the rest of the aquaculture being continental (14,986 tonnes). In the same year, there was a growth of 24.5% in marine aquaculture production compared to that in 2013, while continental aquaculture production decreased by 6.9%. Analysing exclusively the evolution in the production of fish, it can be observed that, in the case of marine aquaculture, it has decreased by 5.1% in 2014 compared to 2013.

The total value of marine aquaculture production in 2015 in the Spanish part of the Mediterranean was estimated at 241.250.425,8 €. Data for aquaculture production in 2015 by autonomous communities included in the Levantin-Balear Region were also collected with these results: 8397,5 Ton of fished product, for a value of 50873,2 thousands of euros and 1260 employees in Catalonia; 14412,2 Ton of fished product, a value of 76729,2 thousands of euros, 476 employees in Valencian Community; 123,2 Ton of fished product, a value of 333,9 thousands of euros, 145 employees in Balearic Islands; 10248,1 Ton of fished product, a value of 64368,0 thousands of euros, 469 employees in Murcia Region. The map below shows the number of aquaculture facilities (228, including both marine and freshwater aquaculture) in the Balearic Levantine marine district.

The Strategic Plan for Spanish Aquaculture is part of the Common Fisheries Policy (CFP) and the European Maritime and Fisheries Fund (FEMP) and seeks to respond to the Strategic Guidelines for the Sustainable Development of Aquaculture proposed by the Commission on common priorities and needs for sector development. The Strategic Plan includes the strategic planning carried out by the autonomous communities on aquaculture. Thus, the Strategic Plan identifies four Strategic Objectives aligned with the Strategic Guidelines: simplify and homogenize the legal and administrative framework and strengthen the representativeness of the sector; increase Spanish aquaculture production, based on the improvement of sectoral planning and the selection of new areas of aquaculture interest; enforce the competitiveness of the sector through R + D + I, closer relations between the scientific community and the sector, health management and well-being; strengthen the aspects related to the transformation and commercialization of aquaculture products through innovation, promotion and support to producer organizations. The area of application of the strategy is Spain as a whole. In fact, Spain runs the risk of having 17 different sea management plans

based on the exclusive competences held by the Autonomous Communities. To avoid this, the conclusions and lines of work included in this Strategic Plan are aimed at establishing the necessary and timely coordination mechanisms among the autonomous communities. In future, the increase of the planned aquaculture production in Spanish waters shall be used mainly to cover the Internal demand of fish, in the case of the sub-sector of molluscs a significant part (around the 20-30% of production) should be exported. The following map (Figure 26) illustrates the areas of aquaculture interest identified by the Autonomous Communities.

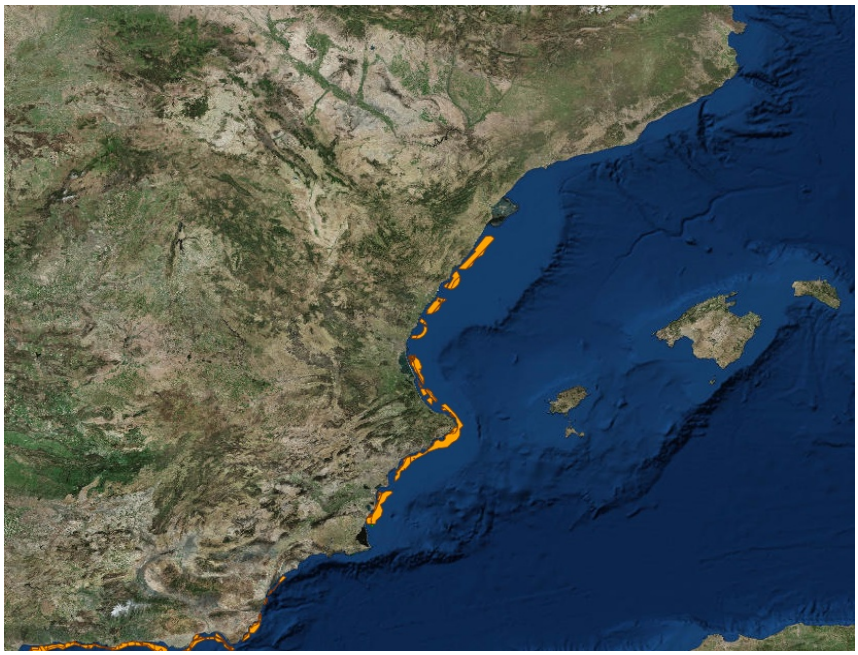


Figure 26 Geographical distribution of areas of aquaculture interest identified in Spanish waters.

The aquaculture production in Spain is expected to grow in the next decades. While in 2012 the aquaculture production of Spain accounted for 266,684 Ton of fish product with a total economic value of 435,632 thousand of euros and 19,892 employees, in 2020 it is expected to reach a production of 320,434 Ton, a value of 550,118 thousand euros, an employment rate of 21437 people, and in 2030 the production should reach 407,940 Ton for a value of 778,152 thousand euros and 23,442 employees. (Source: Data 2012. Ministry of Agriculture, Food and Environment of Spain).

For the French Mediterranean area information on this activity was limited to spatial identification of main shellfish and finfish aquaculture sites (Figure 27, 28) no further information was provided in relation to this activity in France.

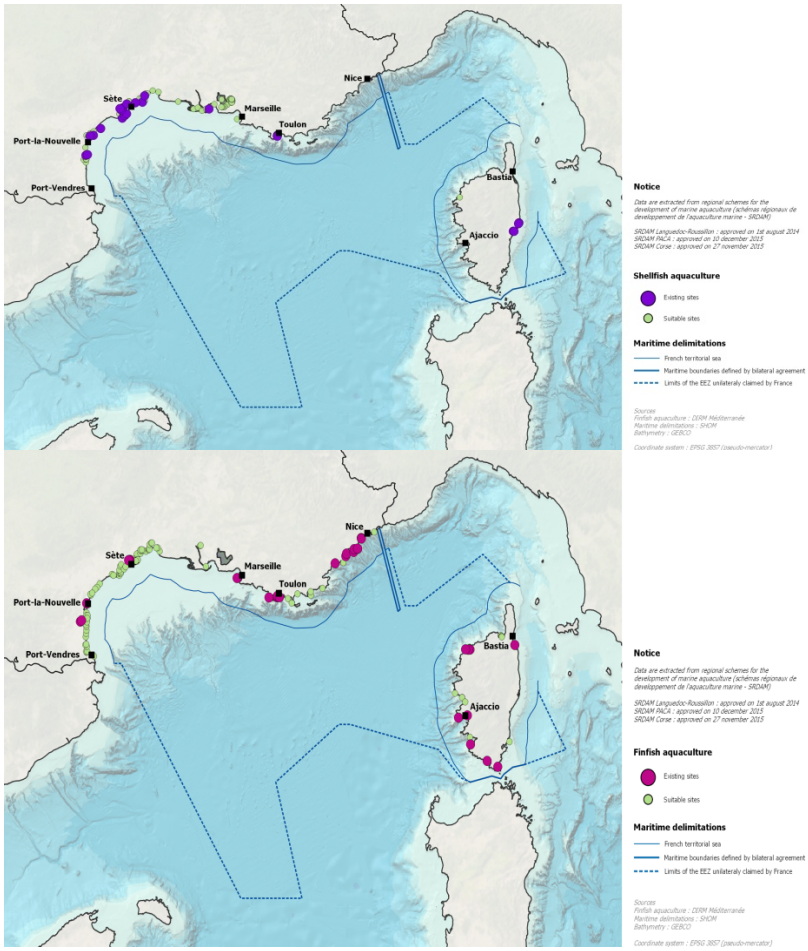


Figure 27,28 Geographical distribution of main shellfish and finfish aquaculture sites in French waters.

Data available for the whole Italian production, from 2002 to 2015, revealed a general decrease of the aquaculture sector, gone down from more than 180.000 tons in 2003 to about 140.000 tons in 2015. A strong decrease was recorded in 2004, most of it within bivalves, other molluscs and invertebrates farming sector. All the other products never exceeded the 40.000 tons/year. One of the most important productions was played by bivalves, which in terms of mean value during the period represented the 67% of the whole production, whereas the rest of production represented a low fraction, taking into account the presence of freshwater aquaculture in the last category. In terms of the value of aquaculture production during the same period, a very similar decrease was recorded in 2004 (300.000.000 €), whereas a maximum value was recorded in 2007 (nearly 600.000.000 €). As a mean value, molluscs and other invertebrates played a key role in economic terms (45%), but, despite the lower quantity production, where other marine fishes represented only the 9%, the sector reached the 23% for the economic value. The prices of aquaculture production (€/kg) during the period 2002-2015 highlighted different prices oscillation range, more evident for crustaceans and tunas but less for other categories, such as other marine fishes, molluscs and crustaceans.

Considering the Western Italian regions, the use of marine waters (sea and transition environments) prevails. Considering data for 2013, Sardinia is the region with the highest number of aquaculture facilities (36 for fish and 45 for molluscs, Figure 29). Tuscany hosts a relatively high number of fish farming facilities (16), but none for molluscs, Lazio 10 for fish farming and 13 for molluscs, Campania 4 for fish and 31 for molluscs, Liguria 2 for fish and 3 for molluscs, Sicily 10 facilities for fish and 3 for molluscs and Calabria 5 for fish and none for molluscs. Anyway, aquaculture in these regions is less intense than in the Northern Adriatic regions and Apulia, also in terms of productivity.

With regard to management strategies for aquaculture in Italy detailed regional information is published within the Italian Strategic Plan for Aquaculture 2014-2020. The European Maritime and Fisheries Fund shall contribute to the Europe 2020 strategy and to the implementation of Common Fisheries Policy. Improve sustainable aquaculture (including offshore aquaculture) is considered a pillar within the Blue Growth EU policies. Union priorities for the sustainable development of fisheries and aquaculture and related activities, such as fostering environmentally sustainable, resource-efficient, innovative, competitive and knowledge-based aquaculture, follow the specific objectives: provision of support to strengthen technological development, innovation and knowledge transfer; enhancement of the competitiveness and viability of aquaculture enterprises, including the improvement of safety and working conditions, in particular of SMEs; protection and restoration of aquatic biodiversity and the enhancement of ecosystems related to aquaculture and the promotion of resource-efficient aquaculture; promotion of aquaculture having a high level of environmental protection, and the promotion of animal health and welfare and of public health and safety; development of professional training, new professional skills and lifelong learning.

No transboundary interactions of the activities are in place in Italy, due to their typical local characteristics. The different shape of the coastline and their geomorphology has led to some national differentiation in the development of aquaculture activities, avoiding transboundary interactions.

The growing demand for fish products together with a decrease/stability of catches requires new aquaculture producers. The policy framework in place in Italy is focused on a substantial improvement of aquaculture in several aspects. Implementation of existing policies could represent the focal point for future aquaculture development. Taking into account the growing demand for fish products and the role that aquaculture shall play in the future as provider of food from the sea for next generations, a strong and robust scientific data availability followed by an improvement in new technological knowledge, will implement the aquaculture activity and the accomplishment of the development policy undertaken.

Figure 29 Geographical distribution of main mollusc farming facilities along Italian coasts.

Malta's aquaculture production started in the early 1990's with production of sea bass (*Dicentrarchus labrax*) and Gilt-head seabream (*Sparus aurata*) and continued to develop in 2000 with the first farm for the fattening of the Atlantic Bluefin tuna (*Thunnus thynnus*).

At the time of reporting the MSFD Initial Assessment in Malta there were nine marine sites for the culture of seabass and seabream, a small production of meagre and fattening of the Atlantic Bluefin tuna. Cages used for the culture of sea bass, sea bream and meagre are located approximately one kilometre offshore, while tuna farms were originally situated approximately 2 km offshore, with two tuna pens located within the aquaculture zone 6 km off the south-eastern coast of mainland Malta.

Priority areas for aquaculture in Malta are generally found on coastal waters and designated aquaculture zones. An aquaculture strategy for Malta was adopted in 2014 covering the period up to 2025. The main strategic goals identified, based on a targeted scenario are: a production target for closed cycle species of 5,000 tons yearly; current levels of capture based species (dependent on Bluefin tuna quotas) maintained; the development of a hatchery; a stronger emphasis on research. The strategy applies to marine waters under Malta's competence. This sector has provided a diversification of the local economy with farmed fish being exported to both EU countries and third countries particularly in the Asian market. For

information on the economic relevance of this activity refer to fisheries section as both sectors are reported together in national statistics. In Malta, there is a long term operational and regulatory experience for aquaculture. Opportunities in this sector may rise from product diversification. Potential spatial limitations for sectoral growth, self-regulation by operators have been addressed as main weakness of this sector. All the farms established in Malta since 1992 have been subjected to a permitting procedure, which included an environmental impact assessment EIA. Following public outcry as a result of fish feed and oil reaching coastal areas, enforcement action in 2016 and revocation of planning permits, all tuna cages had to be relocated. In 2017 two operators located along the southern coast of Malta have been relocated to the Aquaculture Zone. Another operator located 2 km offshore in the north of Malta has been temporarily relocated further offshore along the north of Malta. The location of fish farm cages in 2012 as per MSFD Initial Assessment report can be seen from the Figure 30.

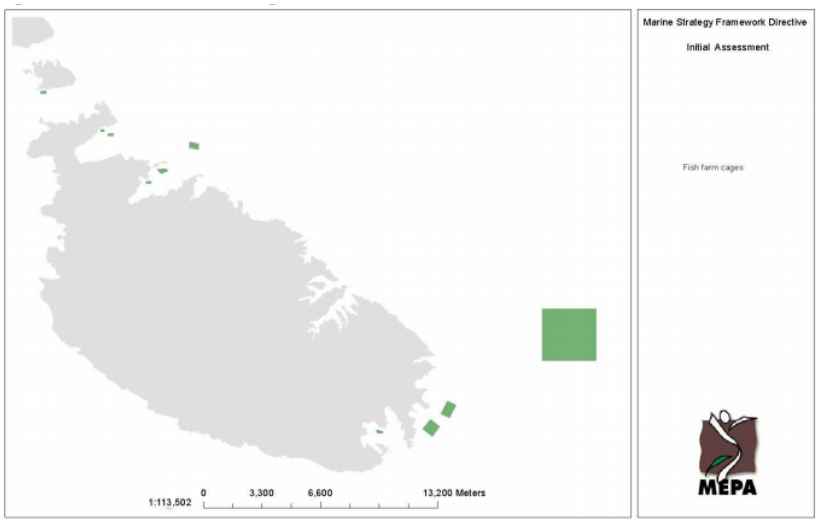


Figure 30 Geographical distribution of fish farm cages in Maltese waters.

4.3 EXTRACTION OF NON-LIVING RESOURCES

4.3.1 Extraction of sand

**This activity is strictly related to the chapter of Physical restructuring of coastline or seabed.*

Coastal erosion in the Mediterranean is accredited as one of the main threats to maritime and coastal-based activities. In total terms, coastal bands which represent a variety of uses and

environmental features such as protected areas of high natural value, infrastructures, (often strategic as viable or industrial settlements), urban settlements, small and large economic activities related to tourism, fish farms (frequently placed in transition environments) can be threatened by coastal erosion. The extraction of sand for beach nourishment is one of the main activities pursued to contrast this phenomenon.

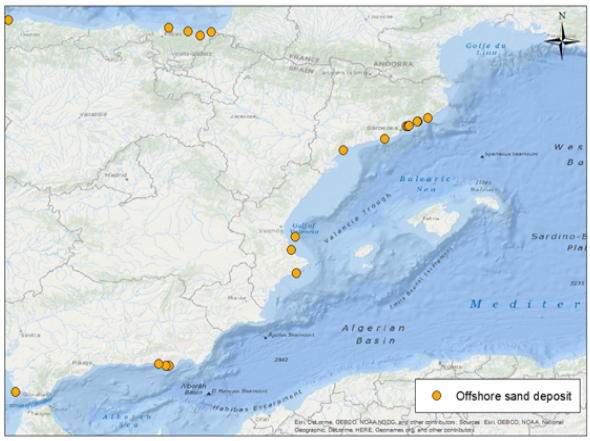
Although in certain countries there is an industrial exploitation of materials extracted from the seabed (mainly sand and gravel) for construction purposes, such activity has been expressly prohibited in **Spain** since the entry into force of the Coastal Law, Law 22/1988 of July 28..

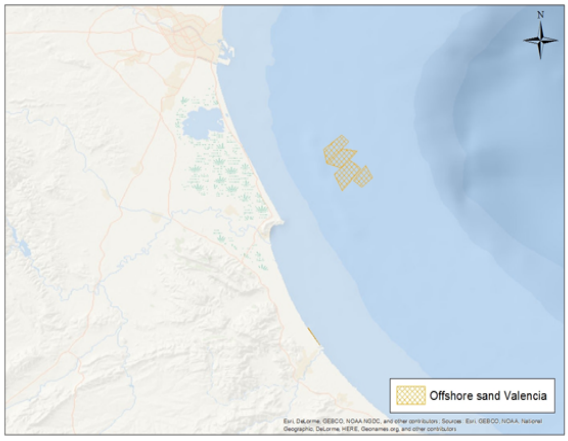
The only extractive activities that, according to the legislation in force in Spain, can be carried out are: Extractions of sands for the creation and regeneration of beaches (regulated by the Coastal Law); Port dredging necessary for the construction or maintenance of ports and waterways (regulated by the Law of economic regime and provision of services of Ports of General Interest, 2003 and also subject to the Coastal Law in what could affect them); Dredging works carried out outside the public port domain for land reclamation in port areas (regulated by the same standards). Spanish Mediterranean coast is deeply affected by coastal erosion mainly caused by damming, port breakwaters and urban development. By the other hand, tourism is one of the primary industries in the country where beaches play an important role and therefore maintenance is crucial for tourism industry.

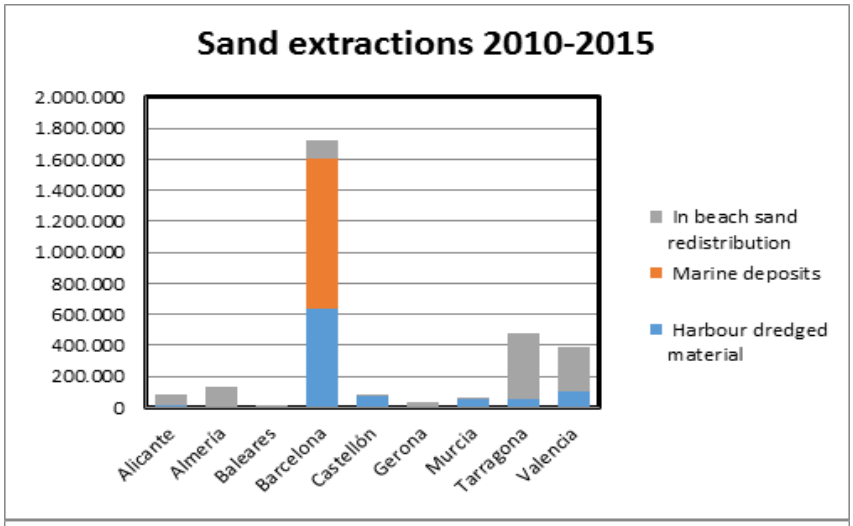
Regardless the aforementioned legislation, certain projects (generally depending on their magnitude and / or their proximity to areas of special environmental protection) are also subject to the legislation on environmental impact assessment developed by the General Administration or Autonomous communities when this is applicable.

Still sand extraction areas are present across the Spanish marine area (Figure 31,32,33,34).

For the period 2000-2010 the main sand extraction projects were in Barcelona coast; three marine deposits areas away from the active profile of the beach (deeper 15 m) were exploited being combined with sand bypass mainly in port areas or sand supply from river mouths. In the Valencia coast, an important marine borrow area called Sierra Helada has been one of the main sources of sand in this coast complemented with dredged material from local ports. Other minor sand borrow areas are located in Balearic Islands and in Malaga and Granada.







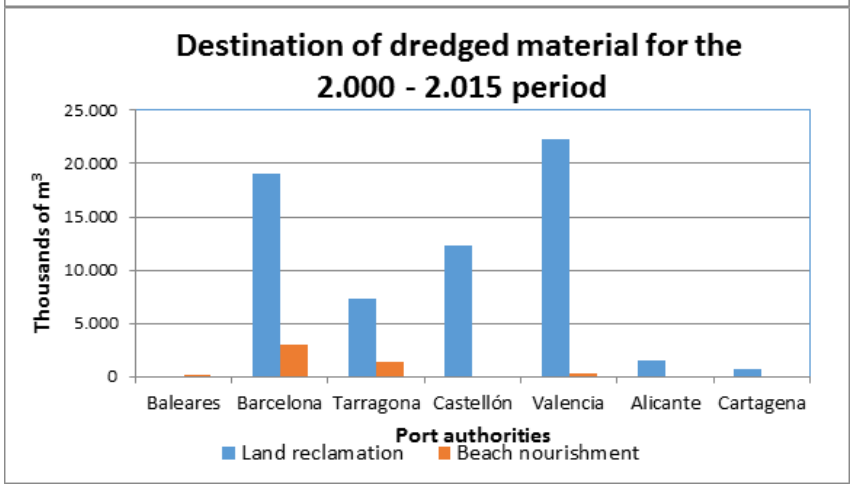


Figure 31,32,33,34 Geographical distribution of offshore sand deposits and destination of dredged material in Spain.

The environmental management of port dredging has been dealt within the framework of the International Conventions for the Protection of the Marine Environment, which has developed specific guidelines in this area. In the case of Spain, in order to articulate these activities in consistency with these Guidelines, in 1994 the Recommendations for the Management of Dredged Material at Spanish Ports (RGMD) were adopted, and were subsequently replaced in

April 2015 by the Guidelines for the characterization of the dredged material and its relocation in waters of the public maritime-terrestrial domain, developed within the Inter-Ministerial Commission of Marine Strategies which will be legally adopted in short term.

Regarding extractions made to obtain sand for use in port fillings or beach nourishment, the ICES Guidance for the management of marine sediment removals was adopted by the OSPAR Convention in 2003. There is a Spanish Technical Instruction of Environmental Management of the Marine Extractions for beach nourishment since 2010, which incorporates the environmental variable to the sand extraction projects although there isn't a national regulation adopted.

Although there is no Spanish strategy for the extraction of sand, a deep-water extraction project framed in the EU-funded Conscience project has been carried out. The EU-FP6 CONSCIENCE project was launched in 2007 with a view to enhancing the implementation of a scientifically based sustainable coastal erosion management in Europe. It has been testing scientific concepts and tools in six pilot sites around Europe, building on the recommendations on coastal erosion management as issued by the EUROSION project in 2004. This project suggests that Member States investigate strategic deposits to identify potentially usable sand sources in regional and long-term beach nourishment projects. The pilot site in Spain consists of the extraction of about 90 million m^3 of sediments from a marine reservoir located in deep waters in the Mediterranean Sea for future regeneration of beaches in the Valencian Community where the coast is highly affected by an erosive process. The reservoir is considered strategic because of the large volume of sediments exploitable, the fact that they are free of chemical and bacteriological contamination, and their proximity to the demand of sand.

In France, for reasons of transport cost, material comes from nearby terrestrial quarries, marine sands deposits located downstream from the concerned areas or neighbouring zones in accretion. Thus, no marine areas of sand extraction were identified.

In **Italy,** the extraction of non-living resources from the seabed (including sand extraction) is authorized through "national maritime concessions" (concessione demaniale marittima) from case to case by Italian Regions. Sand extraction in particular is a fundamental activity of beach nourishment to contrast coastal erosion phenomenon amplified and powered by effects of climate change through the Italian territory.

The conditions of the depositional environment and the sea level that allow to the formation of the offshore sand banks or marine sedimentary deposits (DSMR) on the continental shelf

can strongly change with time due to environmental and climate modifications. Sand deposits are not renewable resources in the short-medium term and therefore their management requires a careful plan based on deepen knowledge of the field, with a correct program of interventions and monitoring activities. In the Italian landscape, there are already numerous experiences of beach nourishment from offshore sand banks performed by Regions from the 1990s to 2016 (Veneto, Lazio, Emilia-Romagna, Marche, Sardinia). Also, numerous Regions have made or started studies and geophysics and geognostics campaigns to detect and characterize submarine deposits, with technical support of university and research centres like ISMAR, CNR and ISPRA. It is important to underline that to date, there is no complete reconnaissance of useful deposits at a Mediterranean level.

Plans concerning beach nourishment in Italy are authorized by the regional administration on a case-by-case basis and focus on scientific research regarding the impacts of such activities. Some official documents are: in Toscana Region "Studi e ricerche sui depositi di sedimenti della piattaforma continentale utilizzabili ai fini di ripascimento"; in Lazio Region "Protocolli operativi e strumenti tecnici messi a punto nei progetti europei "Beachmed" e "Beachmed-e"; in Liguria Region "Relazione sulla presenza e sul possibile utilizzo di sabbie relitte marine ai fini di ripascimento". At a national level the only reference document currently adopted is the "Manual for Handling Marine Sediments of ICRAM-APAT".
The main knowledge gaps for this activity within Italian marine jurisdictions is the precise spatial distribution of the extraction sites and the absence of detailed monitoring systems.

No extraction activity is undertaken in the **Maltese** islands, in terms of sand extraction. However, for this category, the MSFD Initial Assessment reported on dredging activities that are carried out within existing ports in relation to supporting safety of navigation. Dredged material is disposed at an offshore site outside the Grand Harbour (Figure 35). There is no national strategy for Malta for this activity. Marsaxlokk Harbour in the south of Malta and Cirkewwa harbour at the north of mainland Malta are the main areas interested by this activity. Dredging supports continued operations of major ports – the Freeport area to the south and the inter-island connection at Cirkewwa. Main concerns are identified *for this activity* related to the potential impacts of these activities on hydrological processes.

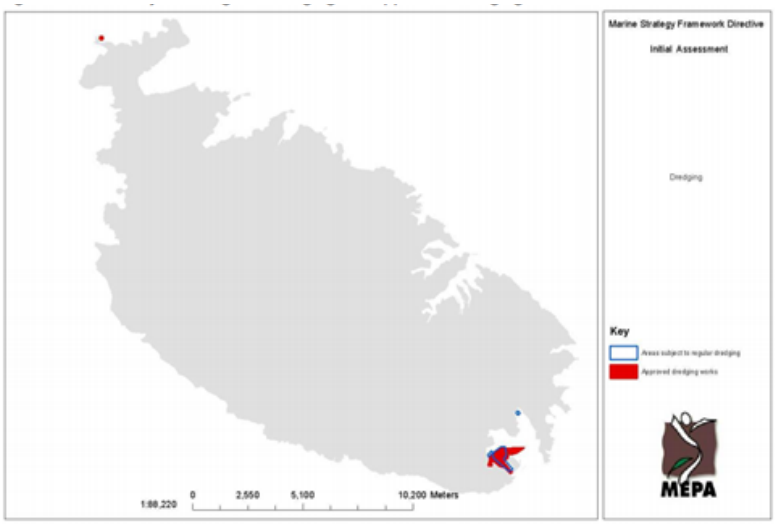


Figure 35 Geographical distribution of areas subject to regular dredging and approved dredging works in Malta.

4.3.2 Extraction of salt

Salt extraction is commonly carried out on the coastal area through the collection of salt accumulated after marine salty water evaporates. Once the salt is collected it is distributed through the market. The salt extraction is an industry with an age-old tradition, basic for numerous industrial processes and the food sector. In the case of Mediterranean salt flats, their geographic location makes them the transit zone for thousands of aquatic birds during their migratory routes from nesting sites (central and northern Europe) to wintering areas (central and southern Africa), so that its ecological function transcends the limits of the local space itself, reaching a whole global network of wetlands. The various areas of extraction of this natural substance, own a cultural value itself, since it is often obtained through traditional practices within salt mines. Thus, the preservation of salt extraction areas is important both from a natural and cultural point of view.

The salt industry in **Spain** it is a dynamic and competitive sector, made up of very diverse companies, both for the process of extraction of the salt that they use as for their dimensions and capacity of production. In the whole of the Iberian mainland, the salt industry employs approximately 2,000 people, directly, apart from the many indirect jobs it generates, which can be estimated at 6,000.

In Spain, there are a total of 21 companies producing salt not counting small ones. The Iberian Association of Salt Producers (AFASAL) brings together 18 companies in the sector that together account for 90% of total production. The production capacity is 4 to 5 million tons per year and its turnover is around 150 million euros per year and exploits sea salt on the Mediterranean coast, Atlantic coast and the islands.

According to the latest AFASAL salt production data, as well as the estimates made, about 1.5 million are sea salt, 2.0 million of brine, 800,000 tons of salt of mine, 600,000 of salt floated and 300,000 tons of salt vacuum. Around 50% of the production goes to the chemical industry and other industries, about 4% goes to the food industry (for table salt, canned products, pre-cooked salted), water treatment and also exports; the salt dedicated to the melting supposes 7% and the rest to other destinations. The location of the main active sea salt flats in the Mediterranean coast of Spain can be seen in the following figure.

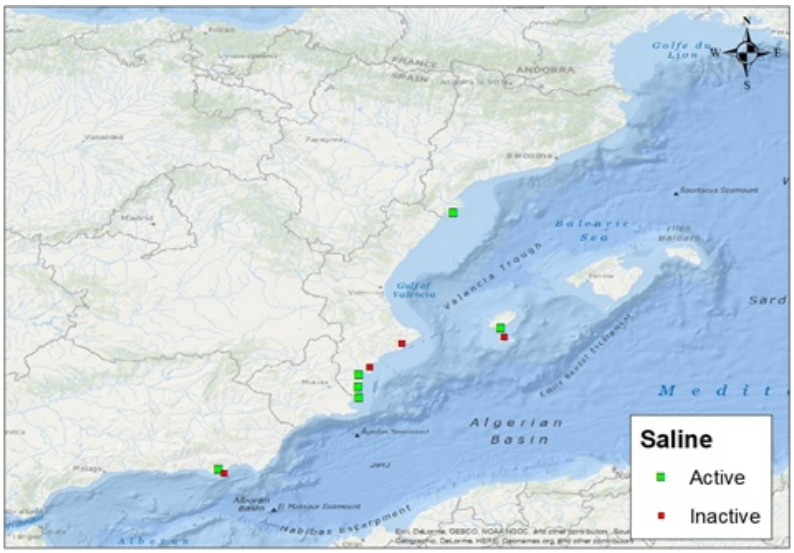


Figure 38 Geographical distribution of the main salt flats in Spain.

In Spain, there isn't a specific national strategy for this activity. The management plans of the protected wetlands in which the salt activity takes place includes in its article the regulation of this activity that is considered compatible with the environmental conservation of the wet zones. The limitations of the activity usually refer to the maintenance of water levels, the deposit of by-products and the realization of infrastructures. In the last 50 years there has been a significant loss of salinas in the Mediterranean, which has mainly affected small farms. Among the factors causing total or partial abandonment of 57% of the existing 70,000 ha of saline nowadays are the urban and industrial pressure, the constitution of large saline companies as well as the transformation of salinas into aquaculture farms.

On the **French** Mediterranean coasts (Figure 35), production generally amounts to 1 million tons a year, almost the total amount of sea salt produced in France.

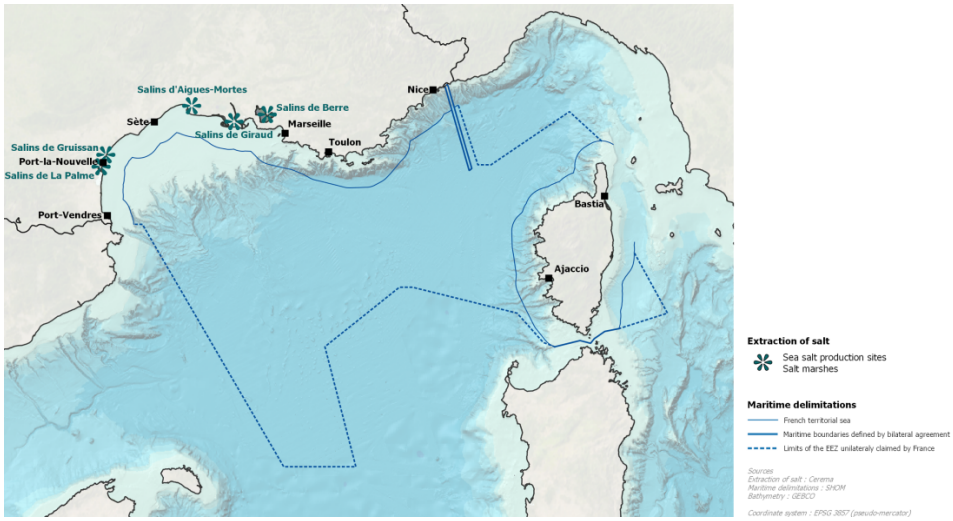


Figure 39 Geographical distribution of the sea salt production sites and salt marshes in France.

Sea salt production represents more or less 15% of the national salt production. There isn't a specific national policies or strategies for this activity in France. Economic and competitiveness difficulties, particularly since the 1990s, have led to a reduction of the activity in France, which gradually concentrated around the following sites: Aigues-Mortes, Salin-de-Giraud, Berre, Gruissan and La Palme.

The Aigues-Mortes and Giraud saltworks are the main production sites. They belong to the Salins Group that is one of Europe's leading salt companies. The Salins Group employs 1,500 people and its production capacity amount to 4 million tons per year of salt in its industrial locations in France, Spain, Italy, Tunisia and Senegal. The Aigues-Mortes saltworks is dedicated to high quality sea salt production, essentially for human consumption. For the Salin-de-Giraud saltwork, the main activities are the production and commercialization of de-icing salt, salt for the chemical industry and other industrial uses, as well as the production of certain manganese products coming from seawater. During the 2000s, the site has undergone significant restructurings and several social plans. The Berre saltwork, also owned by the Salins Group, is in a special situation: salt origins from a brine from the Manosque rock salt deposit. This allows the maintenance of an historic activity around the pond of Berre. In the Gruissan and La Palme saltworks, production was stopped entirely in 2005. Since 2012, a small artisanal activity has taken over on these two sites for a production about 40 000 tons per year. If production seems currently stabilized in France, prospects remain uncertain and one of the challenges will probably be to maintain the economic activity, especially because of the great ecological value of salt marshes and its historical, cultural and tourist importance.

From 2011 to 2016, a LIFE+ program MC-SALT "Environmental Management and Conservation in Mediterranean saltworks and coastal lagoons" has involved France, Italy and

Bulgaria to implement favourable actions for conservation and restoration of active or abandoned salt marshes.

Salt production is an activity that is highly subject to international competition and high market price volatility, especially in the chemical industry. Salt demands can also be very fluctuating: for example, demand for ice-control salt is highly dependent on climatic conditions. Food salt sales have been declining for several years, in line with the recommendations of the national health nutrition program, which aimed at reducing consumption.

There was no relevant information on this activity in **Italy and Malta**.

4.3.3 Extraction of water

Extraction of marine water is commonly undertaken to obtain, through desalination techniques, fresh water which can be used for human consumption. Desalination provides freshwater guaranteeing sufficient supply mainly to public services, industry and the farming. Its use allows development in areas where water scarcity is a limiting factor.

Currently in **Spain** exist more than 900 desalination plants and is the first country in Europe for this activity. One of the main problems of desalted water is the cost of production because of energy consumption. This will not prevent the development of this subsector from continuing to grow based on the own growth in infrastructure in Spanish municipalities and their drinking water needs, mainly for those located on the Mediterranean coast and islands. Although different desalination technologies have different energy consumptions, in Spain the inverse osmosis predominates among existing installations. The most recent data on the production of desalinated water in Spain establishes a fork between 1.5 and 2 hm^3 / day (influenced by the variation of the annual rainfall demand) for the existing desalination plants. Estimated daily production in Spain of 24 hrs/day for 335 days/year, the national consumption of electricity in desalination amounts to 2,460 GWh / year.

One of the main concerns and impacts of this activity in relation with the marine environment was the brine evacuation: the doubts initially generated about the impact of the brine discharge in the receiving medium have been attenuated thanks to the application of diffusion and dilution systems, and control and monitoring plans. The delicate water balance of some territories in Spain and the drought episodes, affected more severely the Mediterranean coast that already suffers problems of water shortage. On the other hand, this situation will be aggravated by climate change, and will be an important factor to be taken into account in hydrological planning and management. The existing underground resources in Spanish

aquifers have, in many cases, high levels of exploitation. They can reach, even in some basins, serious situations of unsustainability because of the extractions rate are far superior to the resources available and, therefore, an increase in desalination processes is expected.

The "AGUA" program, was developed to supplying and irrigate the Spanish Mediterranean basin, totalling 850 hm^3 / year, fundamentally based on desalination technology as a key element of the strategy for solving problems derived from the existing water resource deficit in that area. The three existing plants in the Levantino-Balearic Region, with a capacity of more than 100,000 m^3 / day (Carboneras, Atabal and Valdelentisco), were joined by others (Figure 38) such as San Pedro del Pinatar, Alicante, Águilas, Barcelona and Torrevieja that even in some cases, will exceed 200,000 m^3 / day.

Figure 38 Geographical distribution of desalination plants in AGUA program in Spain.

One of the Mediterranean river basin districts with the greatest problems in the water supply is the Segura basin, which therefore has in the desalination a water resource relevant to both water supply and agriculture.

In the **French** Mediterranean Sea basin there are currently no desalination plants.

As for seawater air conditioning (SWAC) / Deep water source cooling (DWSC) systems, they are currently still rare. If a first installation has been established since 2008 in La Seyne-sur-Mer (Var), the other projects are more recent: in Sète in 2016 as part of the aquatic center renovation in, the Thassalia and Massileo geothermal plants commissioned in 2016 and 2017 as part of the Euromed urban renewal project in Marseille.

For other uses, especially thalassa-therapy and aquariums, available estimated data indicate that there would be 21 catchments points along the French Mediterranean coast: 48 % in the PACA region, 33 % in Corsica, 19 % in the Occitanie region.

As for France, there aren't specific national policies or strategies for these activities. With regard to future trends in French area no desalination projects seem to be expected to date on the basis of currently available information. Thus, adapted to high-density coastal areas,

SWAC/DWSC systems could develop more significantly in the coming years, favoured by the proximity of the urban area to the coastline, the absence of tides and favourable bathymetry. For example, Monaco, a precursor of this technology deployed for almost fifty years along its coastline, now has more than seventy SWAC/DWSC systems producing about 17% of the thermal energy consumed in its territory. For French area, there is lack of accurate and detailed socio-economic data: employment, turnover, added value. Official statistics do not capture these activities and only limited data are available from private information providers. Further there is lack of GIS data and of a comprehensive catalogue of SWAC/DWSC systems and of other uses: localisation, catchment points, volumes extracted.

In **Italy** - according to Istat data revised by WATEC Italy 2017 - the extraction of marine or brackish water for domestic use is just 0.1% of the total levy (13,619 million cubic meters, out of a total of 9,108 billion cubic meters of water is extracted from the various sources) and occurs only in two hydrographic districts: in Sicily, where water is desalinated for 12.6 million cubic meters (92.5% of the total national) and in the Northern Apennine area (the 7.5% remaining, divided between Tuscany with 768 million cubic meters and Liguria with 251 million cubic meters of desalinated water). The main areas of interaction can be individuated among the Sicilian coasts due to the higher presence of desalination plants. There is no national strategy and no official reposes and plans to sustain water demands in Italy, especially in the regions that suffer from drought periods.

Freshwater resources in the **Maltese** Islands are scarce and subjected to intense pressures from various users. According to the MSFD Initial Assessment of 2012, the total fresh water demand is estimated to be 57 million cubic metres per year. During 2011, approximately 16.7 million cubic metres of potable water were produced through desalination. During 2015, the total desalinated water produced was 17.8 million cubic metres. Three desalination plants currently exist on the island of Malta and is distributed to Gozo and Comino via underwater pipelines crossing the channel between the islands. On average seawater extracted from shore wells is approximately 40 million cubic metres per year. Brine discharge amounts to 24 million cubic metres per year. There is no national strategy in Malta for this activity. The three desalination plants are located along three different coastal locations on the island of Malta (Figure 39).

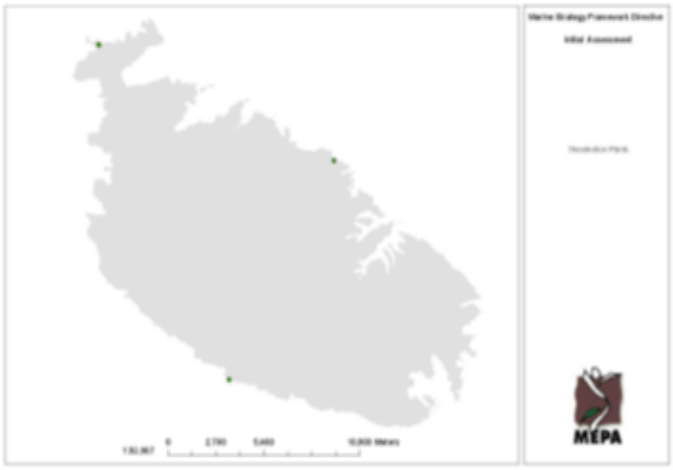


Figure 39 Geographical localization of desalination plants in Malta.

The only potential issue is linked with the plant in the North, at Cirkewwa, since it is in proximity to the inter-island ferry terminal linking the two main islands of Malta and Gozo.

4.3.4 Oil & gas research and exploitation

This activity implies the research and exploitation of hydrocarbons (oil and gas) deposits below the marine subsoil. It is one of the maritime activities with the greatest commercial interest. In the Western Mediterranean it is carried out on specific marine areas mainly on the continental shelf. It implies the research of natural hydrocarbons deposits and their exploitation after the perforation of the subsoil through sophisticated technologies. Prospections are carried out through specific boats while drilling and extraction of hydrocarbons from the subsoil takes place on special platforms.

In **Spain** research and exploitation of oil and gas are both carried out (Figure 40,41). Last updated data indicate that in the marine environment of the area a total of 237 exploratory campaigns and on 228 exploratory drills. In the Spanish Mediterranean area, there is a permanent oil extraction facility, the platform called "Casablanca" which is located 52 km away from Tarragona coast. Exploitation of the Casablanca dates to 1978, when the exploitation of this deposit was granted for a period of 30 years (Royal Decree 3046/1978), which has been extended for another 10 years (Royal Decree 237 / 2009). Other operating concessions granted are "Montanazo" (Royal Decree 2911/1979), which was partially unified with "Casablanca" in 1980 (Resolution of 30 June of the General Directorate of Energy), and for which a concession has also been granted extension of exploitation for a period of 10 years (Royal Decree 1780/2009), before the discoveries of additional reserves and the perspectives collected in the "Development of the Montanazo and Lubina fields". In addition, the

concessions "Salmonete" (Royal Decree 2129/1985) were granted in 1985, which was renounced in 1994 due to exhaustion of reserves (Order 13 June) and "Angula" (Royal Decree 2257/1985), still in force. At the end of 2015, the Council of Ministers approved two royal decrees granting a ten-year extension - until December 3, 2025 - to the Angula and Rodaballo concessions within the working area of the Casablanca platform. Nowadays Repsol has five concessions in the area. Two of the five -Lubina and Montanazo- are also recent; began operating in October 2012 and have a 30-year concession.

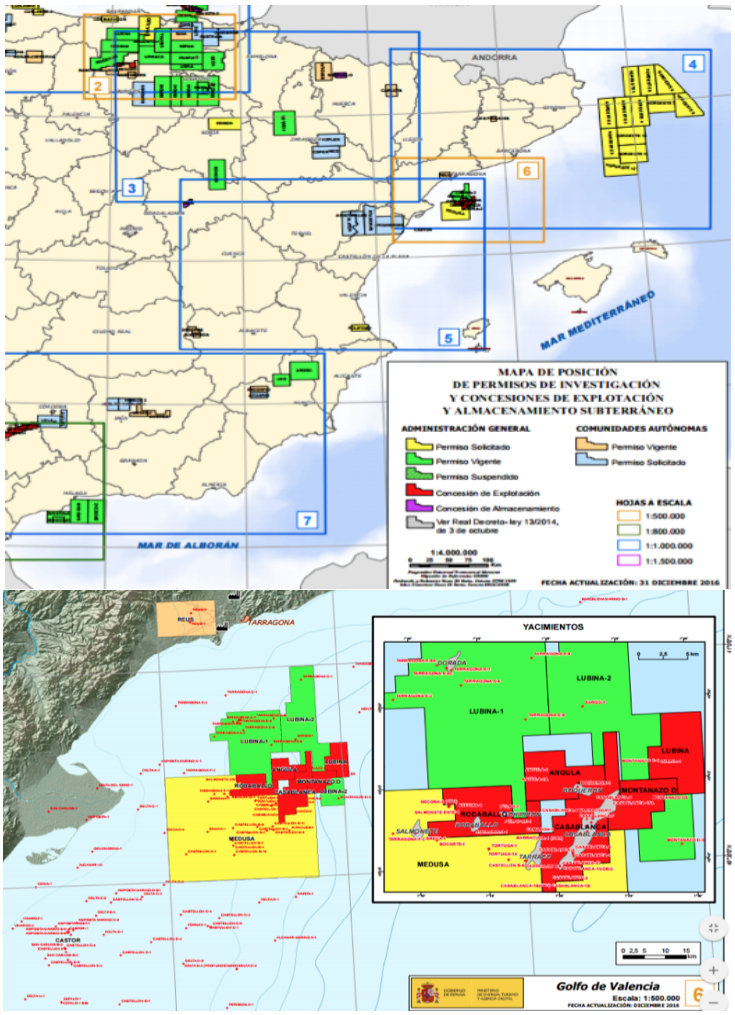


Figure 40,41 Geographical localization of hydrocarbon research permits, probes and concessions in Spanish waters.

The project Castor consisted of the construction of an artificial natural gas reservoir located off the coast of Castellón and Tarragona but was paralyzed by the emergence of seismicity in its implementation. The Castor project was planned to store a maximum of 1900 million cubic meters of natural gas, sufficient to supply the equivalent of 50 days of consumption in Spain. The Castor project was approved by the Royal Decree of May 16, 2008. The Castor reservoir

began operations in May 2012, starting on April 10, 2012 the first gas injection. And it was paralyzed in 2014, since there were evidences that the activity was causing small earthquakes that had provoked social alarm in the provinces of Castellón and Tarragona.

Despite the efforts made, Spanish territory is being considered as relatively unexplored, with potential for new discovers where more than 30 enterprises have exploratory interests and are requesting for research permits. Exploratory permits in Spain are granted by the Ministry of Industry and Tourism for offshore projects and for all the exploitation permits. Nowadays Spain imports more than 99% of the hydrocarbons it consumes and the energetic trade deficit is 45.000 M€ per year, equal to 4% of GDP. Hydrocarbons production in Spain represents 0.18% of crude oil needs and 0.16% of natural gas needs. Although oil remains as the main component of the Spanish energy scheme until 2020 with 38% and gas consumption continues to rise with a 18% in 2020, production of oil and gas has dropped due to the reduction of exploratory activities. There is a national strategy called The National Energetic Security Strategy which was approved by the National Security Council at its meeting of July 20, 2015. Regarding future trends in this activity, it will be conditioned by the Spanish Law related to Climate Change and Energy Transition that is under discussion.

Related to this, it is worth to mention the recent creation of a new Marine Protected Area in the Mediterranean, the Cetacean Migration Corridor, also considered as Special Area of Mediterranean Importance in the framework of the Barcelona Convention (Figure 42). This MPA will prevent the area from new hydrocarbon exploration and extraction activities and will provoke the revision of the ones currently in place.

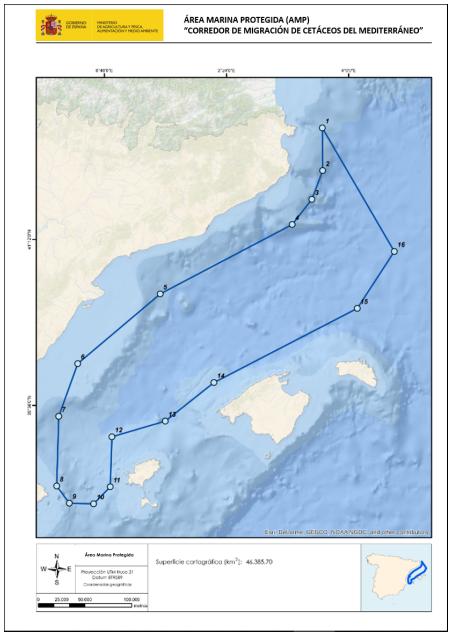


Figure 42 Cetacean Migration Corridor, Marine Protected Area and Special Area of Mediterranean Importance in Mediterranean.

In **French** Mediterranean marine waters there are currently no license, nor demands for oil and gas exploration or exploitation. Following the national strategy for the sea and coast approved by decree n°2017-222 of February 23, 2017, which has established a moratorium on the search for hydrocarbons in the Mediterranean and on the Atlantic coast, a law proposal is currently under discussion in order to end research and exploitation of hydrocarbons in France. Future trends are conditioned by the final disposition of the law proposal under discussion. Figure 43 shows two prospection areas within or near the limits of French jurisdictional waters.

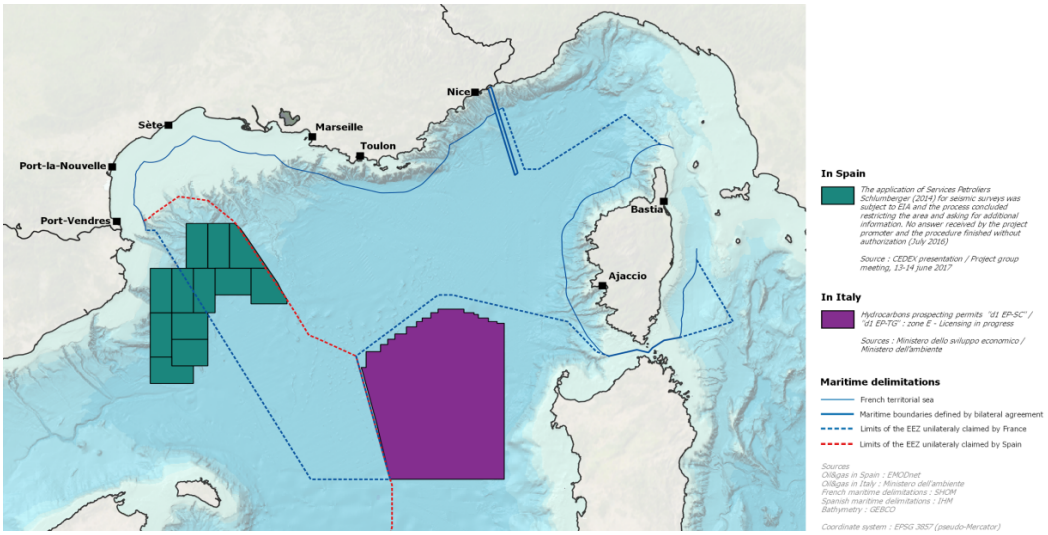


Figure 43 Geographical localization of hydrocarbon prospection areas within or near the limits of French jurisdictional waters.

As regard the state of such activity in **Italy**, the licenses of exploration and exploitation of hydrocarbons in the offshore are granted by the Ministry of Economic Development in the areas of the continental shelf governed by Italian laws and ministerial decrees. They are called "marine zones" and named with capital letters. The Law No. 613/67 has defined five marine zones (from A to E), while two additional sections F and G have been later opened by ministerial decrees. Concerning the area examined from the SIMWESTMED project, the interested zones are C, E and G (Figure 44,45,46). The total surface of all the areas opened to mining activities is about the 40% of the Italian continental shelf. In Italian marine areas, there are 344 offshore production wells in the 67 cultivation concessions. The annual gas production accounts approximately to 7.29 GSm3 of gas and 5.75 Mton of oil. Offshore gas and oil production contributes about 7% and 1% respectively to the national energy supply. These data, referred to year 2014, are available in the website *http://unmig.mise.gov.it*.

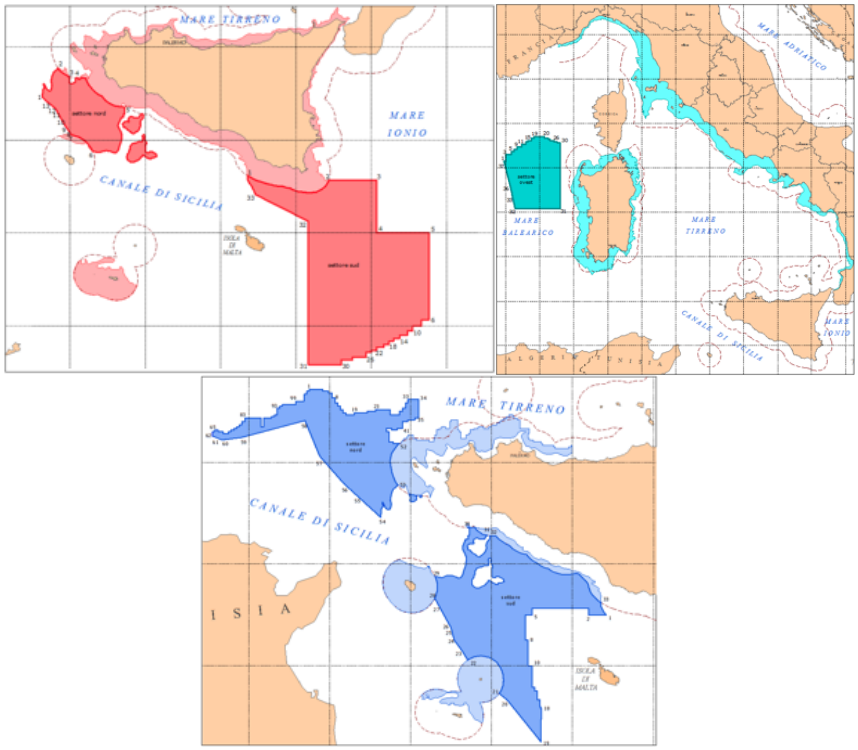


Figure 44,45,46 Geographical localization of hydrocarbon prospection areas in Italian waters.

The law of reference of the release of the research licence is art.8 of the D.P.R.April 18, 1994 n. 484 and art. 6 of the law January 9, 1991 n. 9. The procedure for the release of this licence is regulated by art.1 law August 23, 2004 n. 239. The research projects that the interested agencies develop are evaluated by the Ministry of the Economic Development (MISE), with the support of the Ministry of the Environment, the Ministry of the Instruction, University and Research, the ISPRA, the National Advocacy, and the Regional representatives. For the offshore licences, also the Ministry of the Transport and that of the Agricultural and Forestal Policies are involved. The extraction activity can start only after the release of a cultivation license in line with the decree of the MISE and the interested Region, once the environmental compatibility of the activity is established by the Ministry of the Environment and the Regional competent authorities. These latest are the ARPA (Regional Agency for Environmental Protection) that evaluate and monitor the environmental chemical and physical parameters of the zone sited next to the installations that have to respect the limit values established by the D.Lgs. 152/2006. In case of accidents and spills, the responsible agency must inform the municipality, the province, the Region, the ARPA and the UNMIG (Mining National Office for Hydrocarbons and Georesources), which will handle investigative procedures.

Malta introduced offshore oil exploration in the 1970s and 10 offshore wells were drilled. The area designated for hydrocarbon exploration and exploitation in Malta is made up of seven areas, two of which are further subdivided (Figure 47). Exploration activity is ongoing. The MSFD Initial assessment report indicates that the activity is bound to increase over the coming years. No exploitation activity has taken place to date. The MSFD Initial Assessment indicates that this sector is statistically considered together under NACE codes 8&9 that include other mining and quarrying, mining support services activities. According to the report, in total the sectors under these NACE codes generated an output of €48,300,000 in 2012. The proportion of these NACE code sectors depending on the marine environment and therefore relevant to oil exploration is estimated at 5.0%. This is equivalent to €2,415,000.

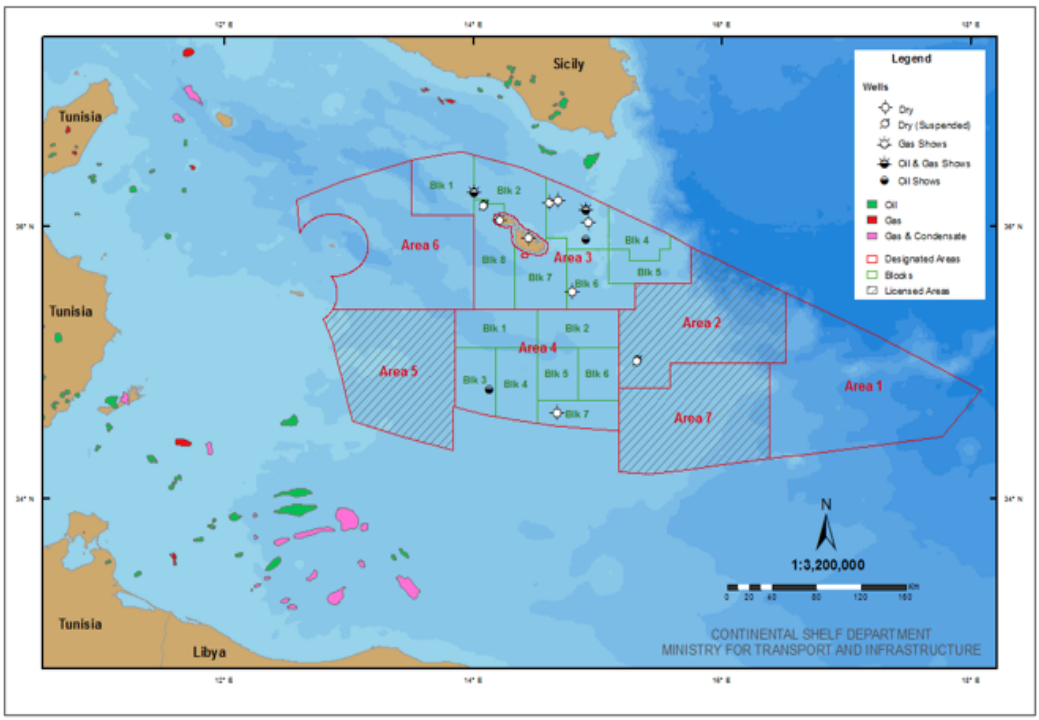


Figure 47 Geographical localization of hydrocarbon prospection areas in Maltese waters.

4.4 PRODUCTION OF ENERGY

4.4.1 LNG facilities

LNG is the acronyms for Liquid Natural Gas, which is obtained from the liquefaction of natural gas extracted from the subsoil. Liquefaction of the gas through the actual techniques allows for a more efficient and safety transportation of it. LNG facilities are all those components

involved in the treatment and transportation of the LNG such as specific coastal terminals, regasification plants, tankers etc.

In **Spain,** the Core LNG project is an initiative co-financed by the European Commission with the aim of developing a logistics chain to boost the supply of liquefied natural gas (LNG) as fuel for the maritime transport sector, especially in the Iberian Peninsula. The project promotes the use of this alternative fuel in both ships and in port infrastructure. The Port of Barcelona is one of the 42 partners in Spain and Portugal, among which there are eight public institutions, 13 port authorities and 21 industrialists, LNG operators, shipbuilders, regasification plants and other companies. In the case of Barcelona, it consists of four pilot tests and a study of the 25 actions that will take shape in the coming months in Spain and Portugal.

In **France**, the multiannual energy plan approved by decree n°2015-1697 of 18 December 2015 presents as one of the objectives concerning the production of electricity from fossil fuels and the security electricity supply in Corsica, the possibility to supply Corsica with liquefied natural gas (LNG). One possible solution could consist of a floating storage/regasification terminal of 40000 m3 of LNG (FSRU) anchored off the thermal power station Lucciana and small capacity LNG vessels that would be able to transport gas from LNG terminals in the Mediterranean.

At national level, **Italy** has 3 operational regasification terminals by considering large-scale import/export infrastructures: 2 offshore (OLT near Livorno and Adriatic LNG near Rovigo) and 1 on-shore (Panigaglia) for a total capacity of 15.2 bcma (of which approx. 6.4 bcm a year in Rovigo allocated to import LNG from Qatar through a long-term contract). The high cost of LNG transport and distribution is one of the main reasons why the LNG network is not yet developed in southern part (Italy) and in the south-east part of Europe. To face this situation, in the maritime and port sector recent development project are being pursued in Sardinia and in the port of Ravenna, Venice and Livorno with the planning of LNG coastal storage (from 9.000 to 30.000 cubic meters capacity) and with the provision of the related LNG sea transport and refuelling equipment (LNG bunker ships and barges).

LNG facilities development indeed address the need of the EC Communication on EU strategy for liquefied natural gas and gas storage (COM(2016)49 final) which stressed that small scale LNG plays a role in reducing environmental impacts giving benefits in terms of competitiveness. The LNG facilities National strategy and policy framework refers to the Alternative Fuels Directive transposition law n. 257 of 16/12/2016 that set out the LNG

National Policy Framework as concerns the deployment and of LNG as transport fuel and the possible synergies with the energy sector. In this context, the GAINN_IT Initiative promoted by the Italian Ministry of Infrastructures and Transport (MIT), aims at conceiving, defining, prototyping, testing, validating and deploying, in the period 2017-2030, the Italian Network of Infrastructures of Alternative Fuels for maritime and surface transport as requested by AFID.

In the **Maltese** waters, there are currently no LNG facilities.

4.4.2 Pipelines

Pipelines are tubes (or pipes) placed on the sea bottom and used mainly for the transportation of hydrocarbons through large distances, very often they connect different countries.

In the **Spanish** marine area, there is a gas pipeline connecting the Balearic Islands (Majorca and Ibiza) with the Spanish peninsula coast (in Denia), with a length of 146 km approximately. A 50 km pipeline links the Casablanca platform to the Repsol's refinery at Tarragona. The Spanish Law AAA/1366/2016 includes the strategy according to the United Nations Convention article 79.1 and 79.2 that regulate the laying of pipelines and the reduction and control of pollution derived from this activity. This law also declares the ban to install pipelines in areas with environmentally sensitive habitats, like *Posidonia* meadows and coral reefs, unless it is not possible to install in other areas. The geographical scopes and areas of application of the strategy are the Special Areas of Conservation (SACs) defined in the EU Habitats Directive (92/43/ECC). No data available about socio-economic value and employment rate.

In **France**, no pipelines are mentioned with the exception of the one of project that present the objective of connecting the Corsica to the European gas transmission network via the marine gas pipeline GALSI. Multiannual energy plan has been approved by decree n°2015-1697 of 18 December 2015 which consider as one of the objectives mentioned concerning the production of electricity from fossil fuels and the security of electricity supply in Corsica the construction of a natural gas supply infrastructure in Corsica to supply therm.

In **Italy**, the actual state of gas infrastructures is regulated from the “Piano decennale di sviluppo delle reti di trasporto di gas naturale 2016-2025” made from SNAM RETE GAS. Gas

Transport infrastructures end with four seaports connecting the underwater pipelines to the ground ones, and which are located at Mazara del Vallo (Trapani), Messina, Favazzina (Reggio Calabria) and Palmi (Reggio Calabria). Standing to European Commission, Italy has 6 PCI for gas networks, 5 of which have an offshore component.

Currently, in **Malta** there is one energy related offshore pipeline between Libya and Sicily. Other pipelines located inshore are related to the transfer of fuel from ship to land based installations. Fuel and Gas pipelines are located in Marsaxlokk harbour and are used to transfer fuel from designated points within the bay to a number of land based installations. The main companies who use these pipelines are Enemalta Petroleum Division and San Lucian Oil Company Ltd. The Enemalta Petroleum Division owns seven submarine pipelines linking its fuel storage facility in Ħas-Saptan to a dolphin (a platform on concrete pylons) in Marsaxlokk Bay. There are five pipelines for fuel (gas, oil, kerosene and petrol), one for fresh water and one for ballast water, although the latter is no longer in use. San Lucian Oil Company Ltd., operates three sub-aquatic pipelines (2 of which are looped in one pipeline) for transfer of fuel oil, light cycle oil and gas oil between vessels and its facility in the San Lucian area in Marsaxlokk. Liquefied Petroleum Gas (LPG) is also transferred via pipeline from supply vessels moored at designated buoys within Marsaxlokk Bay to the nearby plant located on the coast in Qajjenza, Birżebbuġa. The underwater pipelines in recent use comprise a twin pipeline – one for vapour, one for liquid - laid on the seabed and cast together in concrete. The Government of Malta intends to implement a connection to the trans-European Natural Gas Network to end Malta's isolation. This will be achieved by connecting Malta via an approximately 155 kilometers pipeline to Sicily primarily for importation of gas from the Italian National Gas network. The project has been identified as a 'Project of Common Interest' (PCI) under priority corridor 'North-South gas interconnections in Western Europe' in 2013 and its PCI status has been reconfirmed in the 2nd PCI list adopted on the 18th November 2015 (refer to link http://europa.eu/rapid/press-release_IP-15-6107_en.htm). The pipelines for fuel transfer are within the Marsaxlokk harbour. The inter-connector landing area is along the north-east coast of mainland Malta.

4.4.3 Transmission of electricity and communications (cables)

Underwater cables are laid on the sea bottom to transmit electricity and carry telecommunication signals over long distances. Very often underwater cables provide communication and energy connection between shores of different countries.
The Western Mediterranean Sea is crossed by underwater cables connecting both EU and non EU countries. The location of such cables shows a "not widespread" scheme with most of cables concentrated over few specific lanes (Figure 48).

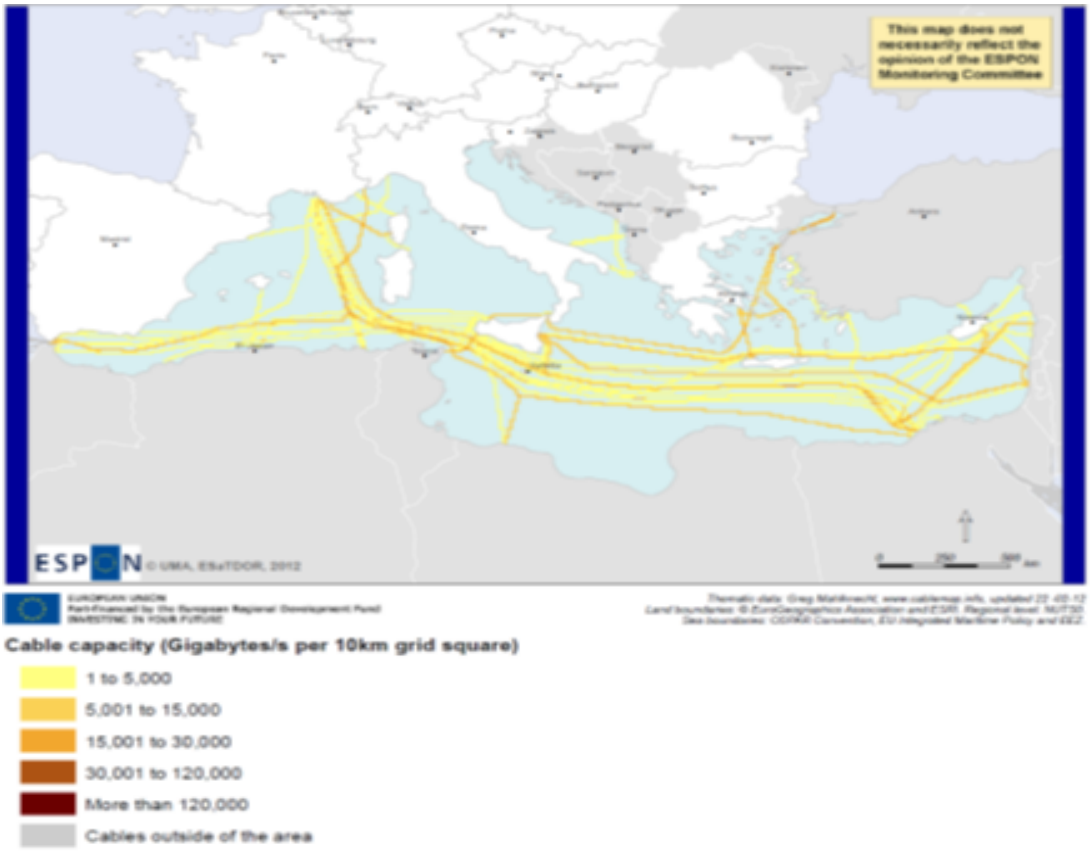


Figure 48 Geographical localization of underwater cable capacity in the Mediterranean.

Submarine cables markets are international and, if the two activities of electric power cables and telecommunication cables show different growth logics, they both, since the nineties, show a highly cyclical nature over the years.
The service activity of cable laying and upkeep is performed by a small number of operators worldwide. Some of them are vertically integrated with cable manufacturing firms, others are part of telecommunications companies and still others have set up as independent enterprises. They may be specialised in laying and maintenance or diversified over a large number of offshore services (oil installations, navy vessels, offshore energy installations, etc.).

In the **Spanish** area of study there is an extensive network of coaxial and fiber optic cables. The first fiber-optic cables installed was a PENBAL-3, between Barcelona and Palma de Mallorca in 1989 and a PENBAL-4 between Valencia, Ibiza and Mallorca. After it, in 1992 a fiber cable was installed between Barcelona and Marseille, and between Palma de Mallorca and Algiers in 1994. In regard of regulation laws for this activity in Spain refer to those regarding the laying of the pipelines. With a fleet of 13 units, France is, in number of ships, the country worldwide with the higher number of cable ship owners. In the French Mediterranean marine waters, the bulk of submarine networks consists principally of telecommunication cables. In this domain, the city of Marseille has emerged as an important European gateway. A dozen submarine cables linking the Middle East, Africa and Asia, are now connected, as for example, the new AAE-1 (Asia Africa Europe-1) cable commissioned in 2016 (Figure 49).

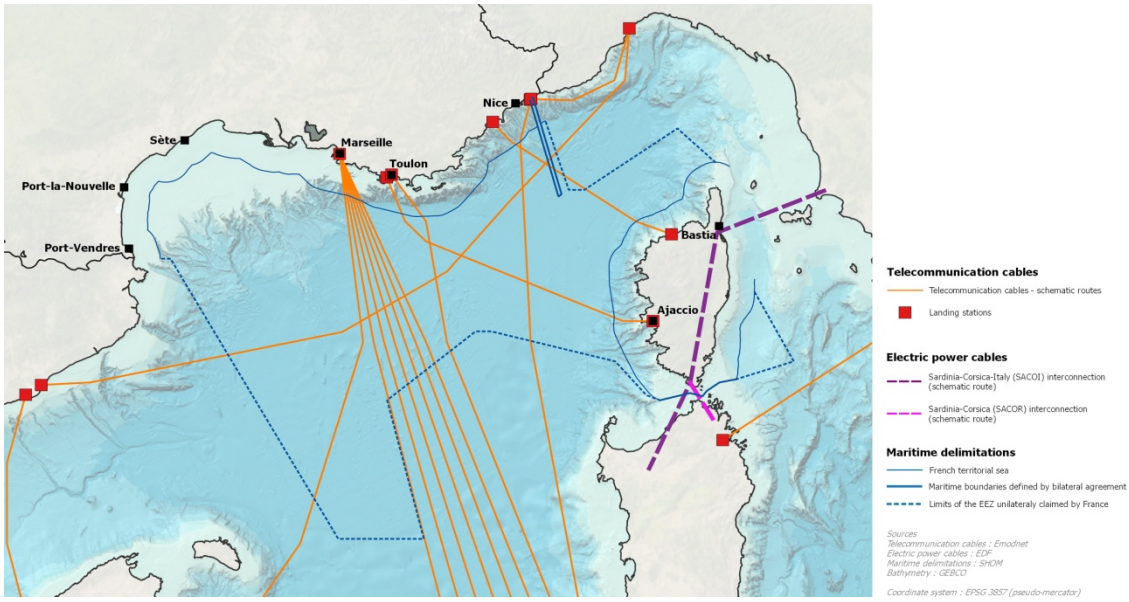


Figure 49 Geographical localization of telecommunication and power cables in French waters.

As far as electric cables are concerned, Corsica benefits from two interconnections with Italy: the Sardinia-Corsica-Italy (SACOI) link, direct current (DC) power line of 300 MW; on which Corsica has a right to levy up to 50 MW; the Corsica-Sardinia interconnection (SARCO), alternate current (AC) power line of 100 MW (Figure 50).

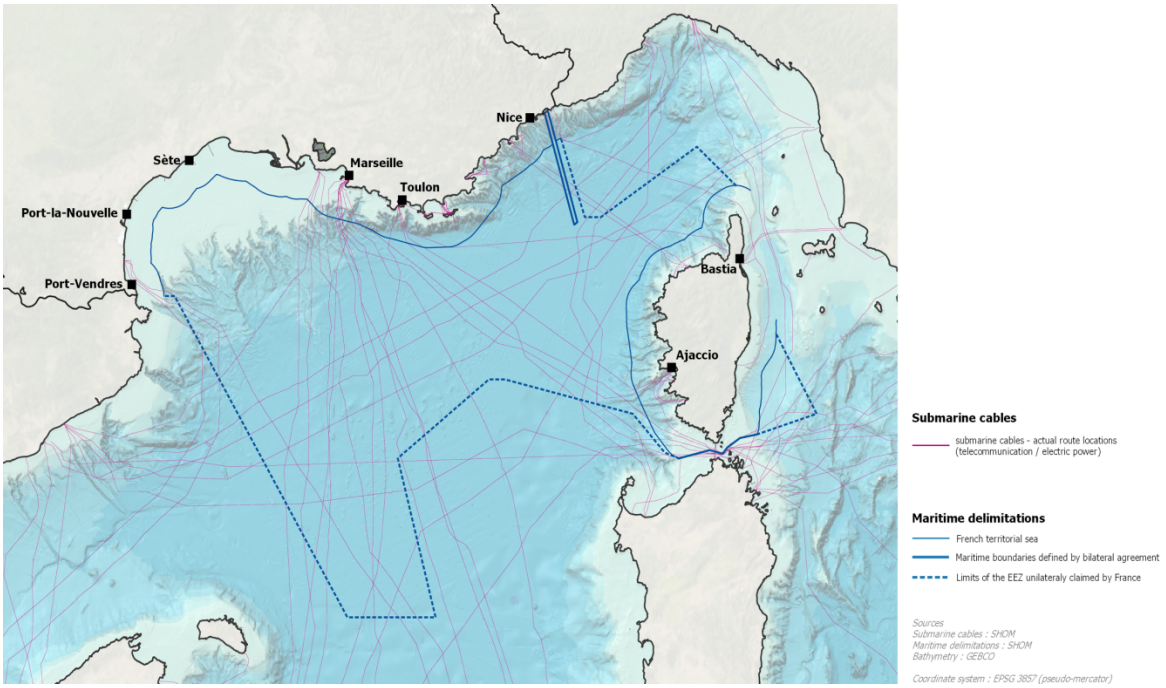


Figure 50 Geographical localization of submarine cables in French waters.

For telecommunication cables in France, there are no specific national strategies or policies except for, due to their strategic importance, a particular attention given to the protection of energy and communication infrastructures in the national maritime security strategy adopted by the Inter-Ministerial Committee for the Sea of October 22, 2015. The planning of this activity appears very limited and facilities are being built without real integrated strategic and spatial planning. For electric cables, there is no new maritime interconnections cables planned in the 2016 "network development ten-years plan" published by RTE, French electricity transmission system public operator. Focus is made on the reception of future offshore wind power generation.

For telecommunication cables, it is likely that future demand for increased communication capacities and intercontinental connections will lead to further cables being installed in France. By 2020, some 20 high-speed cables could connect Marseille to the rest of the world. For electric cables, as previously mentioned, the activity should be driven by the connection requirements of the offshore floating wind farms currently under development.

In **Italy,** the Ministry of Economic Development (MISE) is responsible for policies regarding sectors of energy and telecommunications. By Decree of Minister for Economic Development (December 15, 2010), the activities of electricity transmission and dispatching in the national territory were granted under concession to Terna S.p.A. which has to develop a Development Plan every year, and such Plan has to provide guidance on the development of the sector to

the medium and long-term vision. This, have to be in line with the SEN (National Energy Strategy).

Telecom Sparkle and WIND-Tiscali are the two main competitors in Italy for managing communication cables. An increase in demand for telecommunications and the provision of the latest technologies for television, broadband Internet, mobile and telephone led three major telecommunications companies to lay underwater telecommunications cables linked to Sicily (Figure 51).

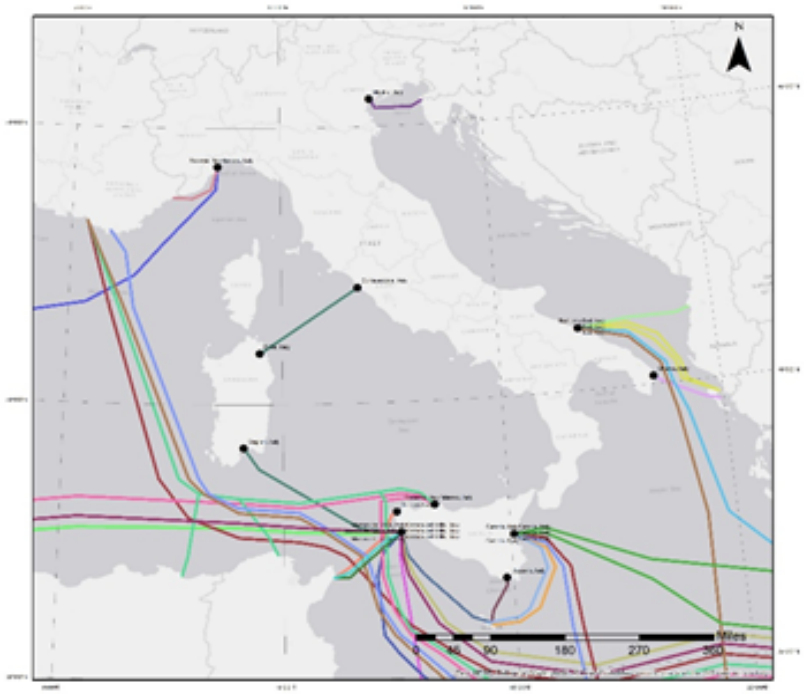


Figure 51 Geographical localization of submarine cables in Italian waters.

SA.PE.I is the deepest power cable up to date in the world reaching a depth of 1650 m. The interconnector entered in operation in 2012 and has a total length of 435 km, of which 420 km is submarine. The cable allows 1000 MW of electric power transfer between mainland of Italy and Sardinia. In December 1967, the Sardinia – Corsica – Italian Mainland direct current interconnection (200kV – 200 MW), called SACOI, entered into operation, connecting the Codrongianos (Sardinia) converter stations with S. Dalmazio (middle Tuscany), in order to initially perform large energy transfers from the new Sardinia (Sulcis) coal power plants towards the Italian Mainland. This use almost immediately underwent some changes, actually allowing to compensate for production shortages in the island, both referring to load/production imbalance periods and to particular emergency conditions and to regulate frequency in AC Sardinian grid. The main future objective of the Development Plan is to strengthen the connection with cross border countries. There are currently plans to

interconnect Tunisia and Italy. The planned line consists of a submarine 400-kV DC line, more than 200 km long, with a rated capacity of 600 MW. The line will connect the substation of Partanna (in Sicily) and Haouaria (OECD/IEA, LARGE-SCALE ELECTRICITY INTERCONNECTION, 2016). In **Maltese** waters the Malta Communications Authority intends to carry out a feasibility study to examine the possibility of an additional submarine cable that would connect Malta to an Internet hub, either to mainland Europe (e.g. Marseilles) or to North Africa. However, no national strategy for the activity exists. The key areas for the telecommunication cables are located along the NE coast of Malta (Figure 52), within three different locations. Two of the areas are within a coastal designated Natura 2000 site. The other site is located within the main harbour area. Underwater cables for power transmission between Malta and mainland Europe, as well as within the Maltese islands are also present.

Electricity generated by the power stations situated on the main island of Malta is distributed throughout the islands of the Maltese archipelago by underwater cables. Power cables are thus laid in each of the two channels between Malta and Comino, Comino and Gozo for electricity supply. The development of an interconnector between Malta and Sicily to connect the power grid of Malta with the European grid has been granted permission in 2012. The Malta-Italy Interconnector, inaugurated in April 2015, comprises a 120-kilometre high voltage alternating current (HVAC) system capable of bidirectional flow of electrical power, transferring 200MW of electricity. In Sicily, the Interconnector is linked to the Italian network at 230kV at the Terna substation in Ragusa. The submarine cable lands in Malta at Qalet Marku, Bahar ic-Caghaq and transmits electricity to the distribution network at 132kV through a nearby Enemalta terminal station at Maghtab.

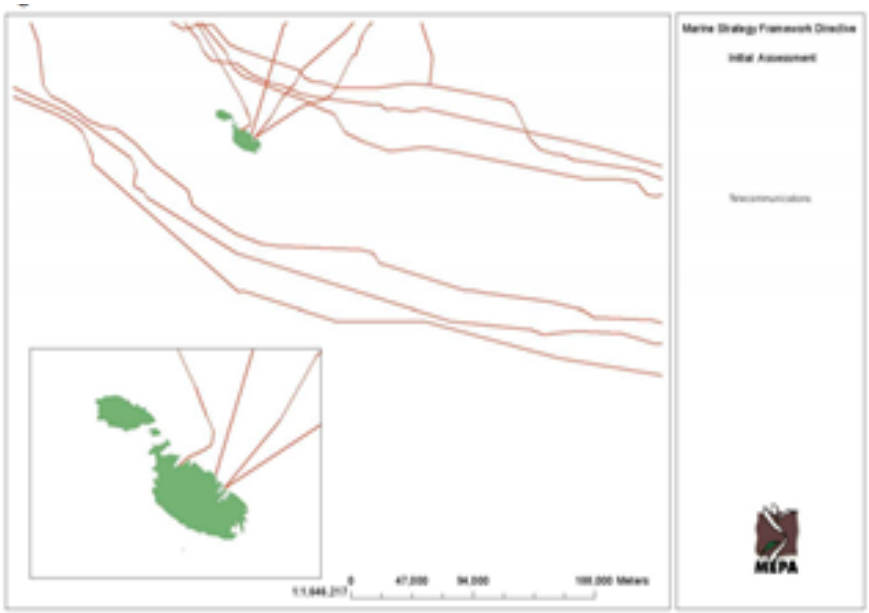


Figure 52 Geographical localization of telecommunication cables in Maltese waters.

4.5 PHYSICAL RESTRUCTURING OF COASTLINE OR SEABED

4.5.1 Costal defence

Coastal defence include all those measures and structures placed to stop or mitigate the effects of natural and anthropic physical pressures (e.g. storms, waves caused by marine traffic, currents, etc.) that may cause the erosion and deterioration of the coastal area.

In the Mediterranean coast of **Spain**, they are induced by sedimentary deficit due to river regulation or retention by structures like ports, intense storm surges, over wash, and rising sea levels. Following EUROSION (2004), in the Levantino-Balear marine district approximately 362 km are in erosion, 1748 km are stable, 43 km are in accretion and there was no information for 282 km of coast.

Since this area is highly populated and is a major destiny for tourists, these risks have a major socio-economic impact, being damage to property and destruction of important coastal infrastructures. Therefore, protection in areas with major erosion problems is fundamental for the management of the coastal zone, especially in areas with a high level of occupation. A large number of maritime defence structures like groin and, breakwaters have been built during the years. Nowadays, the trend consists of looking out for solutions aiming at preventing the coast from being rigid, trying to minimize the use of breakwaters and similar structures. In Spain, the current act on coastal protection and sustainable use of the seashore was approved quite recently, in 2013, modifying the previous law, adopted in 1988. It tries to solve the historical problems of the Spanish coast, a valuable natural resource that must be preserved for future generations, while ensuring legal certainty and promoting those activities that create jobs and wealth in a sustainable way. Differences are established between urban stretches and natural beaches, regulating both occupations and the activities allowed in them. The Regulation includes the provisions on the effects of climate change on the coast. Indeed, it constitutes a national strategy named “Strategy for the adaptation of the coast to the effects of climate change”, coordinated with the regional governments, that was approved in 20171.

In addition to the regulation, the General Directorate for the Sustainability of the Coast and the Sea develops strategies for the protection of specific stretches of coast like Maresme, South of Castellón and South of Valencia. In the near future, it is planned to add Delta del Ebro and Mar Menor. In the short term, annual investments are planned for this activity and, apart

[1] http://www.mapama.gob.es/es/costas/temas/proteccion-costa/estrategiaadaptacionccaprobada_tcm30-420088.pdf

from this, emergency works are carried out whenever it is necessary. For example, in 2015, 21.5 million euros were spent in Spain to repair the damage caused in the coast from the storm events. During the first half of 2017, 25 million euros were necessary in the study area due to severe storms.

In the future, this activity will be highly linked to the effects of climate change, and the development of mitigation and adaptation measures. The main knowledge gap for Spanish area is related to number of jobs.

No information was available on this activity for the areas under **French, Italian and Maltese** jurisdiction.

4.5.2 Restructuring of seabed morphology, including dredging and depositing of materials

Sand extraction and depositing is a common practice in the shallow marine areas of the Mediterranean, sand is used mainly as construction material (e.g. concrete) and for beach nourishment through deposit of large amount of dredge sand on specific areas of the coast. It is extracted through boats with special technology to suction the sand from the surface of the bottom. The main activities that restructure the seabed morphology in **Spain** are dredging and disposal of dredged materials. In recent years, some ports have improved their infrastructures in order to adapt to greater marine traffic and/or higher draft/size requirements of ships. Moreover, in some ports, dredging operations are essential to enable and maintain the protection of navigation and the hydrographical regime in harbours as well as the access to them.

According to the "Inventory of Dredging in Ports of Spain" (Ports of the State), since 1975, the volume of dredged material in all Spanish ports is almost 330 million m^3 with an annual average of 9 million. Of these volumes, 51% has been reused and 11% has been used for filling, so that the volume of material dumped into the sea is almost 125 million cubic meters. In the Spanish Mediterranean area, Barcelona and Sagunto are the Ports of General Interest that have dredged more since the beginning of the century. Some smaller ports of the Spanish Levantino-Balear region, like marinas, also dredge, but the historical series are not available. The management of the dredged materials, giving them a productive use (like beach nourishment or land reclamation) is a priority in Spain and only when there is no other possibility and the materials meet some standards and are not contaminated they can be dumped into certain areas of the sea. There are designated sites where dumping of the dredging spoil is recommended. The magnitude of dry weight (tons) dumped from 2011 to

2015 in each designated area of the Levantino-Balearic Region is shown in the figures 53,54,55.

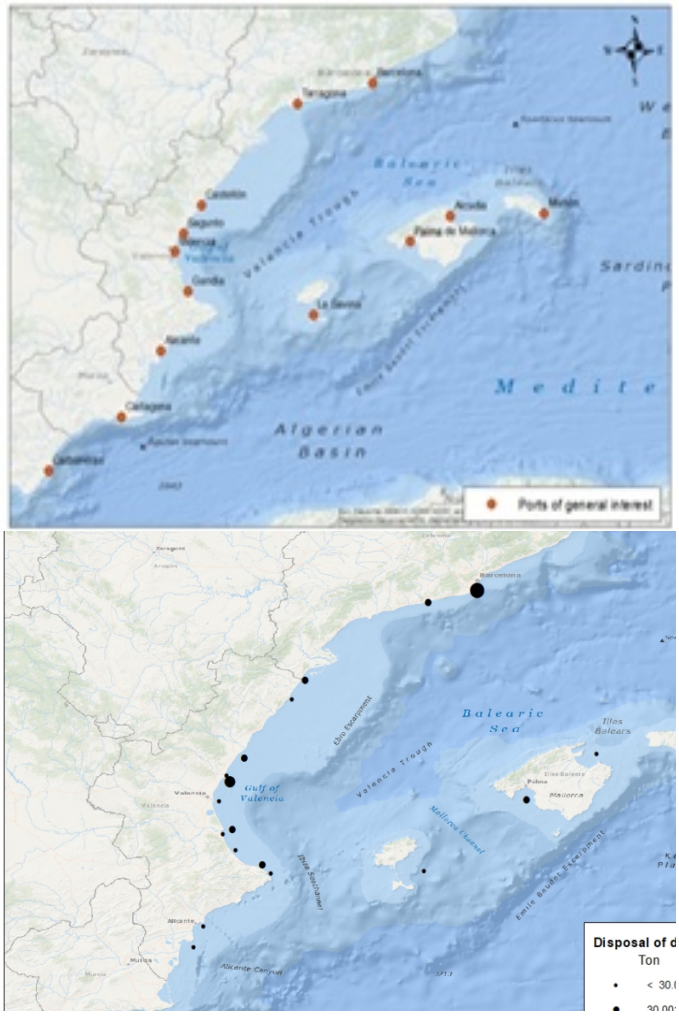


Figure 53,54,55 Geographical localization of ports of general interest, of disposal areas for dredged materials and volume dredged in Spanish waters.

In accordance with Coastal Law, Law 22/1988 of July 28, the only extractive activities that can be carried out in areas under national jurisdiction is extraction of sand for the creation and regeneration of beaches. The main legal acts in Spain related to this activity are: the Law of economic regime and provision of services of Ports of General Interest of 2003 and the Coastal Law to regulate port dredging necessary for the construction or maintenance of ports and waterways and dredging works carried out outside the public port domain for land reclamation in port areas; the Law of Ports (Real Decreto Legislativo 2/2011, september 5, por el que se aprueba el Texto Refundido de la Ley de Puertos del Estado y de la Marina Mercante) regulate the obtainment of dredging licenses.

The environmental management of port dredging has been dealt within the framework of the International Conventions for the Protection of the Marine Environment, which has developed specific guidelines in this area. In the case of Spain, in order to articulate these activities in a manner consistent with these guidelines, in 1994 the Recommendations for the Management of Dredged Material at Spanish Ports (RGMD) were adopted and replaced in April 2014 by the "Guidelines for the characterization of the dredged material and its relocation in waters of the public maritime-terrestrial domain", developed within the Inter-Ministerial Commission of Marine Strategies which will be legally adopted in short term. This guidelines establishes the minimum contents that any dredging project must include from an environmental point of view, the procedure for the acquisition of samples, the determinations and the necessary tests for characterization, the classification of the dredged material into categories, including the definition of the criteria to be considered as non-hazardous sediment, provides the procedure for evaluating the different management options, and establishes the conditions to be fulfilled for the dumping of materials and the development of environmental monitoring programs. Regarding maintenance dredging, similar volumes in similar areas are expected to be dredged in the short term.

Information on dredging sites is scattered in Spanish Mediterranean region and the precise areas in which dredging and dumping of dredged materials is located are not always provided. Neither, it is known the real changes that these activities cause in the bathymetry and morphology of the Spanish Mediterranean seabed (thickness and final granulometry of deposits), and therefore, impacts at a general level cannot be assessed.

In the **French** Mediterranean Sea basin, extraction of marine aggregates only concerns beach nourishment in response to coastal erosion. Apart from creation of some artificial beaches in the 1970s, beach nourishment operations can schematically be distinguished into two major sets: punctual nourishments, redistribution of drifting stones. They can be variable or permanent according to the needs.

Along the French coast sites of dredged material disposal are found as shown in Figure 56.

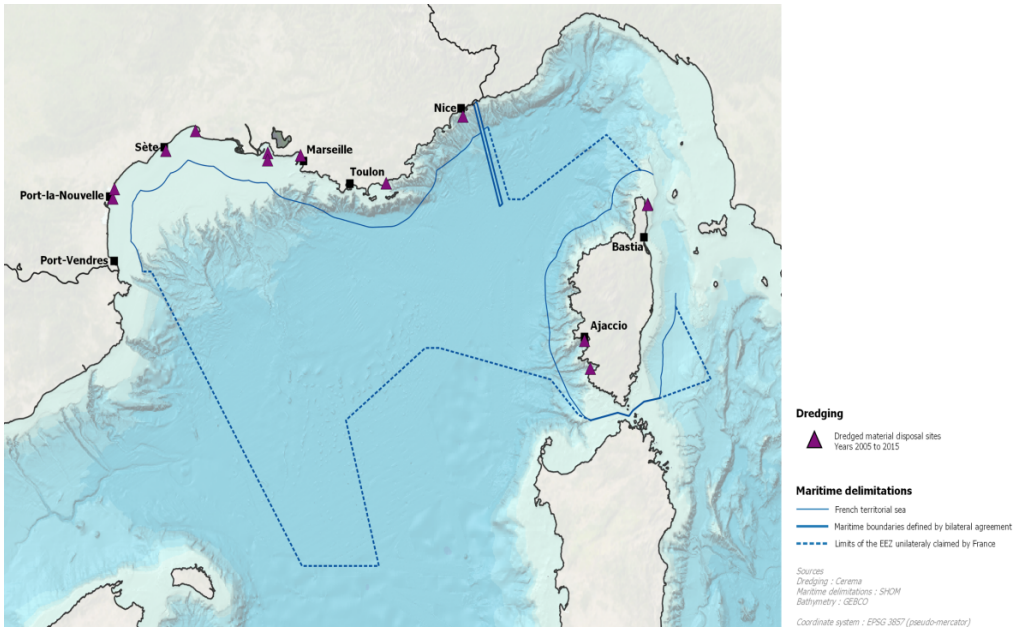


Figure 56 Geographical localization of dredged material disposal in French waters.

In the Provence-Alpes-Côte d'Azur region, beach nourishments date back to the 1970s and take place in addition to beach protection structures. The newer and more massive beach nourishments in the Occitanie region aims, in line with the guidelines for the management of coastal erosion in Languedoc-Roussillon adopted in 2003, to strengthen or restore the functioning of natural environments.

Following the French "National strategy for a sustainable management of marine and terrestrial aggregates and quarry materials and substances" adopted in 2012, which aim specially to manage the development of the use and exploitation of marine aggregates, a methodological guide for the elaboration of the so-called "documents d'orientation pour une gestion durable des granulats marins" (DOGGM - document guidance for sustainable management of marine aggregates) has been published in 2016. The main objective of the DOGGM is to define, for each sea basin, a decision-making framework for the sustainable management of marine aggregates exploration and exploitation projects, taking into account environmental sensitivities and socio-economic needs. If the legal status of these documents has still to be clarified, they nevertheless will be taken into account in the sea basin strategy documents (French implementation document of MSP and MSFD) currently under development.

In the same way, the second action plan 2017/2019 of the French "National strategy for an integrated coastline management" has the following two actions: sub-action 3.3 - Develop knowledge on sediment stocks and transits in connection with the elaboration of the

document guidance for sustainable management of marine aggregates and the sea basin strategy documents; sub-action 1.7 - Develop, where appropriate, beach management plans at the most appropriate scale, including, if necessary, any programs of beach nourishment, in line with the document guidance for sustainable management of marine aggregates and the sea basin strategy documents. In France, because of the abundance of resources on land, exploitation of marine aggregates for construction will probably not be a major issue. As for beach nourishment in Mediterranean France, the activity is strongly conditioned by erosion problem and the demand for sediments will probably increase in the next years. In the Occitanie region, which is highly affected by erosive process, on the basis of ongoing projects, sand requirements are estimated to be around 6 million m3 by 2020. If these needs will be covered by major civil works, especially the extension of the port of Port-La-Nouvelle, the importance of the volumes involved and the lack of land and coastal resources have led to the search, in the Gulf of Lion, of offshore fossil material stocks no longer participating in coastal dynamics and having physical characteristics close to those present at the coast.

The European Beachmed and Beachmed-e programs involving France, Italy and Spain, have demonstrated the existence of large sand deposits on the continental shelf, beyond the territorial waters (but within 200 miles offshore) and identified a potential extraction area. Complementary studies have been carried out by the French Biodiversity Agency to improve knowledge, in particular environmental aspects, and to provide the necessary elements to assess the feasibility of exploiting offshore sand deposits.

In **Italy**, the coastline variations estimated by considering the period between 1960 and 2012 are estimated to be, along a total of 1534 km of coast, in regression (92 km^2), while, for 1306 km of coast, in progression (57km^2).

On the base of a shorter time period monitoring study (from 1994 to 2012), however, these variations have been evaluated to be in regression along a total of 951 km (17 km^2), while, along a coastline of 961 km, in progression (18 km^2).

The balance in the second period of analysis in Italy (1994-2012) is barely positive, due to action taken on the protection of sediments along the waterways and for the artificial beach nourishment operations in some regions. Evaluations of coastline defence works in Italy, necessary to mitigate identified potential risks, has been made through an estimation of cost per kilometre of hard coastal defences, sand replenishment (more than 20 meters) or mixed typology defences.

Following costs are estimated on the basis of the pricing indications of sector operators: mean cost for hard, soft and mixed coastal-defence work correspond to 4,5 M€/km, 4 M€/km and 6,5 M€/km (millions of € per kilometre for 20 m broad).

Regarding the economic assessment of the coastal erosion phenomenon in Italy, several types of estimation have been developed, mainly regarding cost/benefit (cost/avoided-costs) analysis. Several studies have been developed in different occasion (Nomisma, Marche region, Latium region) and they represent a useful contribution for the cost benefit analysis models. Another useful source can be the "*Quarto Rapporto dell'Unioncamere sull'economia del mare*", where the contribution of coastal and marine related activities on the economic sector is estimated. However, there isn't a recognized and certified method to develop an accurate assessment of the economic value of the erosion phenomenon. Usually these estimates are underestimated because such assessment considers only the value of recreational and tourism-related sectors, excluding important sectors (such as catering) and, in general, the induced effects associated with coastal activities.

All Italian regions have a cadastre of the executed interventions, both of hard and soft coastal-defence works. Data are available on maps and, sometimes, in web geodatabases.

Increasing interest in soft coastal-defences works highlighted needs on raw material for sand replenishment.

Beach nourishments with sand derived from river or coastal borrow sites has been the preferred most common method of shoreline stabilization method in Italy for several decades. This practice has increased rapidly over the last period in Italy to the point that the search of alternative sources of sand became an issue. Better understanding of the shelf geology can aid ability to plan for a sustainable use of offshore sands.

From 2014 to 2016 the project MEDSANDCOAST (Innovative models of coastal-marine governance for a strategic defence of the Mediterranean sandy coasts) involved several stakeholders and helped to develop researches in some Italian Regions like Tuscany and Latium.

The outcomes are listed in the technical document of MEDSANDCOAST webpage. This helped to recognize several sand deposits potentially useful for sand nourishment.

So far (September 2017), in Italy, there's no national policy in matter. Recently (March 2017) the Ministry of the Environment, through the Tavolo Nazionale sull'Erosione Costiera (TNEC), have published the Guidelines for coastal-defences from erosion and climate change (Linee Guida per la difesa della costa dai fenomeni di erosione e dagli effetti dei cambiamenti climatici). Specifically, the Guidelines, have the following purposes: framing the causes of coastal erosion in order to initiate a sediment rebalancing path to the greatest possible extent; comparing various coastal erosion issues with possible rebalancing, protection or adaptation solutions, also taking into account the effects of climate change; provide guidance management for the coastal dynamics; provide guidance management for "sand deposits" resources for Coastal-defences; provide guidance and environmental aspects related to

coastal-defence works; provide parameters and methods in order to acquire physical and environmental data for sand deposit sediments and their management; provide guidance on state-owned marine areas and relatives buffer zones. A comprehensive legislative framework at different scales is provided from TNEC's Guidelines at Chapter 3. TNEC's key objective is to complete the research framework of the fields within the next few years, with the rapid establishment of a specific National Program for the identification of submarine sand deposits that can be used for the artificial reproduction of sandy coasts.

No information was available on this activity for the areas **Maltese** jurisdiction.

4.6 PUBLIC SECTOR

4.6.1 Defence/Military areas

Across the marine space specific areas are defined by sovereign countries for military uses. Within these areas special restrictions to navigation are typically imposed by armies. Defence /Military areas are used to carry out military exercises but can also work as strategic outpost for national defence or other strategic goals within the international socio-politic context.

At this moment, the Spanish defence budget is equivalent to around 0.9% of the GDP, and it is expected to grow to 2% in 2024.

Regarding the occupation of marine space, in **Spain**, there are several marine areas where different military practices are possible. Information about the activity in these areas is announced weekly to navigators. Particularly, in the study area, there are areas of shooting, aerial exercises, submarines exercises, training of divers, etc. with a surface greater to 41.400 km^2. The location of these is shown in the following figure (Figure 57):

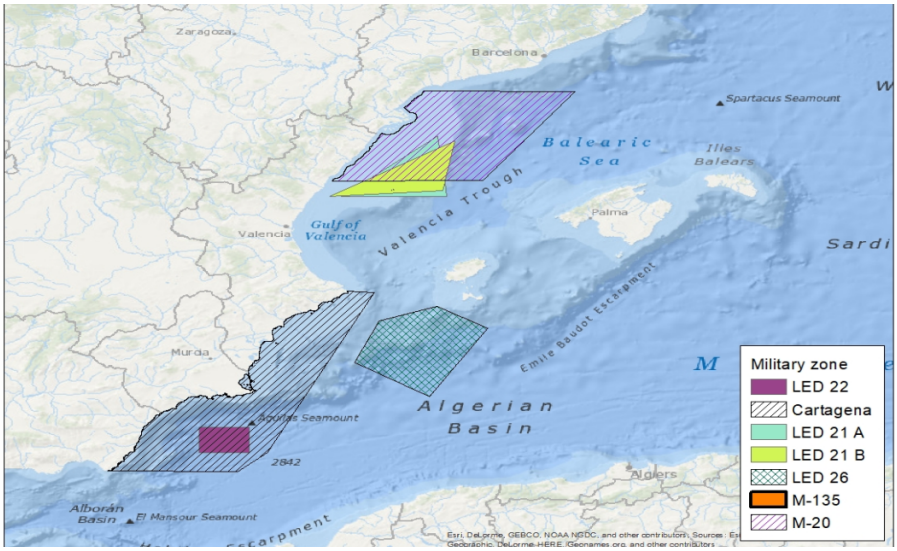


Figure 57 Geographical localization of Spanish military zones

The law that regulates the national defence and establishes the bases of the military organization in Spain is the organic Law of National Defence 5/2005. It also aims to contribute to the preservation of international peace and security, within the framework of the commitments made by Spain. This law is developed by the National Defence Directive 1/2012 and the National Security Strategy (2013). This Strategy provides a comprehensive vision of national security and for an institutional structure equipped to tackle strategic security and crisis-management issues requiring a rapid, coordinated and comprehensive response.

Regarding the Spanish marine jurisdiction particularly, the National Maritime Security Strategy (2013) develops the provisions set out in the National Security Strategy and adapts them to the special requirements of the maritime domain, in line with other strategic instruments in the international environment. It describes the risks and threats to national maritime security distinguishing between those posed by deliberate actions directed against Spain National Security in the marine environment and others arising from the danger intrinsic in any human activity carried out at sea. The first category of risks and threats is generically entitled 'unlawful acts against maritime security' and includes illicit trafficking in transit or bound for Spain, piracy, terrorism, seaborne irregular immigration, the illegal exploitation of marine resources and the destruction or degradation of the marine environment, acts against underwater cultural heritage and cyber threats. Risks or threats arising from conditions inherent in the environment are maritime accidents and natural disasters.

No information regarding the military areas in **French** waters is available.

The updated information about the Military zones in **Italy** is annually included in the document from Istituto Idrografico della Marina "*Allegato al Fascicolo Avvisi ai Naviganti Premessa agli avvisi ai naviganti e avvisi ai naviganti di carattere generale*".

Also, temporary interdicted zones for military reasons are established with Ordinances from the Coast Guard. In the above-mentioned document, several areas are identified: foul areas, with presence of old or recent unexploded war devices; danger zones that correspond to a firing danger area (training zone); military practice areas, which are military training areas (land to sea and sea to land). The following figure (Figure 58) provides an overview of the zones normally used for naval military activities and aerial space subjected to restrictions in Italy:

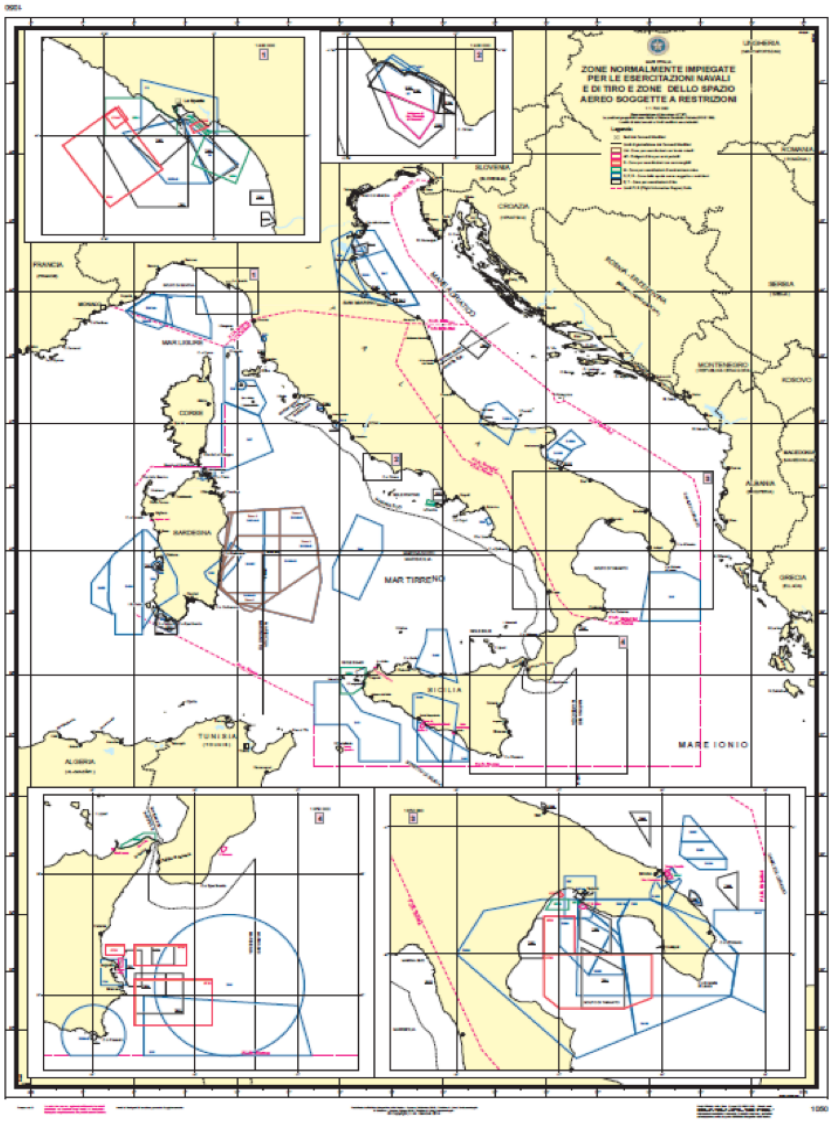


Figure 58 Geographical localization of zones normally used for naval military activities and aerial space subjected to restrictions in Italy.

The defence sector is managed by the Ministry of Defence through the bodies of the armed forces carried out the tasks of national defence and international security.

A White Paper on International Security and Defence was presented in July 2015. The White Paper describes development and cooperation strategies for later years. The elements contained in the White Paper form the basis for the development of implementation solutions that need to be refined and implemented in a timely fashion, according to the guidelines outlined in the final chapter.

The Italian Navy provides a relevant contribution to the marine monitoring in order to ascertain the quality of national and international waters.

The Navy's work is especially important on the high seas, where for other authorities, scientific institutes and organizations involved in marine conservation, it's more difficult to operate.

In **Malta** military activities in the marine environment include routine patrolling activities conducted for Defence purposes, the interdiction of illicit trafficking of various types, fisheries protection and Search and Rescue. These operational activities are supported by training activities, including live gunnery exercises carried out in three established areas.

The Armed Forces of Malta (AFM) has also a supporting role in addressing marine pollution incidents. The majority of vessels are based at the main AFM maritime facility in the Grand Harbour. This facility provides for the mooring of vessels, logistical support and first-line maintenance. Maintenance activities of removable components are also conducted in shore-based workshop facilities.

According to the MSFD Initial Assessment report, in the past, considerable amounts of munitions were disposed at sea however there are no records of the extent of this practice. The AFM has still the permit to dispose munitions at sea even though such operations are infrequent.

In general defence is an activity that, due to its confidential nature, no future trends can be defined.

4.7 TOURISM AND LEISURE

4.7.1 Coastal tourism and beach-based activities

Tourism is one of the most important economic activities in the coastal area, for this reason a large number of different services are provided to vacationers interested in leisure activities at beaches and on the coastal area in general. This type of tourism is generally described as "sun and beach tourism". In the Mediterranean it is an activity characterized by strong seasonality.

The Mediterranean region is the main touristic destination in the world, accounting for one-third of tourism's total income. France, Spain and Italy are the top three Mediterranean holiday destinations (EUROSTAT, 2017).

Historically, the product of sun and beach has been the real engine of the **Spanish** touristic activity that it boasts with a great influence in the economy of the country, although it presents / displays symptoms of maturity provoked by the own antiquity of the product, the continuous growth of the supply causing the saturation of the capacity in certain destinations, the irruption of new competitor countries with a competitive sun and beach product and, finally, the development of residential tourism linked to real estate development in recent years. The use of beaches in Spain is regulated by Coastal Law, Law 22/1988 of July 28, (as amended by Law 2/2013, of May 29, on the protection and sustainable use of the coast), generally for the whole Spanish territory, although each municipality, through Ordinances, develops and complements in more detail what can and cannot be done on their beaches.

The leadership position maintained by Spain in the tourism sector during the last decade shows its recognition by the market. However, various indicators show that the level of competitiveness of Spain for some aspects is declining and that it is reducing the level of profitability of the product sun and beach, which concentrates 75% of the receiving demand. At the same time, the new supply modalities need to guide its growth by developing all its competitive potential. The holiday tourism accounts for 11% of Spanish GDP and within this sector the coastal area is the most important in terms of flows and income generation. Tourism contributes significantly to increasing demographic pressure in coastal municipalities. Most of the coastal populations have doubled or tripled their number of inhabitants due to tourist developments. This tourist pressure is especially relevant in the Spanish islands, as in the Balearic Islands, which have a population of one million inhabitants and receive 11 million tourists each year. The Spanish Horizon 2020 Tourism Plan includes the strategy to medium and long term, to successfully meet the challenges of the Spanish tourism system.

The overall tourism sector, in **Italy** is characterized by over EUR 170 billion added value (contributing to 11.8% of Italy's GDP and approx. 12.8% of employment) and has positive growth prospects over the coming years (PST 2017-2022). Indeed the fourth maritime

economy report 2015 of Unioncamere-SI.Camera (Italian Union of Chambers of Commerce) highlights that the coastal tourism is the largest maritime activity in terms of numbers of enterprises with more than 74.000 enterprises related to accommodation and restaurant sector (40,7% of total enterprises of maritime economy) and more than 28.000 enterprises related to sports and recreational activities (Unioncamere-SI.Camera, Quarto Rapporto sull'Economia del Mare, 2015). Moreover, Italy hosts several cultural and historical sites included in the UNESCO heritage sites. Italy adopted a National Strategic Plan for Tourism (PST), which has a six-year time horizon (2017-2022).

The tourism industry in the **Maltese** Islands was identified as an important economic sector post-independence in 1964. The main marketing strategy for decades was the sun, sand and sea model with hotel development taking place along coastal areas and parts of the littoral rented on long term leases for supporting activities particularly in bathing areas. Since the late 1990s, strategies to diversify the tourism product were still centred on the coastal and maritime area with increased development of yacht marinas and improved marketing on SCUBA diving. Additional development of appropriate infrastructure also paved the way for the introduction of the cruise liner industry in 2001, which has continually experienced growth. Additional activities related to coastal tourism include recreational activities such as bathing and boat trips along the shores. The creation and extension of sandy beaches and the scuttling of vessels for either bathing or diving purposes have been popular in the late 1990s and their implementation have introduced new regulatory regimes. Further opportunities for diversification of the coastal tourism product include the promotion of SCUBA diving near/in Tuna farms and recreational fishing. Most of the tourism related activities occur inshore and along the coast with marinas and cruise liner facilities concentrated within existing ports and harbours.

The evolution and overall results of the tourism sector will undoubtedly be determined by the ability to adapt coastal tourism to new demands and advance its sustainability. It is frequent to observe, in the Mediterranean a worse quality of the marine environment in the time of greater recreational use. If we add that the use of beaches and sport navigation also increase, and that the environmental awareness of users can still improve, it translates into a deterioration of the environment due to the greater presence of plastic and organic remains that sometimes end in the sea.

There was no available information about coastal tourism activity in **France**.

4.7.2 Maritime tourism

Maritime tourism refers to sea-based activities such as boating, yachting, cruising, nautical sports as well as their land-based services (Ecorys, 2013).

According to CLIA (Cruise Lines International Association) **cruise tourism** is intended as a form of travelling, involving an all-inclusive holiday on a cruise ship of at least 48 hours, according to specific itinerary, in which the cruise ship calls at several ports or cities. Cruising is the form of tourism that has shown the highest growth curve in the past decade. The total economic impacts of cruise tourism show how the manufacturing (primarily shipbuilding) and transportation sectors still account for more than half of the cruise industry's total impact throughout Europe. The last report published by the International Association of Cruise Lines (CLIA) in Europe, "Contribution of Cruise Tourism to the Economies of Europe", during 2014 in Europe operated 60 cruise lines, with 183 cruise ships with capacity for 255,000 people. The total of passengers embarked in some European ports was 5.85 million that visited one of the 250 port cities of Europe. The economic impact of economic activity amounts to 40.2 billion euros, direct expenditure on cruise lines, passengers and crews amounted to 16.6 billion euros, and generated about 350,000 jobs.

The Mediterranean has numerous advantages over other cruising areas, with its diversity of cultures, peoples, languages and history. Some observers feel that within a couple of years, the Mediterranean will become a year-round cruise destination. In 2016, the total number of cruise passenger visits at Mediterranean ports reached 27,4 million. Comparing to the previous year, this number is 1,1% lower - the cruise passenger movements that had taken place in 2015 at the very same ports were 27,8 million.

The long-term trends make evident that cruise activities in the Mediterranean and its adjoining seas are performing remarkably well in a demanding economic context and in some, yet rare, cases uncertain political climate. The last 10 years (2007-2016) cruising around the Med experienced growth and resilience in the face of several social, economic and political challenges. The recorded statistical data reflect this resilience.

The demand for cruise passengers is affected by the trend and change of the tourism industry and by the supply dynamics (increase of the routes and scheduling of different itineraries, increase of the fleet, and also improvement of the port offer, also in terms of dedicated services). In particular, the passengers transiting in Italian ports, intended as the sum of boardings, disembarkation and transits registered in cruise ports, have been fluctuating between 10 and 11,5 Millions of passengers since 2011 (Risposte Turismo 2017 Speciale Crociere). Italy, Germany and the UK accounted for 66% of the direct expenditures of the

cruise industry in 2014 in Europe. In particular, the direct expenditures of the Sector in Italy in 2014 were equal to 4,601 Millions of € (2014 CLIA Europe Economic Contribution Report).

According to "Risposte Turismo 2017 Speciale Crociere" the **Italian** ports that handled the most passengers in 2016 were Civitavecchia (2.339.676), Venice (1.605.660) and Naples (1.306.151).

Spain is the second European tourist power receiving cruise passengers. Cruise passenger traffic amounted to 8,435,966 cruisers in 2015. Barcelona, Balearic Islands, Malaga and Valencia in the Mediterranean; Bay of Cadiz, Vigo and A Coruña in the peninsular Atlantic; and the Canary Islands are the main attraction areas of this type of tourism, concentrating 96% of the national cruise traffic.

The trend of cruise vessels becoming bigger in size as cruise lines jockey to enjoy economies of scale has been deterministic insofar as the number of cruise calls is concerned, even when comparing long-term trend. Recalling that since the turn of the century the average size of cruise vessels increased by more than 1.000 passengers per vessel, it is evident that the fundamentals of the industry lead to a continuous slowing down of the number of cruise ship calls per year, even in cases that passenger movements per year increase.

In 2016, Barcelona and Balearic ports were in the top ten for the total number of cruise passengers in the Mediterranean with Barcelona in the first position and Balearic in the third. In the last five years, Barcelona experienced a rise of cruise passengers by 11,4%. One year before, in 2015, Balearic Islands had recorded the biggest growth of all (25,8% on an annual basis), thus the marginal decrease of 2016 is insignificant.

As regards the distribution of ferry traffic per country, the majority of this traffic is taking place in the Mediterranean ports located in Italy (37,3%, more than 28,7 million ferry passengers) and Greece (32,7%, more than 25,2 million ferry passengers), followed by Spanish ports (11,9%).

Moreover, nautical tourism, consisting mostly of boating and yachting activities, is an important economic asset in the Mediterranean countries. In the Tyrrhenian area, it can be seen that the highest density is concentrated in the regions of Liguria, Toscana, Lazio, Campania, Calabria, Sicily and Sardinia.

In Spain, this sector contributes around 5,700 million euros each season to the national economy, which is around 0,5% of the GDP. For the employment, it creates more than 115,000 direct and indirect jobs, located most of them in the coastal towns. Following the "Annual Report on Pleasure Harbours and Marinas 2015" written by The Spanish Federation of Associations of Tourist Marinas (FEAPDT, 2016) in Spain there are 457 sport/nautical concessions, 44% of them being located in the study area. The number of moorings in Spain is above 134000, and almost 60% of them are in the study area.

Marinas in Spain are public, but sometimes there are concessions in favour of entrepreneurs. Competences on marinas are transferred to the Autonomous Regions, and only if they belong to a Port of General Interest are controlled by the correspondent Port Authority. Therefore, each Autonomous Region has its own regulation on marinas.

In the past 30 years the increase in the number of moorings has been constant, is estimated at over 250%. The size of the moorings has increased as well as the average length of the vessels registered. However, the number of marinas remains stable in the recent years. The trend is more to remodel and improve existing facilities than to build new ones because of the environmental impact they have (FEAPDT, 2016). Data are very dispersed and of difficult access. The numbers of moorings are available, but the areas in where the boats sail or anchor are unknown.

4.8 TRANSPORT

4.8.1 Shipbuilding

Shipbuilding is a large scale commercial activity with great economic interests managed by sector specific industries. It commonly takes place on industrial special areas on the coast and it consists in the entire process of construction of ships. The shipbuilding sector is developing in a strongly dynamic, competitive and internationalized market.

Activity in **Spanish** shipyards in 2015 has increased by 17% compared to 2014 in terms of Compensated Gross Tonnage (CGT).

The order book over the year 2015 amounted to a total of 65 vessels, which represent a total of 17 more constructions than during 2014, and which represent a 58% increase in terms of CGT, since in 2014, 290 003 CGT were built, compared to the 459 151 CGT built in 2015. In 2015 the new signed contracts increased in Spain by 19 units, varying from 28 to 47 registered contracts in 2014 and 2015, respectively.

Throughout the year 2016, a total of 24 new contracts equivalent to 137 620 CGT came into force in Spain, which placed the country in the 10th position in the world and 2nd in the EU in terms of contracted units (representing 2.2% and 10.3%, respectively). The most common vessels were destined to the fishing industry, with 50% of the total units contracted, followed by tugboats with 25% and ferries with 8%. At the end of the year, Spain maintained significant positions in the global recruitment of certain types of vessels (CGT), such as fishing vessels (2nd place), oceanographic (3rd place) or ferries ships (4th place). The map below (Figure 59) shows the major shipbuilding companies in the Levantine Balearic Demarcation:

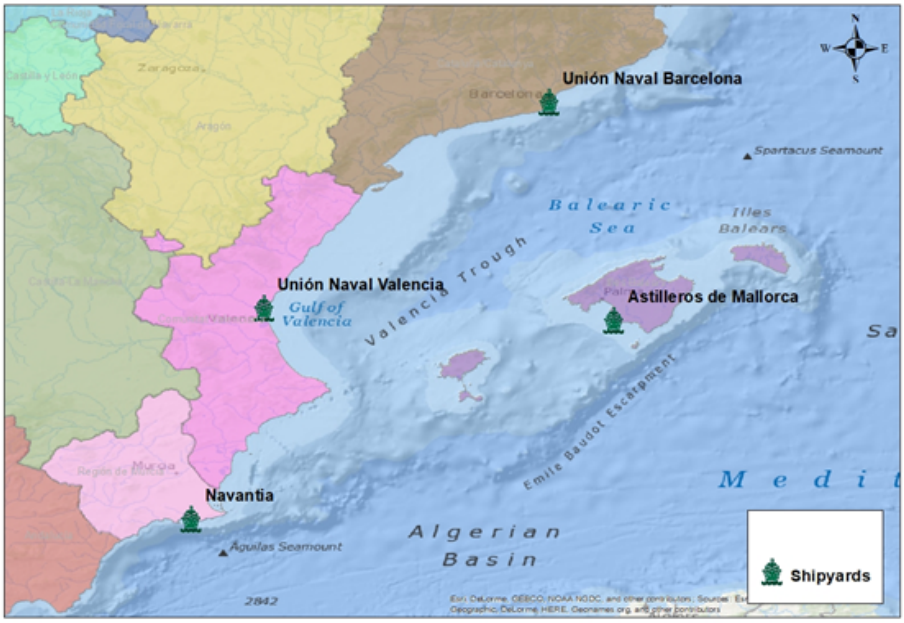


Figure 59 Geographical localization of the major shipbuilding companies in Spain.

According to the most recent data available, the employment generated by Spanish shipbuilding of all public and private shipyards, is 44 273 jobs, involving 16% of direct employment and 84% corresponding to the auxiliary industry. There is no specific strategy to regulate this activity in Spain. Support to the naval sector is made under the Royal Decree 1619/2017, regarding financing for the shipbuilding sector.

In Spain, the future of the shipyard lies in the incorporation of modern organizational and technical forms of shipbuilding. Other industrial models are being considered, e.g. vertical integration within the modernized plant, horizontal integration with customers and suppliers, engineering throughout the value network and specifically prepared work staff. In the context of a strong economic crisis in recent years, intensified by the aggressive and unequal competition presented by Asian countries, institutional support is playing a key role for the achievement of new contracts to ensure the survival of the construction sector both at European and national levels.

For **French**, Mediterranean area no information was available on this activity.

Italy ranks 6th among the world construction countries and second after Germany at European level. The excellence of Italian shipyards, leaders in Europe and around the world in the construction of cruise ships, makes obvious economic and employment returns for the country. Shipbuilding includes the design and construction activities of cruise ships, ferries, military ships, mega yachts, in addition to ship repair and shipbuilding activities. The Italian Ministry of Infrastructure and Transport - Directorate General for the Supervision of Port

Authorities, Port Infrastructure and Maritime Transport and Internal Waterways - has started since 2009 to monitor the shipbuilding industry's activity. Particularly important is Fincantieri's production, which is carried out at national shipyards. Fincantieri also operates in the offshore sector through the VARD Group and Fincantieri Oil & Gas S.p.A with the design and construction of naval vessels dedicated to the oil and natural gas extraction and production market.

Naval repairs have always been a key sector in Italian naval shipbuilding and at this particular moment, after having initially improved better than other shipping compartments the crisis situation. Repair sites located in the Adriatic region are very much affected by competition from other countries in the Mediterranean basin. Demand in the repair sector is, however, presumably increasing for cruise ships due to the need to adapt ships to the latest environmental legislation (e.g. installation on board of scrubbers or wastewater treatment systems) and to the need to adapt ships to an appropriate quality standard such as new generation units. The only shipyard operating in Italy is San Giorgio of the Port of Genova (demolition activities of Costa Concordia). With the application of Regulation (EU) no. 1257/2013 of the European Parliament and of the Council of November 20, 2013 on the recycling of ships this activity is expected to increase. The yards are mainly located in the following Italian regions: Tuscany, Abruzzo, Campania, Emilia Romagna, Friuli, Liguria, Marche, Sicily, and Veneto. According to the data from the 5th Sea Economy Report prepared by the "Federazione del Mare" together with Censis the Italian maritime cluster is confirmed to be one of the most dynamic sectors of the Italian economy, contributing to the national gross domestic product with 32.6 billion euros (2.03%) and employing approximately 2% of the country's workforce (471 thousand people, considering direct employment and workers in allied industries). Italy maintains its European leadership in cruise sector (with 6.2 million passengers and 4,600 port calls) and in the construction of passenger ships and luxury motor-yachts. Among industrial activities of the maritime cluster, maritime transports are in first place in terms of production value with 11.8 billion euros and also for labour productivity with 339 thousand euros/employee. From the employment standpoint, there is an important contribution of maritime transport with 34,725 direct employees followed by logistics and auxiliary activities that revolve around ports that account for 27,611 direct employees. By themselves, these two activities constitute almost 50% of the labour force of the entire cluster, including production and services. Considering the spending by cruise tourists on the Italian territory (in addition to what is already provided by navigation companies) estimated for 2013 at 743 million euros per year, the sector shows its relevance not only within the maritime cluster but also in the national economy as a whole, with a contribution to the GDP

of 11.8%. The distinctiveness of this sector is the considerable increase in the labour force employed in economic activities downstream of cruise services: in 2013, downstream employees activated were 102,867. This shows, once again, the economic importance of this sector in reference to the multiple interactions with other industries. Eurostat data confirm Italy's 2nd place in Europe for seaborne imports with 158 million tonnes of goods, and 4th place for exports with 49 million tonnes. The article 1, paragraph 357, law n. 190/2014 intends to Support Research and Development in the naval field in the implementation of the general block exemption Regulation (UE) n. 651 of the 2014 to functional research, industrial research, experimental research. Italy participates in the shipbuilding working party (WP6), OCSE, which would have as the primary objective the Shipbuilding Agreement for the regulation of the world shipbuilding market and to avoid market distortions or masked state aid. The Revised General Arrangement for the Progressive Removal of Obstacles to Normal Competitive Conditions in the Shipbuilding Industry [C(82)194/FINAL] (hereafter "the Revised General Arrangement") was agreed upon by the countries that participated in the original Arrangement in 1983 as a non-legally binding instrument with the objective to remove obstacles to normal competitive conditions. The Revised General Arrangement mentions measures to be progressively removed. Participating governments are expected to make their utmost efforts to remove measures in the following categories of obstacles: government subsidized export credits; direct subsidies to the shipbuilding industry; customs tariffs or any other import barrier; discriminatory tax policies; discriminatory official regulations or internal practices; specific aid for investments; subsidies for restructuring of the domestic shipbuilding industry; all other forms of indirect public aid which are obstacles to normal competitive conditions in the shipbuilding industry. The future trends of the activity will increase interest and attention to: quality and technological Innovation for green projects in terms of limited environmental impact in terms of smoke emissions in the atmosphere and with regard to ballast water treatment and waste produced on board; sustainable development, incorporating environmental and social responsibility. Italian Shipbuilding industry will continue its strong interest for: construction of energy efficient ships that started in 2013 allowing to Italy a relevant position at European level in terms of shipping construction market trends; continue to operate in highly market niches specialized and high technological content, especially for cruise ships and ferry. The structure of Italian shipbuilding is increasingly polarizing between a great global leader in the sector - Fincantieri - and a group of medium-small yards, whose competitiveness is based on production models lean and flexible, as well as unquestionable technological skills, and on a positioning in market niches characterized by reduced size products and the ability to provide customized services to one particularly demanding customers. General gaps identified in the field of shipbuilding

can be listed as follows: favourites an Integrated and common national framework system to involve a process of replacement of obsolete fleets; increase the public awareness on benefits of the new European requested standard in shipbuilding industry in terms of safety and environmental impact; optimize the technology, create favourable conditions and promote resources to realize an innovation and adaptation of the shipbuilding industry to the new European standards.

No information was available on this activity for **Malta**.

4.8.2 Shipping

Shipping include all those activities that involve the transport of goods by ships typically through large distances.

Maritime traffic of goods is one of the essential reasons for the existence of port facilities. From the point of view of these, the traffics can be of two types Import / Export or in transit. The import / export consideration applies to cases where the port is the point of origin or destination of a sea route. From an economic point of view, it is an essential activity for ports because it involves activities linked to intermodality with a direct effect on employment and the development of services and industrial activity. Transit traffic is conditioned by the variations in world trade, since its movements are practically not dependent on variations on local national economies but rather are more concerned with business (and / or geostrategic) reasons of shipping companies or agents.

On the other hand, the traffic of goods in general and the so-called import / export in particular, are closely linked to the economic activity of a country, to greater volumes of traffic, greater intensity of the activity and vice versa. As indicated, these trades are mainly channelled through ports so that their activity can also be used as an indicator of the health of a country's economy. In this sense, the economic recovery of 2014 has been accompanied by a growth in traffic of goods. In 2014 there has been a recovery in the volumes and activity of Spanish ports, until practically reaching the pre-crisis figures.

In 2014 the total of the traffic of merchandise in the Spanish ports reached 482 million tons, 5,12 % more than in the previous year. In this context, containerized goods and liquid bulk accounted for 155 and 161 million tons respectively. But the biggest growth in Spanish context was solid bulk goods, which have grown almost 12% over the year 2013, reaching 89 million tons. The rest, approximately 77 tons, are distributed in other goods, tons of fishing, internal traffic and supplies.

All this volume has been channelled through 46 Spanish ports of state ownership that coordinates Puertos del Estado, and mainly in those located in the Mediterranean strip; almost 70% of the traffic of goods has been transported by them. This situation reflects the importance of some of Spanish ports in the Mediterranean basin, such as Valencia and Algeciras, which occupy important positions in the international ranking. By volume, the port of Algeciras, with its 95 million tons and 4.5 million TEUs, accounted for almost 20% of total transported goods and 30% of containers moved in the Spanish port infrastructure.

The second in importance in Spain is the port of Valencia, with volumes similar to those of the Bay of Algeciras, both in volume of tons and in number of containers, followed in third position by the port of Barcelona. A separate mention deserves the so-called ro-ro traffic, the traffic of goods inside motor vehicles. In 2014 this concept reached 48 million tons and grew 8% over the previous year.

In 2015 the State-owned Port System of Spain handled 502.4 million tons, which represents a growth of 4.2 % compared to year 2014, when a total of 482.1 million tons of goods were handled. Quantitatively, the two main types of cargo in Spain are liquid bulk and general cargo, most of it in containers (71%), and solid bulk. They all recovered their level since 2008.

In 2013 the occupation of the maritime transport sector represents 0.02% of the total occupation in Spain.

The National Maritime Security Strategy (2013) is based on an analysis of Spanish environment, reflects national maritime security interests and their vulnerabilities, establishes shared objectives and defines lines of action aimed at orienting the use of all available means to serving those objectives, both at the time of the response and in anticipation and forward planning. It creates an institutional framework for encouraging and facilitating cooperation between the different organizations and for including the private sector when appropriate. The participation of the private sector will allow a truly comprehensive approach to today's and tomorrow's maritime security.

The basic principles of the Spanish National Security Strategy of 2013 are fully applicable to the field of maritime security and should guide the lines of action set out in this Strategy. These basic principles are as follows: a) unity of action, which means the involvement, coordination and harmonisation of all State actors and resources under the direction of the Prime Minister, as well as public-private collaboration and the involvement of society in general. The comprehensive approach to security, encompassing all its dimensions, accounts for this principle of action and must in turn be fully managed through a National Security System that is promoted and led by the Prime Minister; b) anticipation and prevention: which must guide Government action in detecting situations that may pose a potential risk or threat

to National Security and steering them back on track; c) efficient and sustainable use of resources: a principle which must govern administrative action at all times but is especially significant in a context like the present one. It is based on prioritising resources and optimising their use, requires results to be monitored and assessed, and guides administrative organisation; d) resilience or ability to resist and recover: a principle relating to the ability of human and material resources to address crisis situations flexibly and forcibly and tackle them by minimising and cushioning their negative consequences. In accordance with the abovementioned objective and principles, five lines of strategic action are established. The first involves adopting a comprehensive approach that fosters coordinated and cooperative action of the different authorities in solving the problems that affect maritime security and includes shared knowledge of the maritime environment and operational cooperation between the different departments. The second refers to the adoption of effective and efficient measures in an optimal use that makes the most of available resources. The third line of action involves fostering international cooperation, and the fourth collaboration with the private sector. Finally, the fifth line of action calls for improving cyber security in the maritime environment.

It is important to remark the Med Atlantic Ecobonus. The overall objective of this Action is to contribute to the further policy development of the Motorways of the Sea. (MoS) The specific objective of this Action is to design a new effective and sustainable incentive Scheme (ECOBONUS), which aims to support intermodal freight transportation via the increase of demand for MoS and is aligned with the framework and new priorities of the TENTT policy.

The proposed Action will result in a policy study, in cooperation with the Ministries of Transport of Spain, France, Italy and Portugal, aiming at the development of a coordinated incentive Scheme to support the demand for MoS, valid for Atlantic and West Mediterranean markets (existing and new). The incentive scheme would be called ECOBONUS in reference to the system that has been previously implemented in Italy (Ecobonus) and will focus on: Development of a detailed ECOBONUS Scheme design, addressing all necessary aspects such as: financing, scope, operation, technical, technological and innovation aspects, along with regulation and legal framework issues;

The Spanish port authorities maintain forecasts for the year as a whole, once the stowage conflict is resolved, and they expect to reach new record highs with 529 million tons of goods and 33.5 million passengers.

The above figure (Figure 60) provide an overview of the marine areas within the Levantino-Balearic regions with greater traffic intensity:

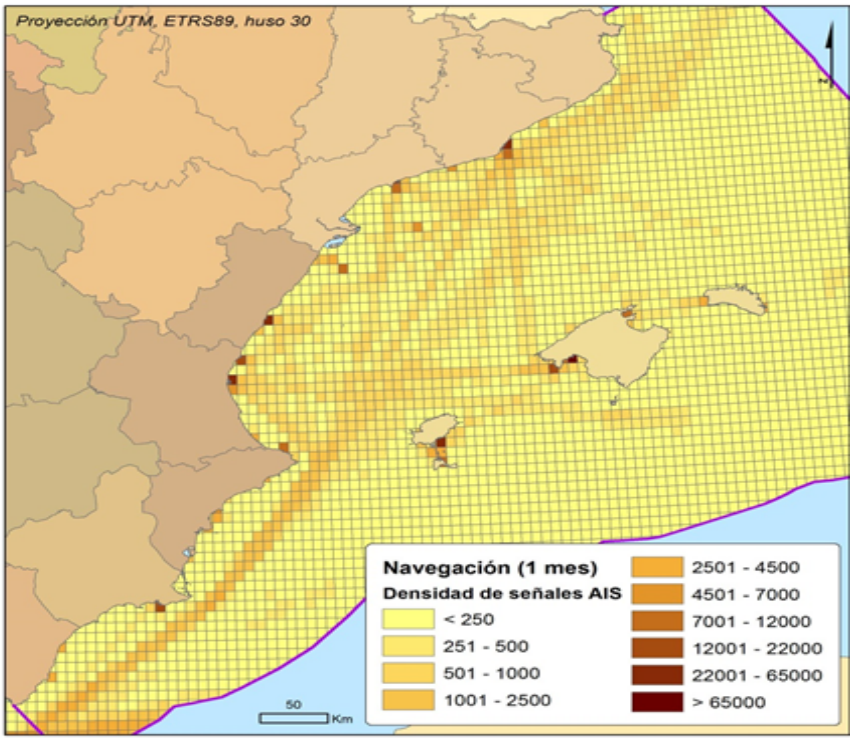


Figure 60 Shipping traffic density in the Spanish Mediterranean Sea.

Information on this activity in **French** waters is limited to spatial identification of main shipping routes has shown in Figure 61. No further information was provided on this activity in the French area.

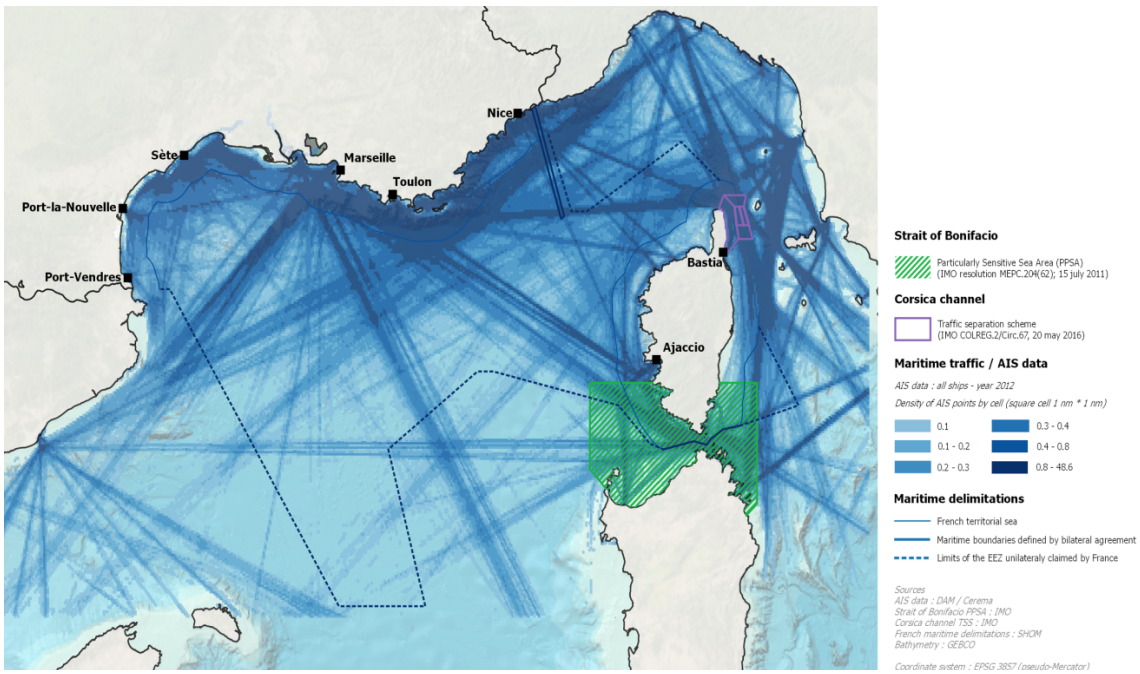


Figure 61 Shipping traffic density in the French waters.

In Italy maritime transport, port activities, their regulation and management are in charge of the Ministry of Transport and Infrastructures (MIT) through the “Capitanerie di Porto” Coast Guard and the Port Authorities. The Port Authority is a public body with legal personality and manages and organizes goods and services in their own port area. In the region, there are 14 different Port Authorities: Cagliari, Civitavecchia, Genova, Gioia Tauro, La Spezia, Livorno, Marina di Carrara, Messina, Napoli, Olbia e Golfo Aranci, Palermo, Piombino, Salerno, Savona. The area is most characterised by traffic linked to the movement of passengers and trucks and trailers in ferries of the ro-pax type. According to the “V Rapporto sull’economia del mare” (2015) among industrial activities of the maritime cluster, maritime transports are in first place in terms of production value with 11.8 billion euros and also for labour productivity with 339 thousand euros/employee (year 2013).

At the regional level, Lazio's leadership focused on Civitavecchia for 2013, covering 22.4% of national cruising traffic and 19.2% of the total number of registered ships in our country. In 2013, Liguria is the region with the highest increase in absolute value in comparison to 2012, both in terms of passenger traffic (+ 33.1%) and of ship touched (+ 39.2%), performance recorded by the Genova, La Spezia and Savona ports. In 2013 Genova was the second port in Italy in terms of total volume of goods in transit, and the tenth of the top 20 major ports in Europe. In the European container ports rankings in millions of teus the port of Gioia Tauro is the first Italian port with a total volume of 3,100 million teus, then there are Genova and La Spezia in the top 20. Besides this the passenger traffic in the area is of fundamental importance both for national movements and connection to the Italian island and for the connection with the Western Mediterranean.

Italy implemented the following reposes and plans for this activity: The National Strategic Plan for Ports and Logistics (ref. Decreto Legislativo 4 agosto 2016, n. 169), The National Maritime Technology Platform - PTNM (2005); The National Operational Program (PON) Infrastructures and Networks 2014-2020; EUSAIR (Pillar 2 - Connecting the region). No major knowledge gaps were identified for the Italian territory.

By the end December 2015, the number of ships registered under the Merchant Shipping Act had reached 7,249, for a total gross tonnage of 66.2 million. This signifies a steady increase over the previous years with Malta maintaining its position as the largest register in Europe and one of the 10 largest registers in the world in terms of gross tonnage. Vessels arriving in Malta mainly constitute cargo ships, followed by bunkers, conveyance and passenger vessels. Malta is situated along a number of main shipping lanes with over 65,000 vessels estimated to pass within 20 nautical miles of the Maltese Islands. Maritime transport is the main source of inter-island transport, which provides a life link to residents on the Island of Gozo particularly

for employment and services from the mainland. The Transport Masterplan 2025 published in 2016 covers all transport within the Maltese Islands. It incorporates targets and measures related to internal and external maritime transport mainly related to improved governance and improvement of existing coastal/port infrastructure.

Most of the strategic objectives for this activity are related to governance with targets addressing ongoing and continuous improvement of operational activities. No further details are provided with the exception of the potential for alternative fuel infrastructure Maritime Transport supports the Maltese Islands through commercial trade. The movement of goods and passengers provides a life-link for the archipelago with the rest of the world.

4.8.3 Transport infrastructures

Transport infrastructures as a whole include all those areas specialized for the reception of transport means directly relevant for maritime transport such as ports or spcial mooring areas, they are commonly located on areas close to the coast or on the coast itself.

In the Levantino-Balear Marine District there are 7 Port Authorities and 14 Ports of General Interest (Figure 62): Port Authority of Barcelona (Port of Barcelona); Port Authority of Tarragona (Port of Tarragona); Port Authority of Alicante (Port of Alicante); Port Authority of Castellón: Port of Castellón; Port Authority of Cartagena: Port of Cartagena, Port of Escombreras; Port Authority of Valencia (Port of Gandía, Port of Sagunto, Port of Valencia); Balearic Port Authority (Port of Alcudia, Port of Eivissa, Port of La Savina, Port of Mahón, Port of Palma de Mallorca). Further in this region there are 88 fishing ports among which stand out the 39 fishing ports of the Autonomous Community of Catalonia, 165 marinas of autonomous competence and more than 77,800 moorings.

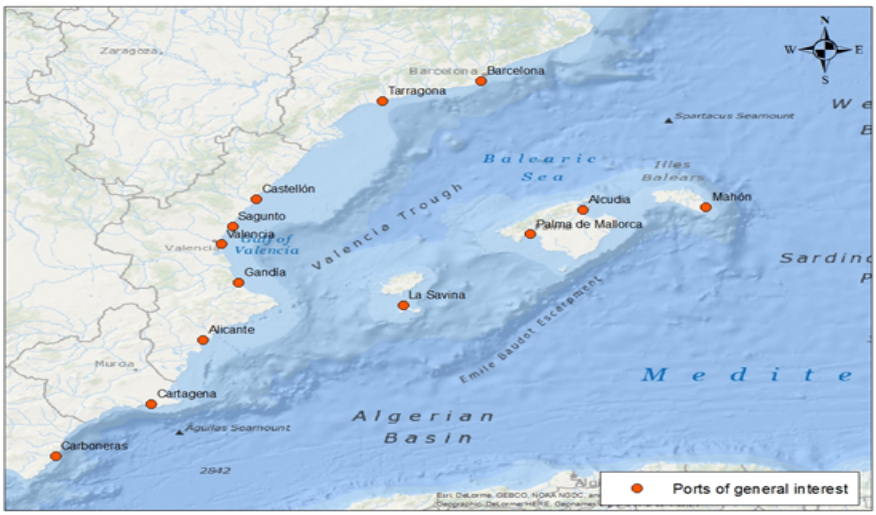


Figure 62 Localization of Spanish Ports of Interest in the Mediterranean area.

The State-owned port system has reached in 2015 a volume of investment of 632 million of euros (in accrual basis), mainly focused in modernization of infrastructures and port capacity building, followed by investment in logistic activities, equipment and facilities.

The basic foundational moment of current legal port regulations comes from Law 27/1992, of November 24, on state ports and the merchant marine, to which there have been different partial reforms through other laws: Law 62/1997, of December 26, modifying Law 27/1992, of November 24, on State Ports and the Merchant Marine; Law 48/2003, of November 26, on the ports' financial structure and on provision of services of general interest, and Law 33/2010, of August 5, modifying Law 48/2003, of November 26, on the ports' financial structure and on provision of services of general interest.

After this process of regulatory evolution, the regulation of the structure and management of the state port system is based on Royal Legislative Decree 2/2011, of September 5, by which the Revised Text of the Law on State Ports and the Merchant Marine (TRLPEMM due to its Spanish initials) is approved.

The purpose of this Law is: a) to determine and classify the ports that depends on the State Administration; b) regulate the planning, construction, organization, management, economic-financial regime and policy of this system; c) regulate the provision of services in these ports, as well as their use; d) determine the state port organization, providing ports of general interest with a system of functional and management autonomy for the exercise of the powers conferred by this law, and regulates the designation by the Autonomous Communities of the governing bodies of the Port Authorities; e) establish the regulatory framework of the Merchant Marine; f) regulate the proper Administration of the Merchant Marine; g) Establish the regime of infractions and sanctions of application in the scope of Merchant Marine and in the port of state competition. The State-owned Spanish Port System includes 46 ports of general interest, managed by 28 Port Authorities, whose coordination and efficiency control corresponds to the government agency Puertos del Estado a body answerable to the Ministry of Public Works that is responsible for implementing the government's port policy according to the Royal Legislative Decree 2/2011. Each port authority will develop a Strategic Plan with the aim of improving actions that can be used to improve the quality of the port infrastructures. New infrastructures must be identified in this Plan that must be submitted to environmental impact assessment. Spanish Autonomous Communities will coordinate the remaining ports. The future trends of this activity are included in each Strategic Plan developed or to be developed by each Port Authority. It should be noted that the main development in Spanish Ports took place in the years 2000-2010 when substantial investment in infrastructures was made. Malta constitutes an important hub for the shipping industry, as

a result of its strategic location in the centre of the Mediterranean region. Within this context, Malta provides a comprehensive range of maritime services and facilities including a container transhipment terminal (Malta Freeport), oil bunkering facilities and a cruise passenger terminal. Malta is thus an international maritime centre providing the whole range of maritime services and the Maltese flag is a reputable flag of ship registration. In Figure 63 are addressed the bunkering and waiting areas disposed within Maltese waters.

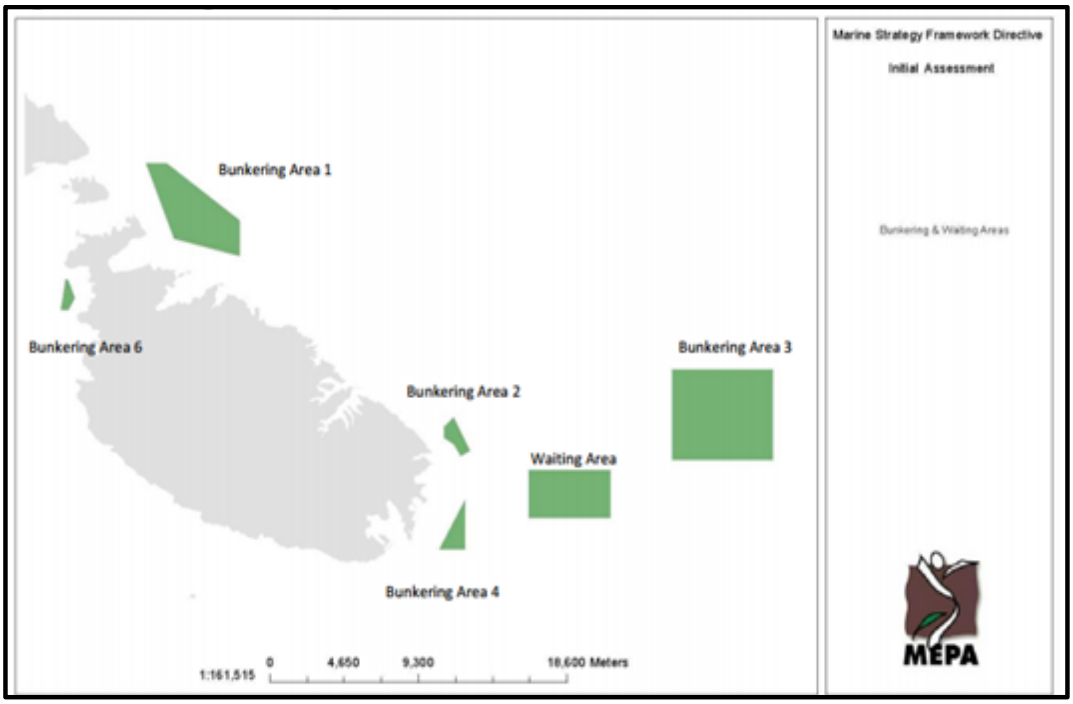


Figure 63 Localization of shipping bunkering and waiting areas in Maltese waters.

There was no available information for this activity on the areas under **French and Italian** jurisdiction.

5. ANALYSIS

5.1 CONFLICTS AND SYNERGIES (AREA-BASED) – DESCRIPTION OF THE CONFLICTS AND SYNERGIES IDENTIFIED

Managing human activities to enhance compatibilities and reduce conflicts among uses, taking into account future trends and alterations due to climate change and other long-term pressures (e.g., overfishing) are important outcomes of a plan. The European Directive on Maritime Spatial Planning (2014/89/EU) clearly establishes that "the main purpose of MSP is to promote sustainable development and to identify the utilization of maritime space for different sea uses as well as to manage spatial uses and conflicts in marine areas".

Conflicts weaken the ability of the ocean to provide the necessary ecosystem services. In intensely used areas potential spatial overlaps among human activities and between human activities and important natural areas frequently occur. A potential spatial conflict may arise in a stable way or in different time periods. Conflicts can be described in two major types:

- Conflicts between human uses and the marine environment (user-environment conflicts; refer to Section 3.2. Anthropogenic pressures on the marine environment);
- Conflicts among human uses (user-user conflicts).

The Western Mediterranean coasts and national waters host an important set of human activities. Almost all the marine and maritime uses described in the whole Mediterranean basin are present and concentrated in a relatively small area: transport of goods and passengers, fisheries, aquaculture, oil & gas, energy and communication cables, coastal tourism, military uses, sand extraction, cultural heritage and protected areas. As a consequence, relieve the competition and enhance the synergies among spatial uses in the narrow coastal zone, as well as with protection needs of the marine environment, is a compelling need for MSP in Western Italian waters. Plans have to take into account regional policies and trends to establish potential increases in coastal conflicts due to the development (e.g. aquaculture, coastal tourism and energy) and the decline (e.g. intensive fisheries) of key sectors. The EU Blue Growth Strategy and the Maritime Policy is the long-term strategy to support sustainable growth of the maritime sectors within a whole integrated system. The strategy aims to develop sectors that have a high potential for sustainable jobs and growth (e. g. aquaculture, coastal tourism, ocean energy) improving knowledge, better governance of the sea, a safer maritime space, through spatial planning and enforcement.

In 2009, UNESCO published specific guidelines on MSP (Ehler & Douvere, 2009), in a cooperative initiative between the Intergovernmental Oceanographic Commission and the "Man and the Biosphere" (MAB) Programme. The guidelines provide a step-by-step approach to MSP from establishing authority, through planning to implementation, monitoring and evaluation. The report aims to foster a practical approach to manage both conflicts and compatibilities in the marine environment in the face of both increasing development pressures and increasing interest in the conservation of nature and to manage marine ecosystems sustainably.

Ehler and Douvere (2009) synthesized the knowledge on existing conflicts among maritime human activities (Figure 64).

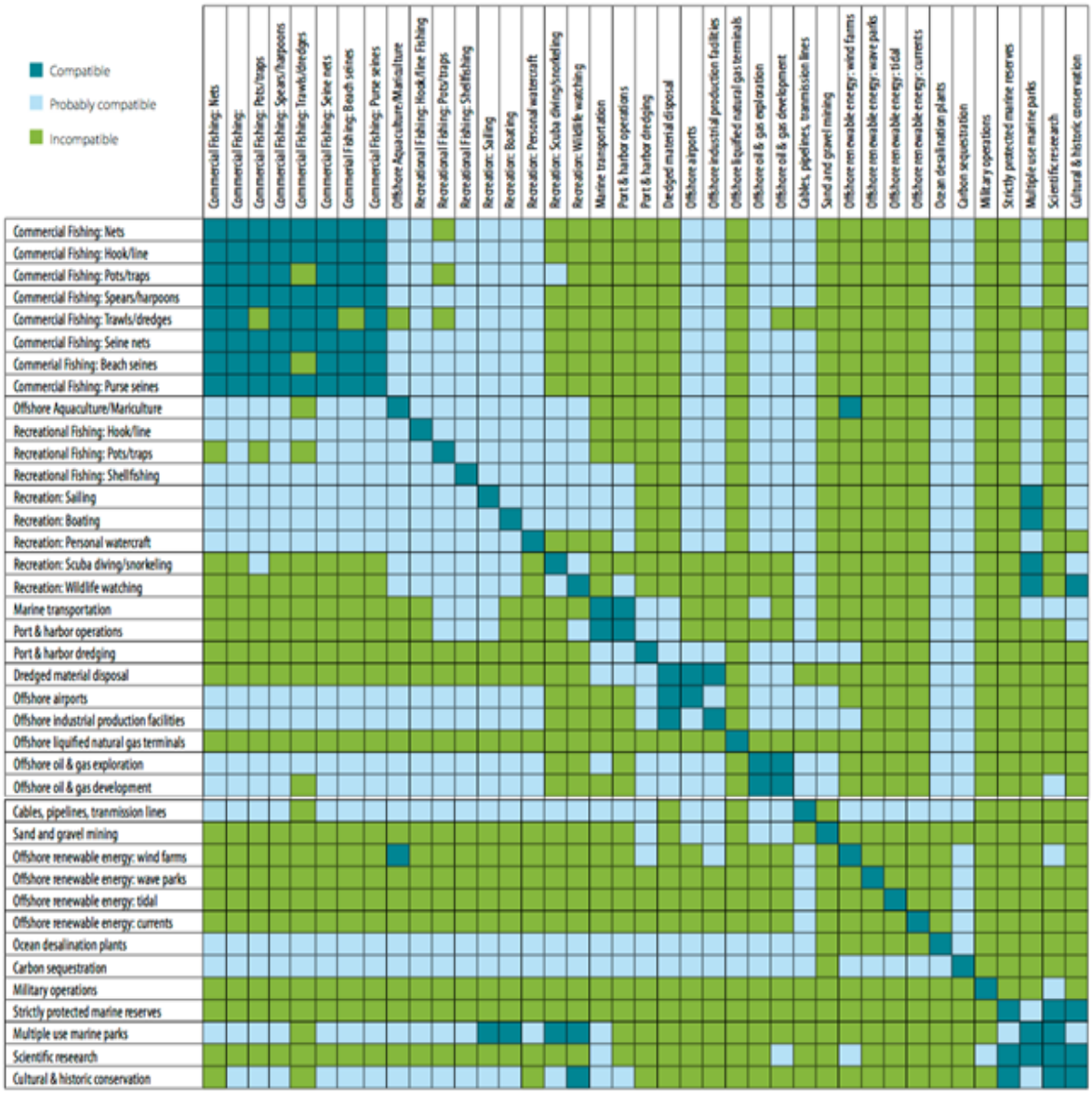


Figure 64 Human uses, conflicts and compatibilities (Ehler & Douvere, 2009)

Taking into account the Blue Growth strategy, the main categories of conflicts and synergies between human activities described in Tab x and the activities insisting on the Western Italian seas, the main sectors involved in conflicts and potential synergies are: fisheries, maritime transport, energy, coastal and maritime tourism and environmental protection and conservation.

In the specific case of Malta, with the implementation of ICZM since 1992 through the spatial planning process, efforts were ongoing to minimize user conflicts within the coastal zone of the Maltese islands that extends up to 12nm. In parallel, the adoption of the EIA procedure has guided decision making for development proposal to reduce environmental impacts as much as possible.

To this effect, the main conflicts that exist today arise from the fact that the Maltese Islands have a very high population density with diverse needs and demands for development and activities that utilize coastal and marine space. This undoubtedly leads to multiple demands from various sectors competing for similar spaces.

Fishery related conflicts and synergies

Conflicts in fisheries arise usually when other activities are in competition for the resources or for space. Fish stocks in the whole Mediterranean Sea are generally fully exploited or overexploited and this condition increase the competition for this resource.

If correctly managed, the interactions between fishing activities, tourism and aquaculture can support good environmental, economic and social decisions. The major negative impacts can be individuated in conflicts with maritime transports, tourism activities and generally in the use of sea space. Spatial conflicts may also arise with the maritime transport sector which is constantly increasing and also with the renewable energy sector although no large-scale projects are expected in the area. In some cases, indirect effects on fishing may be caused by activities such as navigation and hydrocarbon seismic search, which may impact on the behavioural patterns of fishery resources, altering or reducing stocks in neighbouring areas.

In Spain, artisanal fishing is turning around the marine reserves: the purpose of these reserves is to support traditional artisanal fishermen who, on a regular basis and only in selected areas, perform fishing activities in those established marine reserves. Within these reserves the development of small scale fisheries carried out by local professionals is allowed and considered a core reserve activity, and traditional methods by local artisanal fishermen are supported. These fishermen not only observe the local prohibition of fishing inside the integral reserve, but also self-regulate their activity with more strict criteria than in fishing-grounds adjacent to reserves.

For the marine waters of France, no information was available on existing conflicts and synergies between fishery and other human activities.

The major conflicts for fishing activities in Italy are with maritime transports, tourism activities and generally in the use of sea space. Spatial conflicts may also arise with the maritime transport sector which is constantly increasing and also with the renewable energy sector although no large-scale projects are expected within the Italian waters.

Resource conflicts are potential in several coastal areas between trawlers and small-scale fisheries. Fishery activities are almost widespread along Italian Tyrrhenian coasts, with historical fishing harbours and medium-large fleets, as described in chapter 3. The geographical allocation of fleets is dominated in Sicily, which hosts the 23% of vessels belonging to the national fleet, the 30% of the gross tonnage and the 23.7 % of the engine power. Also, Sardinia Campania, and Calabria present medium-high values, while Liguria, Tuscany, and Lazio have fishing capacity relatively low to the national values. The fleet allocation for fishery sector, based on the frequency of use of the fishing gears as prescribed by the Commission Regulation (EC) No 665/2008, confirms the prevalence of small-scale fisheries (vessels using passive gears and having Loa <12m). However, the importance of this sector results in a low representation in terms of tonnage and engine power, considering which vessels operating with trawl nets prevails. Western Italian fisheries are involved in the national policies aiming to foster the sustainable development of fisheries and recover fish resources with the progressive reduction of the fishing effort in terms of vessels, gross tonnage and engine power. Many vessels and fishing gears are small-scale and have a limited environmental impact but small-scale fishing can also be harmful to sensitive coastal habitats and its aggregated impact can be significant with real consequences on the state of the stocks. Artisanal fisheries, with their large share of small- and medium-sized vessels, play an important role in the social structure and the cultural identity of the Italian coastal regions. Small-scale fishing usually operates in the marine area between 0 and 3 miles off the coast, which involves a large number of fish species and a wide variety of gears, representing a potential conflict with industrial fisheries, especially when both the activities target the same fish stocks.

Proper space planning for the development of new sites is particularly compelling in areas featured by intense fishery activities. Space competition may occur without proper planning of the co-location with other activities. The Strategic plan for aquaculture in Italy 2014-2020 has as its primary objective the sustainable development of aquaculture activities to create economy, employment and social benefits. The importance of aquaculture in the fishery sector has increased over the last 20 years, especially given the reduction of about the 40% of fishing effort. The general potential conflict between fishing and aquaculture is mainly tied to spatial

constraints and economic competition. The reduction of areas dedicated to fisheries and the sharing of common markets are usually perceived as a strong conflict by fishery operators, already in economic contraction.

According to the Strategic Plan, the increase in aquaculture, together with sustainable artisanal fisheries, can be an example of synergy with the widespread coastal tourism through the development of complementary activities, including recreational fishing, environmental services, food and gastronomy sector and ecotourism. Promoting tourism-fisheries and fisheries cultural heritage could be an important economic resource for the territories in which it is carried out and in the neighbouring areas, provided that the operators are able to act in an appropriate regulatory environment that combines work activities with those related to the reception and logistic. Good practices are present in the study area, with several examples of fisheries heritage tourism from Sicily Spatial conflicts with fisheries activities frequently occur across areas, particularly close to major commercial ports, military and hydrocarbon extraction areas. As well, protected areas (e.g. the Pelagos Sanctuary for Mediterranean Marine Mammals, Marine Protected Areas, Sites of Community Interest, Biological Protection Zones) may be a strong source of conflict where protection needs determine significant restriction to fishing activities or no take zones are established.

The "Guidelines for Technical Measures to Minimize Cetacean-Fishery Conflicts in the Mediterranean and Black Seas" (ACCOBAMS, 2004) and the "Sea Turtle Handling Guidebook for Fishermen" (2001, RAC / SPA), together with the Maritime Strategy for the Adriatic and Ionian Seas (EU COM(2012) 713 final) aims to the mitigation of conflicts between professional fisheries and the environmental protection through the adoption of specific measures to protect habitats and species sensitive to fishing activities, especially sea turtles and cetaceans. Otherwise, well-managed protected areas can represent a useful tool to protect the marine environment and rebuild stock in synergy with local fisheries. Examples of positive interactions are given in the area by the MPAs of Portofino (Ligurian Sea) and Tavolara (Northern Sardinia), where a thorough planning of protection measures, no take areas and strictly regulated fisheries through bottom up approach, are achieving significant positive results in terms of reducing impacts and driving the transition towards sustainable and locally-based fisheries.

Fisheries in Malta are mainly artisanal and are considered as having a socio-economic value at the local level in view of the cultural characteristics attributed to this industry. Traditional fishing villages have over time been marketed as a tourism attraction.

Aquaculture related conflicts and synergies

In the Western Mediterranean Sea, there is a strong competition for coastal resources between the aquaculture and the tourism sector. The presence of farms in coastal areas competes with the need for high water quality near beaches for tourism development but also with professional fisheries grounds and other coastal activities.

On the other side when correctly managed, the interactions between fishermen and farmers support good environmental, economic and social decisions. Some potential synergies can be achieved with the renewable energy sector, as aquaculture farms can be located near wind farms without causing disturbance.

In the specific context of Malta, the conflict between aquaculture and recreational activities possibly arises from inadequate self-regulation by aquaculture operators that lead to discharge of offensive oily substances from feeding operations that reach coastal bathing areas.

No specific spatially referenced information was provided on aquaculture related conflicts and synergies for the entire study area.

Maritime Transport related conflicts and synergies

Maritime traffic may be affected by conflicts for space with the aquaculture and fisheries sectors. Conflicting interests may also occur with activities such as the development of offshore energy installations (e.g. wind farms or oil and gas rigs), which may increase the risks of accidents. But on the other side, the shipping activity in the region stimulates economic development and internal transport of goods and services.

Actual level of maritime traffic congestion and the planned expansion of cargo and passenger traffic may cause severe environmental impacts.

No specific information was provided on maritime transport related conflicts and synergies on Spanish and French waters.

The harbours present along the Italian coasts usually insist on areas dominated by the presence of highly populated and urbanized cities (e.g. Savona, Genoa, La Spezia, Livorno, Civitavecchia, Naples, Salerno, Cagliari, Palermo), close to leisure and fishery marinas. As a consequence, they feature intense interactions between naval activities (due to the shipping and cruise port), increasing bathing and nautical tourism (e.g. Genoa, Naples, Cagliari, Palermo), cables, small fisheries and trawling. Conflicts with port activities in the area may arise due to the great demand for maritime space of port operations and navigation, but also

for the ensuing impacts (e.g. marine litter, water pollution, introduction of non-indigenous species, siltation, hydrographical changes, underwater noise) that may affect overall environmental quality, such as the behaviour of commercial fish stocks and the protection goals for target species (e.g. marine mammals and sea turtles).

The Italian Strategic Plan for Maritime transport and Logistics (Ministry for Infrastructures and Transports, 2015) identifies the Tyrrhenian ports of Genoa, La Spezia; Livorno, Naples, Gioia Tauro, Cagliari, and Palermo as strategic for achieving the objectives of the trans-European transport network. One of the cornerstones of the Plan is the reduction of the environmental hazards of port infrastructure within the overall process of logistical development and increasing use of the sea linked to port activities. This objective has to be reached reducing conflicts with other uses and pollution from ship traffic and port-based operations.

The need to combine environmental protection and the development of the port and logistic system has been first established in the United Nations Conference on the Environment and Development (UNCED, 1992), which stated that "port management must be oriented to sustainable development models". The opinion of the European Economic and Social Committee on a common EU ports policy (2007/C 168/12) is that "a common port policy in the EU must ensure the sustainable development of capacity of ports and related facilities", ensuring relevant planning tools between the actors involved in the improvement of port infrastructure (cruise and tourist ports).

A strong synergy within the sector follows the increasing tourist flows in the area. Tyrrhenian ports are characterized by a strong presence of passengers and traffic, with increasing demand for spaces dedicated to recreational boating and yachting. With regard to cruise traffic, the main poles are Genoa, Civitavecchia and Naples (together with Venice, representing the four major cruise poles in Italy). Anyway, it emerges a widespread demand on other ports, with growing relevance in all Western harbours (e.g. Sicilian ports, Tuscan ports).

A critical issue for this activity in Malta is the potential competition from new or expanding maritime sectors that may require relatively shallow maritime spaces that coincide with the same locations as Bunkering areas.

Coastal and Maritime Tourism related conflicts and synergies

The foreseen growth of the tourism sector will probably bring new challenges and conflicts with other sectors in the future.

No information was available on coastal and maritime tourism related conflicts and synergies in Spanish and French areas.

In Italy, cruise tourism could also compete for space with shipping and passenger transport while sailing and other touristic activities at sea may compete with the fisheries sector and aquaculture developments along the coast. Aquaculture could also compete with touristic locations for available space along the Italian coast, particularly with sun and sea and nautical tourism destinations. Instead, tourism activities may be highly compatible with sustainable fishing practices, and with the development of new MPAs although suitable management of those areas needs to be in place to avoid overcrowding of tourists or other types of damage.

Many tourists join packed excursion boats during the peak tourist season (July- August) in Italy to visit MPAs. Not only does this have an impact on marine biodiversity, but it also affects the visitor's satisfaction.

In several areas (especially Liguria, Tuscany, Campania, Sicily) seaside tourist flow is steadily increasing over the last 10 years.

The Italian Strategic Plan for Tourism (Ministry of Cultural Heritage and Tourism) is based on the functioning of a vast system of production interdependencies (which involve highly different sectors, including agriculture, manufacturing industry, transport and services), and may produce effects in many economic sectors, even if not directly related to tourism, due to the changes caused in general quality and appeal of the territories. One of the overarching principles of the plan is the systematic reinforcement of sustainable tourism, in its various meaning, in relation to environment, territory, protection of heritage, the socio-economic system, culture and citizenship. The reduction of the impacts of tourism related structures on the environment (e.g. land use, waste production, energy and water consumption) is a key need to minimize environmental impact and to manage the cumulative pressures of touristic activities in marine and coastal waters. Developing cultural and ecotourism in synergy with the adoption of proper protection tools (e.g. MPAs) is considered a good practice to share within large portions of the territory. Among the operational good practices cited in the strategic plan, a portion of the western Italian coasts are involved in the "Tuscany Landscape Plan", which includes measures to protect the dunes and coastline and imposes limits on building permanent structures on beaches, in order to guarantee accessibility and sustainable use of the shores.

With the entry into force of the Directive for Maritime Spatial Planning in September 2014, the tourism industry will be increasingly involved in MSP. With most touristic or recreational activities depending on a high-quality environment, benefits will arise from long-term and integrated planning of the seas and coastal waters.

Pleasure craft and yachting, including offshore recreational fishing, are a key sector in several Tyrrhenian areas: developing and promoting an integrated approach with the overall maritime traffic, involving a network of ports and marinas, specific spatial needs of the cruise industry (traffic separation schemes, scenic quality, port facilities, environmental impacts, etc.) could represent an important and challenging synergy for the area. Increasing nautical activities, however, especially during the summer months, may cause physical and acoustic disturbance, affecting fish stocks of commercial values (potential conflict with fisheries) and target species for protection policies.

In Malta one conflicting activity with tourism has been aquaculture. In 2016 a decision was taken to revoke existing permits and request operators to move further offshore into designated aquaculture zones, to minimise impacts on bathers.

Energy related conflicts and synergies

In the offshore context, the expected expansion of oil and gas operations in some areas, including proposed cable and pipelines, could lead to serious conflicts with typically offshore sectors such as maritime transport, commercial fishing and environmental protection. However, they may be compatible in the presence of adequate planning and effectual governance system, supporting sustainable development of search and exploitation activities, reducing conflicts with other uses and facilitating a thorough environmental management at the right spatial scale.

The “Cetacean corridor” proposed by Spain as reservoir for cetacean species is a case that can lead to potential spatial conflicts between oil and gas industry and conservation actions. In fact, the inclusion of the Cetacean Migration Corridor as area for conservation will imply the banner on prospection by active methods as waves, compressed air or explosions controlled, as well as, by means of underground drilling. Moreover, future extractive activities will be denied. For further information on this specific issue refer to section 3.3.

As previously described (section 2.4.3.4), a large portion of the coasts of the Western Italian Mediterranean area is not interested by such kind of activity, with the exceptions of South-Western Sicily, which may host intense hydrocarbons research and extraction activities during the next years, Eastern Sardinia and the presence of an offshore LNG terminal of national importance close to the city of Livorno (Tuscany).

An important conflict may arise for space competition with fisheries and maritime transport: the Legislative decree 145/2015 transposes Directive 2013/30/EU on maritime safety in the hydrocarbons sector, establishing (Article 6) a "safety zone" with an extension of 500 meters from the facility, which prohibits the entry and holding of ships. In order to reduce conflicts

with coastal activities and protected areas, article 35 within the Decree 83 (22/06/2012) sets the prohibition of research, prospecting and cultivation "within the boundaries of marine and coastal areas under any form of environmental protection under regional, national or international laws and conventions". This prohibition also applies in maritime areas within twelve nautical miles from the coastline and from the outer boundaries of the existing protected marine and coastal areas.

Potential effects on protected species, such as sea turtles and cetacean, may be observed around the extraction platforms. Also considering the presence, in the northern part of the study area, of the Pelagos Sanctuary for Mediterranean Marine Mammals, an international Marine Protected Area established in 1999 under agreement between Italy, France and Principality of Monaco to protect a wide area (approximately 84000 km^2) of the waters between Toulon (French Riviera), Capo Falcone (western Sardinia), Capo Ferro (eastern Sardinia) and Fosso Chiarone (Tuscany), the main feeding ground for Fin Whales in the Mediterranean basin, the needs of protection are particularly compelling. One of the main direct pressures comes from seismic surveys and all other sources of noise pollution that can induce behavioural changes and consequently lead to direct or indirect mortality. The "Guidelines to address the impact of anthropogenic noise on cetaceans in the ACCOBAMS area" prescribe the use of visual and acoustic detection of marine mammals in areas subject to seismic exploration.

In Marsaxlokk Harbour in the south of Malta, synergies exist between energy operations and port related activities, in areas where they are located in close proximity, facilitating operations management.

Environmental Protection and Conservation related conflicts and synergies

Marine protected areas (MPAs) are among the most spread and effective conservation strategy. There are cases of synergies with MPAs and responsible tourism activities and appropriately managed recreational and commercial fishing. Conflict arise when human activities spatially overlap with MPAs, or are developed in surrounding areas, with negative impacts on the ecosystems inside the protected areas. The Italian Tyrrhenian area feature several Marine Protected Areas, coastal and marine Natura 2000 sites, biological protection zones and national protected sites, as described in section.

The commitments of the WFD, MSFD, H&B Directives (GES, FCS and Targets) and other national and European Community relevant environmental protection obligations, based on the Ecosystem-Based Management approach and aiming to reduce impacts and pressures on species, habitats and ecosystems, foster the need to enhance the network of Marine Protected

Areas and move towards of protecting the 10% surface coverage by 2020 of the Tyrrhenian Sea. None of the existing or planned protected areas can be considered a pristine area, since several human activities falls within or close to them (e.g. fisheries, coastal tourism, maritime transport). As a consequence, conflict may arise with the protection objectives, especially in protected areas featuring hot-spots of biodiversity and rare species. Moreover, several activities, such as fisheries and coastal tourism, are often subjected to limitation (e.g. reduce/eliminate the most destructive fishing practices, reduce accesses to high valuable areas) within the boundaries of the protected areas, with severe risks of conflicts with involved stakeholders.

However, marine protected areas are widely recognized as fundamental regulative and planning tools that, in presence of proper planning options, may pursue goals of environmental protection (e.g. protect target habitat or species) and cultural and historical conservation while fostering the sustainable uses in the area (e.g. ecotourism, historical artisanal fisheries, recreational diving and fishing) (Italian Laws n. 979/1982 and n. 394/1991; "Habitat" Directive 92/43/CEE). An interesting example of transboundary cooperation is that of Pelagos Sanctuary for Mediterranean Marine Mammals. In Malta, there are emerging synergies between fisheries, tourism and nature protection through the establishment of Natura 2000 sites under the nature directives, promoting more opportunities for eco-tourism and for fisheries diversification in the tourism sector, if managed appropriately.

No information was provided on environmental protection and conservation related conflicts and synergies within Spanish and French areas.

Sand extraction related conflicts and synergies

There is main concern for the potential impacts of this activity on hydrological processes.

This activity is strongly conditioned by the erosion problems in the Spanish Mediterranean coast that also depends on the occurrence of extreme events like heavy rains and waves. There are some national strategies with the aim of improving coastal stability in areas like the south of Castellon, south of Valencia and Maresme. Sand extraction projects need appropriate assessment and monitoring especially for their impacts on marine environmental and sensible ecosystems such as seagrass meadows of *Posidonia oceanica.* For this reason, future, potential sources of sand shall be allocated on off-shore areas deeper than 80 m.

No information was provided on extraction of sand related conflicts and synergies within French, Italian and Maltese areas.

Water extraction related conflicts and synergies

One of the main concerns and impacts of this activity in relation with the marine environment was the brine evacuation: the doubts initially generated about the impact of the brine discharge in the receiving medium have been attenuated thanks to the application of diffusion and dilution systems, and control and monitoring plans.
No spatially referenced information was provided on water extraction related conflicts and synergies.

Farming, livestock farming and industry related conflicts and synergies

Impacts on maritime activities are related to the nutrients and chemical outflows in the hydrographic basin in general. For this reason, the main activities of the region impacted by farming are all the activities based on high water quality (fishing, beach-based tourism, etc.)
No spatially referenced information was provided on farming, livestock farming and industry related conflicts and synergies.

Salt extraction related conflicts and synergies

On the French coast this activity has a great ecological value since salt extraction can be sustainably developed in harmony with salt marshes ecosystems and is well integrated in the landscape having a great historical, cultural and touristic importance.
No spatially referenced information was provided on salt extraction related conflicts and synergies for Spanish, Italian and Maltese areas.

5.2 ANTHROPOGENIC PRESSURES ON THE MARINE ENVIRONMENT

Biological (i.e. input or spread of non-indigenous species, disturbance of species due to human presence)- Relevant qualitative descriptors to consider (2) and (3).

Non-indigenous species (NIS) are a spread and diffused environmental issue in the Western Mediterranean Sea, they are often caused by human activities, which accidentally transport and introduce new species in the Mediterranean waters. They are introduced outside their natural range by human action, either direct or indirect, and can cause harm to biodiversity or ecosystem services by competing with and, on some occasions, replacing native species, and

causing complex changes within the structure and function of the new hosting ecosystems. The most relevant activities causing the introduction of NIS are mariculture, shipping, aquarium and ornamental escapees. A good example of an aquarium species turned invasive is the killer alga *Caulerpa taxifolia*, an alga that continues to spread through the Mediterranean. The expansion of some species seems to be favoured by a previous degradation of local habitats. However, other species, like several macroalgae as *Lophocladia lallemandi*, *Caulerpa racemosa* or *Womersleyella setacea*, have spread successfully in habitats that can be considered non-degraded, as extended *Posidonia* meadows in protected areas of the Cabrera archipelago National Park (Spain). At least 298 different NIS have been recorded in the Alborán Sea and Levantine-Balearic area. They belong to a wide range of taxonomic groups, from fishes and benthic macroalgae or macrobenthos to small meiobenthic invertebrates or planktonic protozoa, occupying a variety of habitats, from intertidal areas and coastal rocky bottoms to shelf soft bottoms and different areas of the pelagic realm. It is worth pointing out that tropicalization of temperate areas as the Mediterranean Sea is favouring the entrance and establishment of NIS from warmer waters, including the non-indigenous Lessepsian migrants from indo-Pacific region arriving through Suez channel, recently enlarged. Thus, the majority of introductions into a specific area are attributable to natural dispersal processes from the primary introduction sites. For example, a large number of Lessepsian species are arriving to the Western Mediterranean by their own means, in spite that in some cases the secondary spreading can be also produced through anthropogenic vectors, as for example secondary spreading of macroalgae due to recreational small vessels. As expectable, some species have been recorded for the first time in the vicinity of port areas or aquaculture plants. However, many species have been found and have spread successfully in more pristine areas as MPAs. In any case, the spatial distribution of records reflects mainly that of sampling effort, and hence it can be considered a biased figure in most of cases. Most of records correspond to macrophytes and zoobenthos in coastal areas (Figure 65), but this is almost for sure a biased figure resulting from the limitations imposed by the sampling schemes, since there are not standardized, large scale and continuous monitoring programmes, including different sampling techniques adequate for recording individuals from the different habitats covering a wide size spectra, and most of research efforts on alien species are concentrated on these benthic macroorganisms.

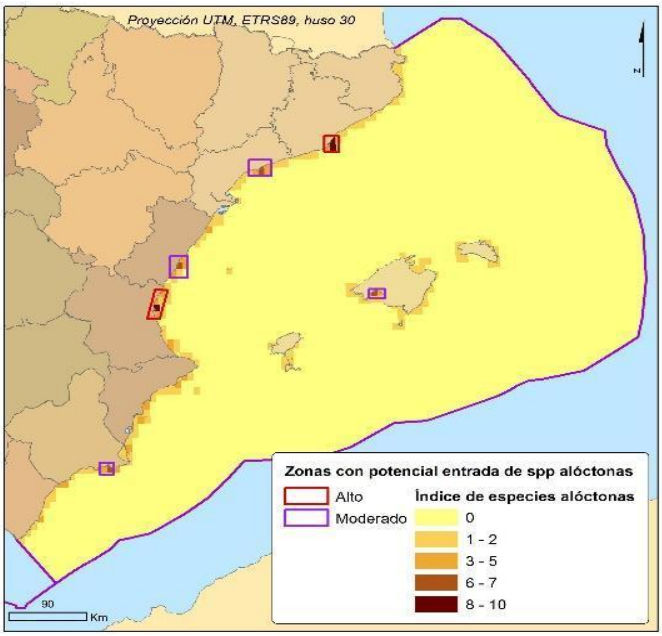


Figure 65 Areas where the input of NIS is more probable in Spain.

Within Spanish waters there are knowledge gaps on part of detailed and reliable quantitative information on NIS abundance and distribution, resulting from the scarcity or absence of standardized monitoring programmes, in general a main knowledge gap is the lack of knowledge about the real impacts of NIS on local ecosystems.

In the Gulf of Lion aquaculture is a main cause of primary introduction of NIS such as the Pacific cupped oyster, *Crassostrea gigas*, and the dissemination of NIS (e.g. macrophytes) via regular transfers of mollusc larvae and oyster stocks between various oyster-farming sites. The ports of Port-La-Nouvelle, Sète, Marseille and Toulon (Figure 66) are vectors for the introduction of NIS in the Western Mediterranean due to significant de-ballasting operations (discharge of ballast water from ships) occurring each year and biofouling activities.

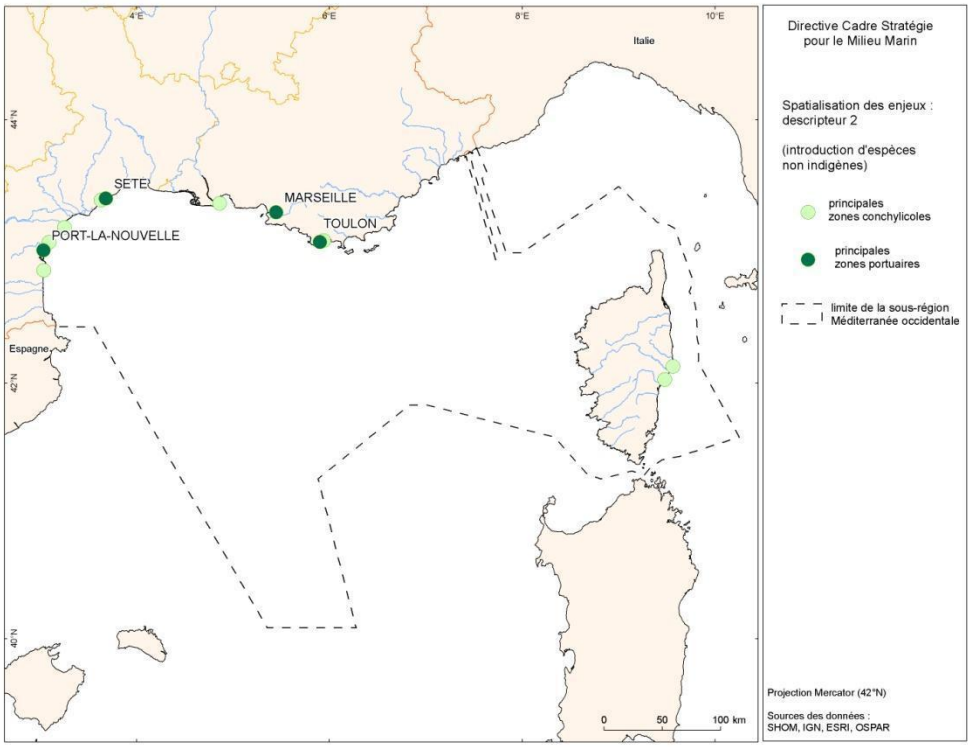


Figure 66 Areas where the input of NIS is more probable in France.

Caulerpa species (*Caulerpa taxifolia* and *Caulerpa racemosa*) are considered among the main invasive forming habitat species introduced into the Western Mediterranean and they are uniformly distributed along the entire French coastline. In this region lagoons are also an area with significant cumulative impact from invasive non-indigenous flora. Overall the distribution of invasive NIS in the French area is still poorly understood. With regard to species extraction, which also represent a severe and strong pressure on marine environment, in French Mediterranean waters it does represent a main concern due to potential bycatch of top predators such as marine mammals, marine birds or marine turtles, which has not been thoroughly assessed. The Gulf of Lion is probably the most sensitive area to this impact given its major foraging function for several marine bird species potentially subject to bycatch.

Within the Italian waters of the Western Mediterranean Sea, a total of 119 NIS belonging to 12 main taxonomic groups (microalgae, macrophytes, poriferans, cnidarians, ctenophores, polychaetes, bryozoans, molluscs, crustaceans, pycnogonids, ascidians, fishes) have been identified. 58 of these NIS (49%) are considered to be invasive according to the definition of Invasive alien species (IAS, a subset of established NIS which have spread, are spreading or have demonstrated their potential to spread elsewhere, and have an adverse effect on biological diversity, ecosystem functioning, socio-economic values and/or human health in invaded regions) in the TG2 report of the Marine Strategy. The cumulative number of NIS shows a relevant increasing trend from the decade 1972-1982. The presence of the invasive

crab *Percnon gibbesi*, investigated in summer 2010 in the Capo Gallo – Isola delle Femmine MPA, NW Sicily, resulted irregular across the whole MPA. In agreement with previous findings, a strong correlation has been found between crab density and the boulders with algal turf. Observations on Brachiomma spp. are available for *Branchiomma luctuosum* and *Branchiomma bairdi*. The first is recorded as an introduced species in the Mediterranean since 1983. Initially present with very few specimens, it subsequently underwent rapid increase in the whole basin. High population densities of *B. luctuosum* are observed in sheltered areas of the Gulf of Naples, decreasing to few individuals in more open areas. The more recently introduced species *Brachiomma bairdi* was collected for the first time in the Gulf of Naples in 2004. It is now present with high density populations on every submerged structure around the Ischia Island. This species originates from Carribean area, it is smaller than the previous one however, it seems to be more dangerous as it can also reproduce asexually. Population density studies of this species are being carried out to assess possible competition with smaller species. At MPA "Ustica Island" *Acrothamnion preissii* shows a uniform distribution from the midlittoral to circalittoral zones with abundance always < 1 %. The species is considered as established. The steady environmental conditions in situ, do not suggest predictable variations of both abundance and distribution of this species. Based on data collected in the area of Tuscany the incidence of occurrence of *Caulerpa racemosa* do not vary according to the degree of protection (partial versus total). At the seascape level, *C. racemosa* is more widely spread within degraded habitats (i.e. *Posidonia oceanica* dead matter or algal turfs) than in better preserved habitats (i.e. canopy-forming macroalgae or *P. oceanica* seagrass meadows). In Sardinia the spatio-temporal distribution of the records of NIS species belonging to 4 main taxa (algae) is the following: 1) *Asparagopsis armata*, is present in many sites of Sardinia but invasive in Isola Rossa; 2) *Codium fragile*, is widespread along all Sardinian coasts with significative abundance on sandy shores; 3) *Caulerpa racemosa*, which invaded the Gulf of Cagliari since 1994, today is well widespread all over the Sardinia coasts, with a special abundance on Posidonia dead matter; 4) *Caulerpa taxifolia*, it was found in Golfo Aranci for the first time in 2002, today it reached the Tavolara Isle, where is moderately invasive. In La Spezia harbour *Tricellaria inopinata* is found within a few small colonies, whereas in Olbia harbour it was identified the presence of isolated colonies. The toxic benthic dinoflagellate *Ostreopsis ovata* was reported since 1990 in Latium, with first abundance peaks in Liguria and Tuscany between 1998 and 2003. Like in other areas, intensive monitoring over the last 10 years has led to the finding of *O. ovata* in most places with rocky shores while no clear trend has been reported in terms of expansion or increased abundance. The planktonic species *Skeletonema tropicum* and *Pseudo-nitzschia multistriata* it is spread in the region, with no clear trend in abundance since their first observation in 2002 and 1995,

respectively. *P. multistriata* generally peaked in autumn over the first years, but since 2005 it is decreasing in this season and increasing in June-July. *Chaetoceros bacteriastroides*, which has been detected for the first time for the whole Mediterranean Sea in 2000, is present with low abundance. The toxic planktonic dinoflagellate *Alexandrium catenella*, recorded since 1999 in Sardinian coasts, shows a range expansion across the Mediterranean Sea, and has been also found since 2011 in Sicily. *Alexandrium catenella* was found at Olbia Gulf for the first time in 1999, it is present in Olbia Gulf, where is considered as moderately invasive; its occurrence close to aquaculture sites at Olbia Bay can negatively impact the farming and harvesting along with bivalve contamination (it is PSP toxic). Three NIS crustacean isopod species (*Paracerceis sculpta, Paradella dianae* and *Sphaeroma walkeri*) occur in the Italian Western Mediterranean Sea. Abundance data are available for *P. sculpta* from a survey conducted in 2000 in the harbour of Salerno. The number of individuals collected was 68, constituting 11% of the total isopod abundance; this was indicative of a well-established population associated to the harbour fouling habitat. Spatio-temporal distribution of the recorded NIS in Italian Western Mediterranean Sea is available in GIS maps. Instead, for this area there is low availability of impact estimates, and very poor information on main introduction vectors. These gaps may be filled through i) activation of monitoring nets aiming at evaluating the real settlement of NIS, in particular the invasive ones, and their impact, through a standardized methodology; ii) activation of monitoring systems in marine protected areas where human impact is absent or limited; iii) surveillance actions in areas with high probability of introduction such as harbours and aquaculture sites and control actions on ballast water and fouling, and trade of aquarium species. Italy has adopted the Reg (CE) 708/2007, which will allow a better control of target species introductions due to NIS farming. However, the contribution of non-voluntary introductions due to NIS pressure should be better understood by a better comprehension of farming risks. Italy is in the process of implementation of the UNEP-MAP Mediterranean Strategy for the management of ships' ballast waters and sediments, within the framework of the Barcelona Convention, and is close to ratifying the International Convention for the Control and Management of Ships' Ballast Waters and Sediments (IMO, 2004). Data of monitor of the presence of microbial pathogens on the Italian coast of the Western Mediterranean Sea are also available and they have been collected through the littoral over the last years. The compliance with limit values showed oscillating annual trends, with compliance with lower limit values being > 80 % of the assessed bathing areas, compliance with higher limit values rising from 1.6 % in 2008 to 8.6% in 2011 and a small number of bathing waters (around 1%) which do not comply with mandatory values. The number of bathing waters banned in 2008 was 157 (6.2%), decreased significantly in 2010 to 2 (0.1%) and increased again to 82 (3%) in 2011. Monitoring of

microbial pathogens in shellfish waters is under the Shellfish Water Directive 2006/113/CE and National Decree 152/2006, and the Shellfish Hygiene Regulations. In the Western Mediterranean Region, there are over 38 shellfish waters and the number of those not compliant with mandatory limit value changes over the years 2005-2011, from a minimum of 2 to a maximum of 12. According to Shellfish Hygiene Regulations, on 2011 a total of 83 areas were classified for shellfish production, representing the 18% of total national classified areas. The proportion of total classified surface (km^2) not compliant with lower limit values resulted below 25%. Other analyses have been carried out in shellfish to assess the presence of viruses (e.g. NoV, HAV) and their results highlighted the need for a more thorough check and monitoring of such emerging pathogens. Reference detection methods are still lacking and should be implemented. Algal biotoxins should also be monitored among health issues in Italian shellfish waters as potential source of severe intoxication in consumers and cause of the closures of numerous shellfish production areas. The correlation and type of algal biotoxins can be influenced by natural factors, such as temperature, season, etc., but also by nutrient load from riverine inputs and such correlations need further investigation. Knowledge gaps on the estate of Italian shellfish waters are due to partial monitoring of shellfish waters due to structural/economic constraints, different competent authorities responsible for monitoring activities and lack of continuous data stream. Future actions should be aimed to build up an extensive database to integrate, manage and share environmental and sanitary data on microbial contamination of Italian shellfish waters and to optimize the monitoring activities among different Competent Authorities within different regions. Other microorganism with potential toxic effects present along the Italian coasts is *Ostreopsis cf. ovata* (a NIS), a benthic dinoflagellate. Since the 1990s an increasing trend in the presence and abundance of this benthic microalgae has been reported especially during summer season. Alarming values of concentration of this organism (≥ 1000 cells/l) have been recorded at least once in 29 sites in 2010 (32%) and in 22 sites in 2011. Regarding the extraction of species several information are available related to the Italian Western Mediterranean Sea. In this marine area the amount, as well as the total number of days at sea by fishing vessels of less than 12 m length with passive mobile gears significantly decreased between 2004 and 2011. The total engine power (kw) and the total tonnage (GT) of fishing vessels also decreased, but the trends were not significant. For vessels of more than 12 m length with mobile gears affecting the seabed the total number of vessels and the total engine power (kW) increased between 2004 and 2011, but trends were not significant. For vessels of more than 12 m length with other kind of mobile gears, the total number of fishing vessels and days at sea and the total engine power (kW) decreased between 2004 and 2011, but trends were not significant. For vessels of more than 12 m with passive fishing gears the total

number of fishing vessels and the total engine power (kW) increased between 2004 and 2011, but trends were not significant, while the total tonnage (GT) of fishing vessels significantly increased. The number of vessels for recreational fishing targeting Bluefin tuna significantly increased between 2008 and 2011. The Sicilian fleet of swordfish harpoon fishery was analysed representing the 65% of the whole Italian swordfish harpoon fishery. These vessels are usually fishing in two assessment areas (GSA10, GSA19). The total number of vessels, total tonnage (GT), total engine power (kW) of Sicilian fleet increased between 2002 and 2011, whereas days at sea decreased. However, all trends were not significant and all variations related to the fishing capacity during the considered time period were negligible. As regards the swordfish harpoon fleet, the actual information is limited to the 65% of boats, belonging to the Sicilian fleet. This data could be improved and integrated by monitoring also the activity of harpoon vessels from Calabrian fleet. Knowledge of recreational fishery needs a substantial improvement by integrating collected data (tonnage, power, days at sea) on recreational fishery targeting Bluefin tuna and on other activities included in this category. A full census of Italian recreational fishermen is required to assess the magnitude of recreational fishery together with fishing gears used and catches. A future data collection for recreational fishery may be the basis for the assessment of this fishing capacity and may allow a first regulation of Italian recreational fishery to be established.

From Malta, marine area 56 NIS were recorded. Most of the information is based on works carried out in coastal waters (Figure 67). Four of the species under consideration may in actual fact not classify strictly as non-indigenous either due to their cryptogenic status in the Mediterranean Sea (e.g. *Acanthophora nayadiformis* and *Aplysia parvula*) or due to the fact that they are considered by Zenetos et al. (2012) to occur in the Mediterranean as a consequence of natural range expansion through the Straits of Gibraltar (e.g. *Seriola fasciata* and *Sphoeroides pachygaster*).

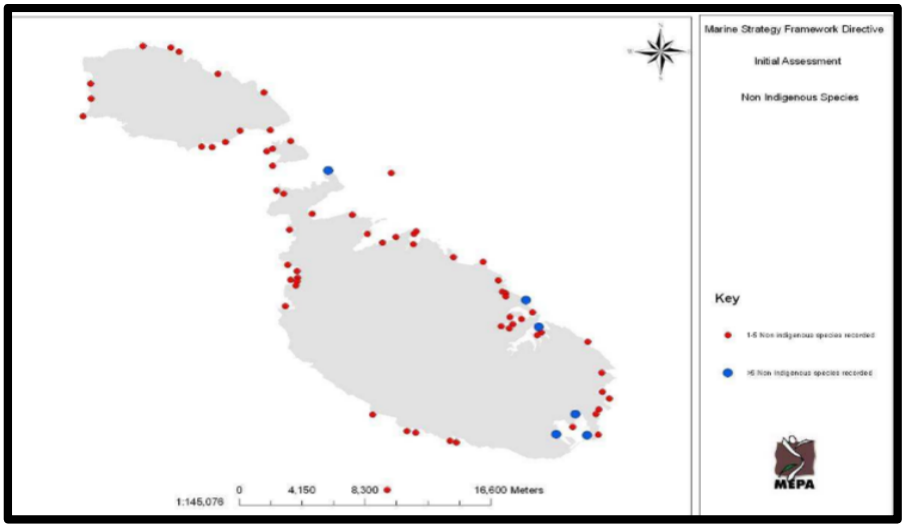


Figure 67 Areas where the input of NIS are recorded in Malta.

Recent surveys carried out as part of EU funded project LIFE Bahar covering the 25 NM spatial extent have recorded the presence of *Coronaster briareus*, a species previously reported from the Western Atlantic but never reported in the Mediterranean Sea, at depths of more than 200 m. Recent publications also refer to the capture of a single specimen of the silver-cheeked toadfish *Lagocephalus sceleratus* in 2014 by fishermen.

When assessing the documented spatial distribution of NIS recorded in Malta, the key areas considered as point of entry are: Grand Harbour and Marsamxett Harbour for its Ports activities, such as yachting, recreational boating and hull cleaning; Marsaxlokk Harbour for being a fishing harbour, freeport container transit station and main fuel unloading station. The latter is the location with the highest number of documented NIS records. Bays where aquaculture was or is practised or, where recreational boating and fishing is common, are another main source of NIS through yacht anchors and fishing gear.

A high number of NIS is also recorded at the North-Eastern tip of mainland Malta. The high incidence of NIS at this site cannot be explained in terms of the presence of major sources of NIS, such as maritime traffic. Local experts suggest that this could be due to the popularity of the area within divers, translating into a higher effort in identifying NIS at this site.

In Malta, while between 1900 and 1960 only 2 NIS records are available. In contrast, 54 NIS records are documented from 1961 to 2011. The trend coincides and might have been biased by the increasing scientific interest being given to marine NIS by local experts including sea users such as divers and fishers who report their unusual findings to experts for identification of the species.

The entry of NIS in Malta is considered a result of range expansion of Atlantic and Lessepsian migrants due to the general warming trend observed in the Mediterranean basin, accidental introduction via maritime traffic or via deliberate introduction. The number of records for the period 1966 to 1980 is attributed to the attempts to start an aquaculture industry in the mid-1970s during which experimental oyster cultures were set up at Marsaxlokk Bay, Mistra Bay and Rinella Bay. Such attempts resulted in both deliberate introductions such as *Crassostrea gigas* (imported from Anglesey, in Wales), as well as accidental introductions, such as *Celleporaria aperta*, *Celleporaria pilaefera* and *Gibbula cineraria*. No records are available for the period 1981 to 1990.

The geographical partitioning of marine NIS in Malta is as follows: 41% of Indo-Pacific including Pacific origin, 23% of Atlantic origin, 20% from the Red Sea and/or Indian Ocean, 14% are Circumtropical and 2% are of Antarctic origin. In Malta NIS are in the majority of cases, Lessepsian migrants (from Suez Channel). The warming of the Mediterranean Sea is also facilitating the colonisation and spread of Lessepsian Migrants species. Atlantic migrants

to the Mediterranean are also increasing. Local examples include *Cephalopholis taeniops* and *Seriola fasciata.*

Overall the main pathways responsible for introduction of NIS in Malta are shipping and floating structures, culture activities and aquarium trade.

It is worth noting that new records of NIS are generally made from locations that are well frequented e.g. diving sites and fishing grounds. Further the Maltese Islands are on the main east to west shipping route and a significant number of commercial, cruise and leisure vessels call at the Maltese Islands (and its main harbours) or pass close to them. The Maltese Islands are also important staging points for drilling platforms, and their occasional duration moored in coastal waters (can be for weeks), giving ample opportunity for movement of biota associated with the platform to inshore waters.

For a significant part of NIS recorded from Malta, the mode of introduction/entry, abundance, spatial distribution and establishment success, temporal occurrence and proportion of assessment area (%) where NIS are present are not known or could not be assessed in view of data limitations. So far documented records of NIS in Malta present limited data, normally as a result of snapshot studies restricted to point locations, and providing information on year when found, accompanied by a theory/assumption on how it reached these waters. Quantitative data as well as data on impacts of native communities is lacking, with only recent published literature documenting new records providing quantification of abundance and mapping distributions. Moreover, to date, data on marine habitats is generally localised with significant gaps in information on deeper habitat types.

In Malta, all of the 25nm Fisheries Management Zone is utilised for fishing activity. Information on spawning sites around Malta is either very limited or not available.

With regard of the environmental pressure origins from the extraction of living resources information related to the Maltese waters are available. The Council Regulation (EC) No 1967/2006 concerning management measures for the sustainable exploitation of fishery resources in the Mediterranean Sea, relates to the conservation, management and exploitation of living aquatic resources in the Mediterranean. The regulation adopts the 25 nm Fisheries Management Zone around the Maltese Islands, stipulates provisions regulating fishing within this zone and prohibits fishing for dolphinfish within the 25 nm Fisheries Management Zone by FAD from 1 January to 5 August each year. It further stipulates that the number of vessels for dolphinfish fishery shall not exceed 130. The regulation also sets the authorized trawlable areas within the 25 nm Fisheries Management Zone, (with specific geographical coordinates identified). Malta's Fisheries Management Plans however indicate that the Maltese authorities are currently studying the possibility of relocating part of these authorized trawlable areas

due to a rationalization exercise that has led to the closure of parts of the areas due to protected habitats present in the zones. Specifically, the management plans point out that the authorized trawling zones as per Annex V of regulation 1967 of 2006 include areas which are found within the 3 nm zone, which should be adequately managed to protect coastal resources from trawling activities and to give priority to artisanal fisheries. Malta is a member of ICCAT since 7th August 2003. The International Commission for the Conservation of Atlantic Tunas (ICCAT) is an intergovernmental organisation responsible for the management and conservation of tuna and tuna-like species in the Atlantic Ocean and adjacent seas. Malta observes ICCAT Recommendations, including the ones on the Bluefin tuna catch limits and has regulated fishery through the Fishery Regulations (G.N. 206/1934, G.N. 148/1935), which lay down detailed licensing and operational regulations. Through the implementation of other relevant legal provisions, Malta has established the number of fishing vessels allowed to target Bluefin Tuna using purse seine nets and surface long line fishing operating in the ICCAT Convention area. The open season for the taking of Bluefin Tuna by Maltese registered fishing vessels commences on the 15th April and extends up to the 31st December. However, the season comes to an end once the allocated catch quota for Malta is reached.

Fisheries management is regulated under national legislation through the Fisheries Conservation and Management Act Cap.425 and its subsidiary legislation.

Available information on biomass is based on the Fishery Independent surveys carried out in Malta including the Mediterranean International Bottom Trawl Survey (MEDITS) and MEDIAS surveys. Current data on large pelagics is restricted to stock assessments of the main commercial species (*Thunnus thynnus* and *Xiphias gladius*) carried out at the regional scale in the framework of the International Commission for the Conservation of Atlantic Tunas (ICCAT).

In Maltese waters fish and elasmobranchs species with existing or potential commercial value found at depth between 50 m and 800 m, showed different trends in biomass (increasing, stable or declining trend) depending from species.

With respect to 'Demersal fish' and 'Demersal Elasmobranchs', data limitations are mainly due the fact that the main source of data for these two functional groups, the MEDITS surveys, are focused on target species which have an existing or potential commercial value. Other non-target species for which biological parameters are not measured as per the MEDITS protocol may also be representative of the functional groups in question.

ii. Physical (i.e. physical disturbance to or loss of seabed substrate, changes to hydrological conditions) - Relevant qualitative descriptors to consider (6) and (7).

Threats to seafloor integrity, as considered in this evaluation, have the potential to give rise to significant adverse and irreversible damage of the sea bottom and the annexed ecosystems. This is dependent on the type of activity, the scale at which is undertaken (spatial and temporal), the degree of regulation that is in place to minimize potential impacts and the location where it takes place.

Physical damage from abrasion affects in the short term the concentration of suspended material in the water, and consequent sediment deposit produce burial of species and habitats. The more important activities associated with physical loss and alteration are: solid extraction, exploitation of submarine fields and dredging port, discharges of dredging port material, beach regeneration, creation of artificial beach, cables and pipelines, artificial reefs, wrecks sinking, marine wind farm, hydrocarbons exploitation and exploration, and, with also very consistent effect, marine litter.

Apart from these sources of pressure that directly affect the morphology of the sea bottom, there are other important pressures on the seabed related to activities in the coastal zone and continental shelf. For example, activities carried out on land can indirectly impact the marine environment through the discharge of sewage waters in rivers, which in a subsequent phase contaminate the marine environment and interact with benthic habitats. Some other pressures, such as pollution by dangerous substances, accumulation of nutrients and organic materials, are associated with loss and physical damage in the benthic marine environment. Further it should be considered that the Western Mediterranean, as the whole ocean, is affected by sustained warming since the last decades, a process attributed to global warming and hence an anthropogenic-driven shift of hydrographic conditions. Also changes in stratification and pH have started and are expected to increase in the future. These processes are deeply affecting all ecosystems, causing a decrease of primary production, northwards migration of several species across the trophic chain and even phenological changes as shifts in migratory patterns or spawning timing. Information is very unclear with regard to the monitoring and reporting of large hydrographical changes, although it is acknowledged that they deeply affect ecosystems health as well as indicators defined to assess the good environmental status.

As conclusion of researches and studies on the Levantino-Balear Region, it was found that the main source of physical disturbance on the seabed in this area is fishing pressure mainly related to techniques that use gears affecting seabed substrate, especially bottom trawling (Figure 67). In the study area, this fleet is composed of, (according to census) 582 boats.

Other fishing activities with effects on the bottom are present in this area such as purse-seine, artisanal fleet and trap. Bottom longline gears also generate impacts on the seabed but with lower intensity compared to the other fishing techniques.

If the attention is focused on bottom trawl fleet in the Levantino-Balear region, there is a clear difference between Balearic Islands and peninsular coast (Figure 68). Thus, the fishing effort is less in Balearic Islands than peninsular coast.

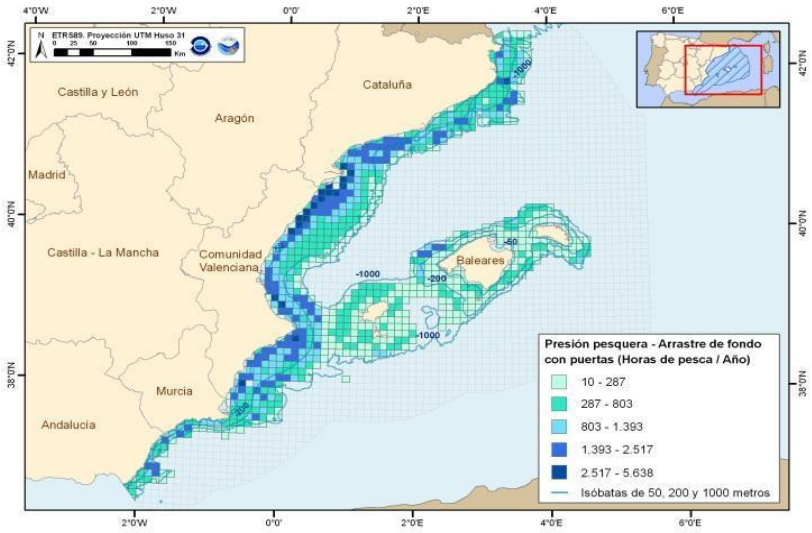


Figure 68 Geographical distribution of bottom trawl gear effort in Spanish waters.

In terms of hydrological conditions, the Spanish Western Mediterranean includes two different regions: Gibraltar-Alboran area and the eastern Iberia-Balearic area.

With regard to the local or regional activities directly interfering with the hydrological and hydrodynamic conditions of Spanish waters, the coastline is strongly anthropized, with more than a 30% of artificial coastline. The freshwater natural inputs are diverted for irrigation up to more than 50%. Through the coast of the Levantino-Balear region there are large harbours causing hydrodynamic perturbations and effluents that cause local anomalies both thermal (power or re-gasifying plants) and haline (desalination plants). These anthropogenic influences were mapped and in general they are circumscribed to local coastal spots (Figure 69,70) though some of them overlap high-value ecosystems.

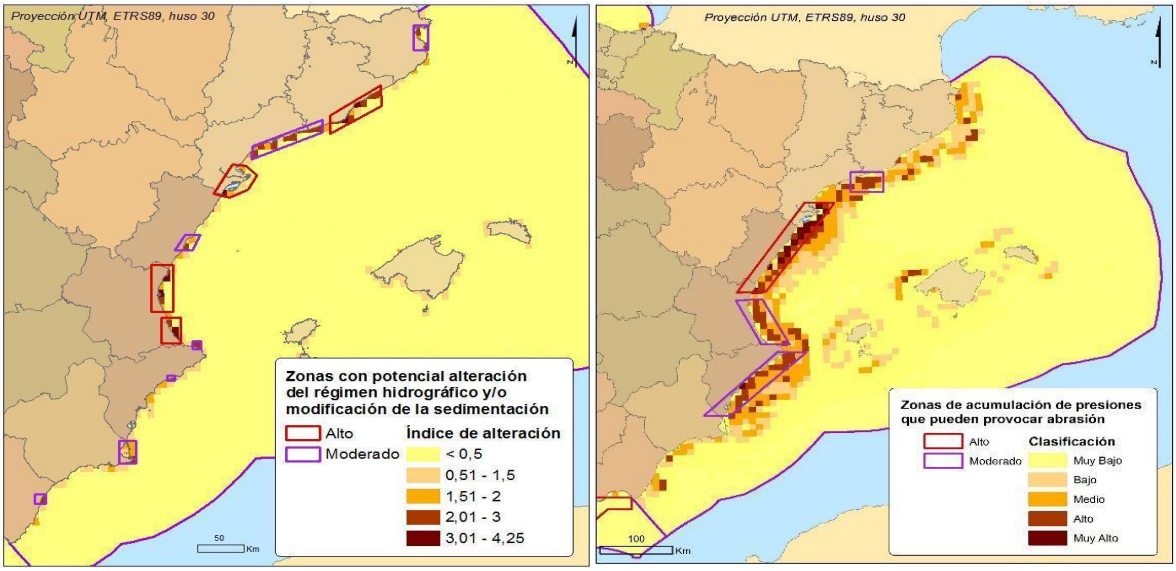


Figure 69,70 Areas with potential changes of hydrological conditions (left) and potentially affected by abrasion (right).

Such activities can provoke physical damages in marine ecosystems destroying or modifying substrate or habitat, causing consistent bottom profile sealing or variation. The areas with potential changes of hydrological conditions and potentially affected by abrasion, were mapped in the Levantino-Balearic region (Figure 71,72,73,74).

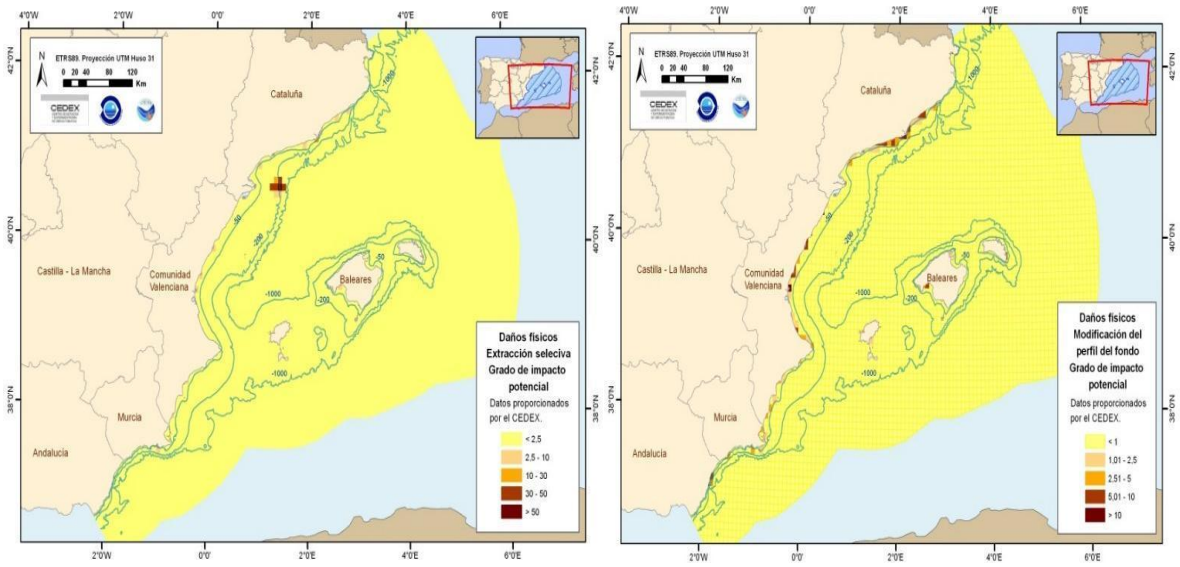


Figure 71,72 Geographical distribution of selective extraction (left) and of bottom profile changes (right). Potential Impact in Spain.

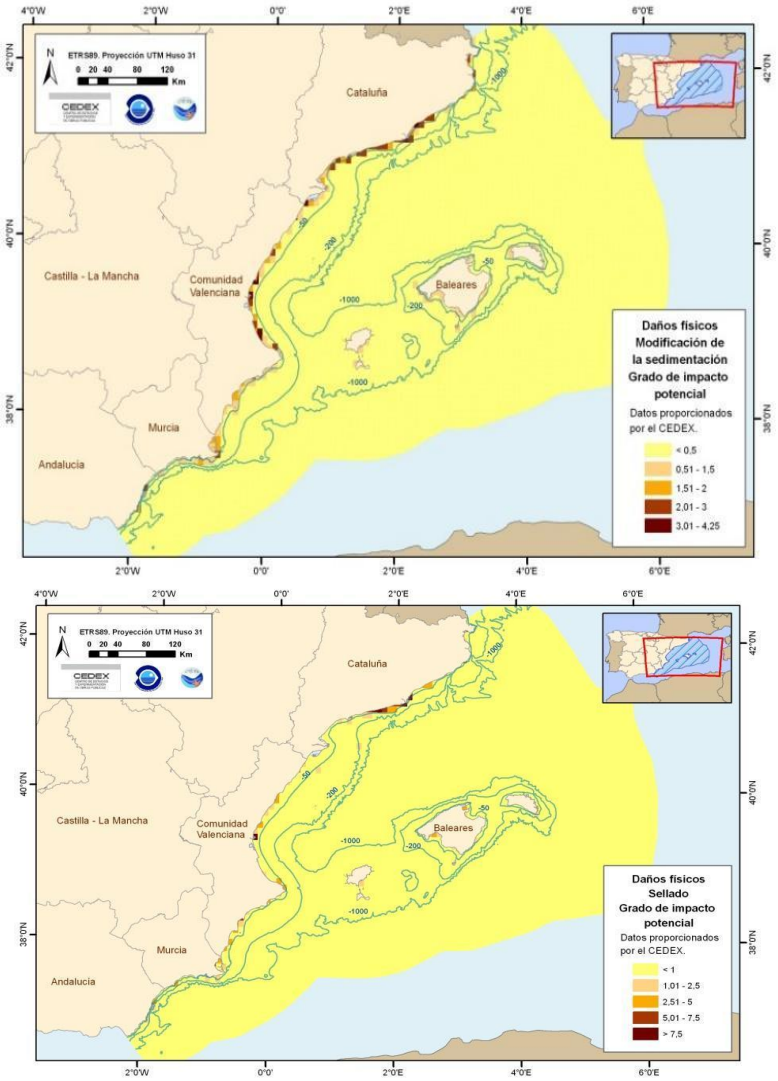


Figure 73,74 Geographical distribution of sedimentation changes (left) and of bottom sealed (right). Potential Impact in Spain.

Also in the French Mediterranean, the main physical pressures occurring are recognized to be the physical disturbance of the seabed due to abrasion (mainly from fishing activity) and subsequent effects (substratum change or rising turbidity), and changes in hydrological conditions mainly due to coastal construction (ports, coastal protection, etc.). As previously mentioned, changes in hydrological conditions may also lead to sealing, smothering, substratum changes or rising turbidity. Since these two types of pressure could lead to the same effects, areas of attention in French waters were identified for both of them indistinctly (Figure 75).

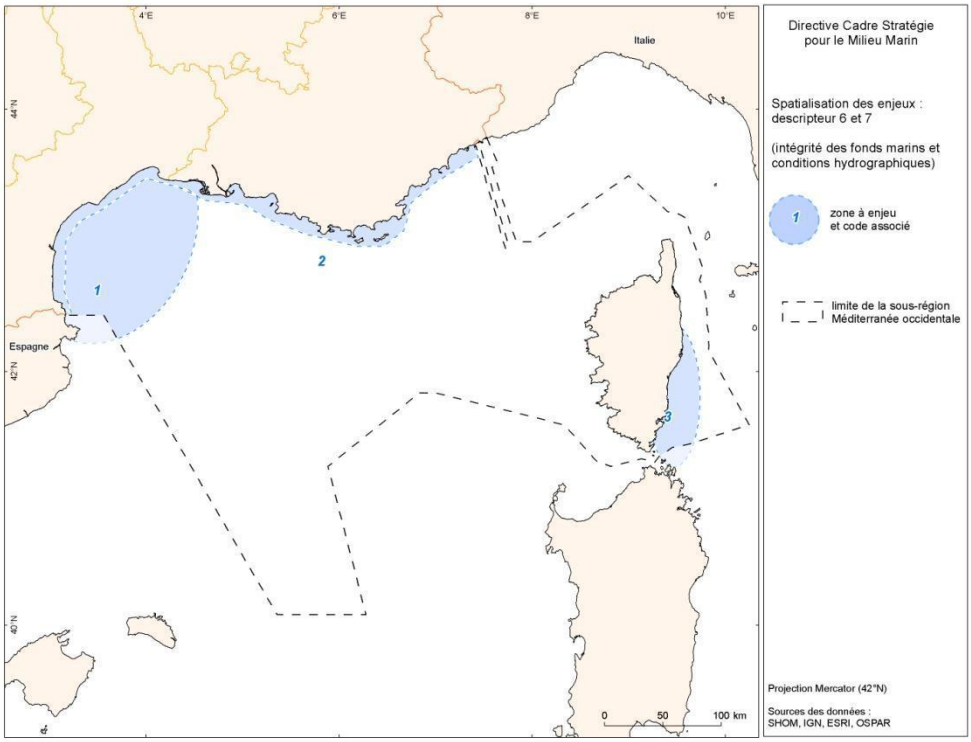


Figure 75 Identified areas of attention for physical pressures in French waters.

In the map, 3 different zones of impact are identified. Zone 1 extends across the whole continental shelf of the Gulf of Lion and corresponds to the area covered by drag-net fishing activities, which produce abrasion and modify turbidity and sediment type over the whole area. Zone 2 involves the whole continental coast due to significant development on the coastline, coastal and nearshore development (including artificial reefs), construction of coastal erosion defences, and beach replenishment, which produces smothering and sealing pressures on the biocenosis of mediolittoral and near infralittoral zones. Furthermore, sheltered coastal areas are also subject to abrasion pressure due to the anchoring of recreational vessels. In these areas, *Posidonia* meadows are especially sensitive to all these pressures. Zone 3, on the southern part of the east coast of Corsica, is also a significant area due to drag-net fishing activities, which produce abrasion pressures and turbidity changes over the whole area, particularly affecting *Posidonia* meadows.

In Italy, in Ligurian Sea, Central Tyrrhenian Sea and Southern Tyrrhenian Sea, physical damage is mainly represented by abrasion caused by fishing and anchoring. Fishing mainly occurs between 3 nm from the coast (or from 50 m deep) to a depth of 1000 m. Another important pressure is “change in siltation” present mostly on the seabed affected by man-made structures, in particular ports. For this area, no data are available on intensity quantification of physical damages, coastal fishery (LOA < 15 m) impact through abrasion,

boat anchoring zones, siltation caused by bottom trawling, shipping and river inputs. In order to obtain an accurate estimation of impacts, complete maps of habitat and substratum distribution, must be produced through specific campaigns and monitoring studies. Interferences with hydrological processes were detected in the Italian waters of the Western Mediterranean specifically in the area from Mignone river to Rio river, and from Chiarone river basin to Fiora river. Within Italian waters further data and methodologies for assessing physical, chemical and biological impact on habitats of the water column and seabed including the associated communities and functional groups are needed. In addition, no data are available to identify activities that generate "elevate temperatures". It is necessary to develop a standard methodology on a national scale for the assessment of pressures and impacts due to changes in physiographic and hydrological processes. Possible tools for this purpose should be modelling, mapping of benthic habitats and monitoring. Physical loss on the Italian coast have been detected mainly on the coastal area from Vado Ligure to Punta Ala; from Talamone to Punta Campanella; from La Pelosa to Tortolì; from Marsala to Palermo Gulf. In these cases, the main drivers of physical loss were: activities and structures such as coastal defences, ports, submarine cables, pipelines, wrecks, recurrent defence operations and subsea wells. Most available spatial data on the substrates have a low resolution. To better monitor physical loss on the Italian waters, the available information should be integrated through specific monitoring campaigns aimed at mapping the sea bottom.

In Malta, the same sources of pressure related to physical loss are basically recognized. It has been identified anchorage sites related to shipping within the Grand Harbour and Marsaxlokk Harbour along the south-east coast of Malta and in coastal waters within designated bunkering areas (Figure 76) as identified by Transport Malta (entity responsible for safety of navigation). Cargo vessels are known to anchor within Malta's marine waters along the south east of the islands whilst waiting either to enter Malta's ports or while in transit to other port destinations. Yachts anchor within identified and designated marinas. Anchorage associated with recreational boating along the coast and embayment is not yet regulated except for one area within the island of Comino (Figure 77). Fishing vessels are moored in ports and harbours as designated by the Fisheries Department.

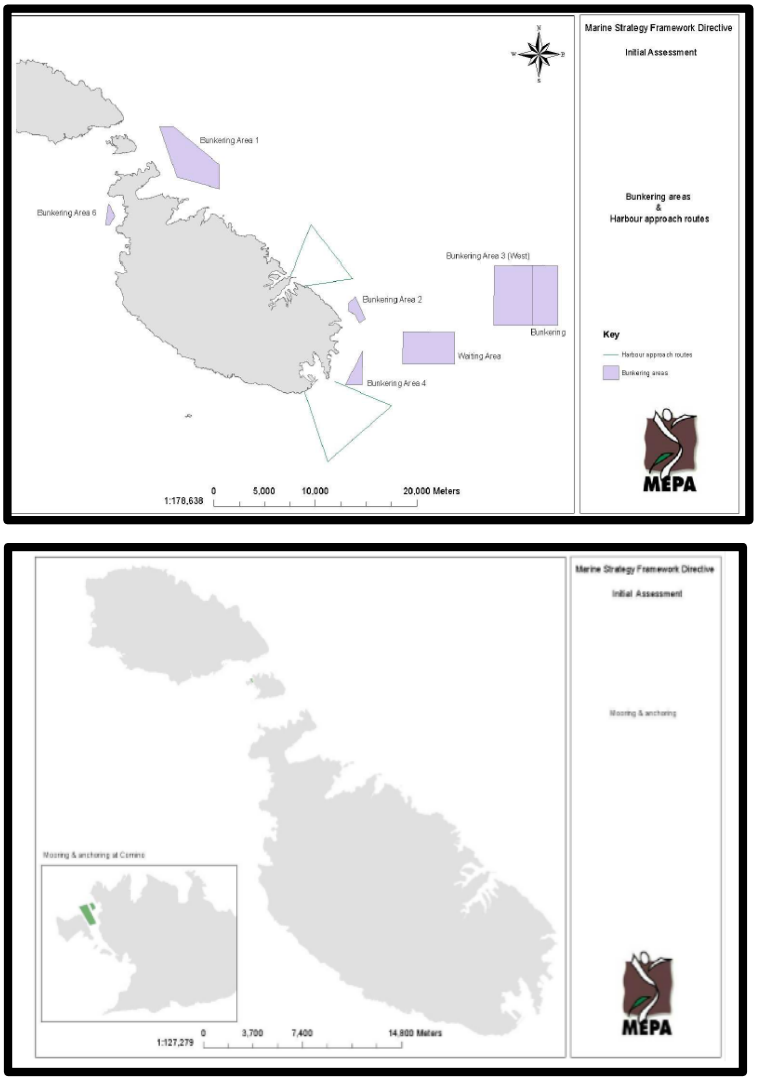


Figure 76,77 Identified bunkering (left) and anchorage (right) areas in Maltese waters.

The Grand Harbour area in Malta has historically been developed for maritime trade, ship building and together with other coastal areas for naval defence for centuries. In general, the activities identified as threat source in Malta include aquaculture, cables and pipelines, coastal and maritime tourism, coastal defence work, dredging, dumping area for inert material, LNGs, maritime transport, oil and gas research and trawling.

Among these, the main activities that take place in nearby areas of Maltese waters and can affect sea floor integrity are maritime transport and fisheries, carried out by vessels not registered in Malta. Here, marine data have always been focused on coastal waters with very limited information obtained on offshore areas and current estate of integrity of the seabed. However, such data are currently being collated through EU funded projects. Alteration of hydrographical conditions was found in correspondence of the main artificial structures along the coast in relation to port and harbour development with the creation of jetties, pontoons and breakwaters which are present within the main harbours (Grand Harbour, Marsamxett

Harbour and Marsaxlokk Harbour on mainland Malta, Mgarr Harbour in Gozo, as well as the fishing harbours on both Malta and Gozo). Interventions related to tourism and recreation, relate to the creation of permanent sunbathing platforms, beach replenishment and creation and yacht marina developments, the latter all located within existing ports and harbours.

Historical underwater wrecks and artefacts of cultural heritage are present along the coast within proximity of the main bays and harbours, with additional wrecks being placed underwater in a number of coastal areas for diving/recreational purposes in 6 areas along the coast. Offshore structures within Malta's marine waters are related to aquaculture.

Thermal effluents in Malta are mainly associated with the operation of the power stations at Marsa (within Grand Harbour) and Delimara (within Marsaxlokk harbour). The Marsa Power Station has since been decommissioned. Cooling waters from the Delimara power station are discharged into a bay known as il-Ħofra iż-Żgħira on the eastern side of the Delimara peninsula. In 2003 waters at this site were found to be at 5.4°C and 5.5°C above ambient temperature up to 25-50 m away from discharge points. Reduced oxygen levels, high levels of chlorophyll and occasional water turbidity were also recorded.

Brine discharges in Malta are mainly associated with the operation of the three desalination plants. Brine is also discharged from tourist resorts. The effects of brine discharges on hydrological processes have not been assessed at a local scale. Nevertheless, the main brine discharges from desalination plants are localised and can be considered to be of low significance.

Review of aerial imagery and ad hoc cases suggest that erosion is visible where human intervention occurred in the form of development or incompatible activities. There are no long-term studies, neither on marine acidity nor on coastal erosion in Malta.

iii. Substances, litter and energy (i.e. input of nutrient, organic matter, litter, sound or other forms of energy) - Relevant qualitative descriptors to consider (5), (8), (9), (10) and (11).

Substances like nutrients and pollutants enter into the sea from several sources. Among the land sources, direct discharges (from wastewater treatment plants or all kind of industries) and riverine inputs can be found. In areas where agriculture is an important economic sector, nutrients can reach the sea due to runoff. Aquaculture or dumping of dredged material may be also sources of pollution but, in general, they are not as important as the previous ones. Atmospheric deposition also contributes to the entrance of nutrients and heavy metals to the sea. Oil or chemical spills are not very frequent, but they have to be also considered in case of accidents.

Regarding litter, the land sources that have been identified are coastal towns, ports, bathing areas, landfills of urban solid waste and rivers while when considering the marine sources, it is important to point out that it comes mainly from fishing and navigation activities. In both cases, the litter can be produced by the crew (lost or thrown overboard), and in the case of fishing, it can also come from abandoned gears, causing what is known as "ghost fishing". For noise, commercial and recreational navigation, research activity using seismic methods, and dredging and dumping of material are the main sources to be taken into account. The spatial location of hotspots of substances, litter and energy input in the Levantino Balear region is shown in the maps of Figure 78,79,80,81,82.

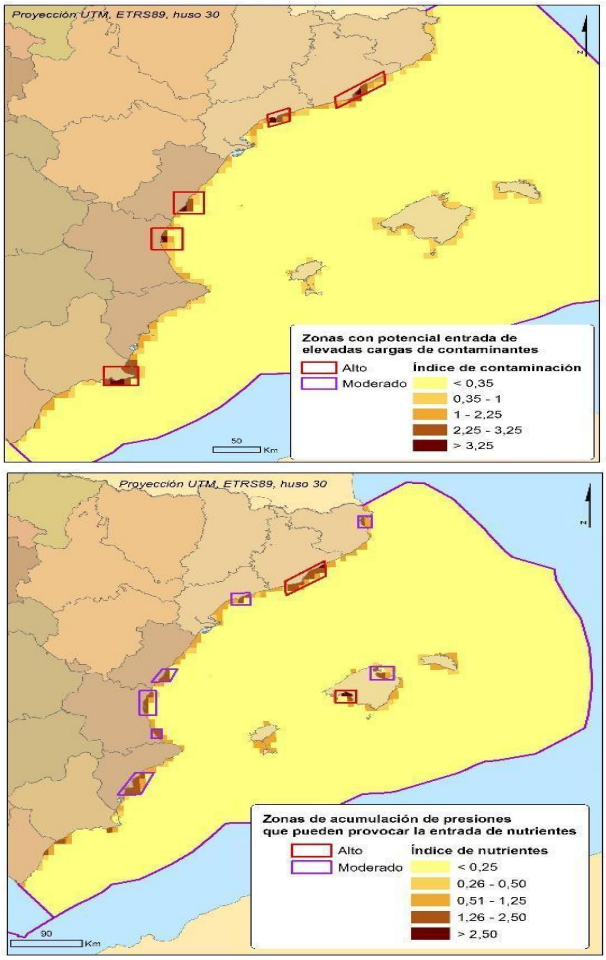


Figure 78,79 Areas of accumulation of potential inputs of contaminants (left) and nutrients (right) in Spain.

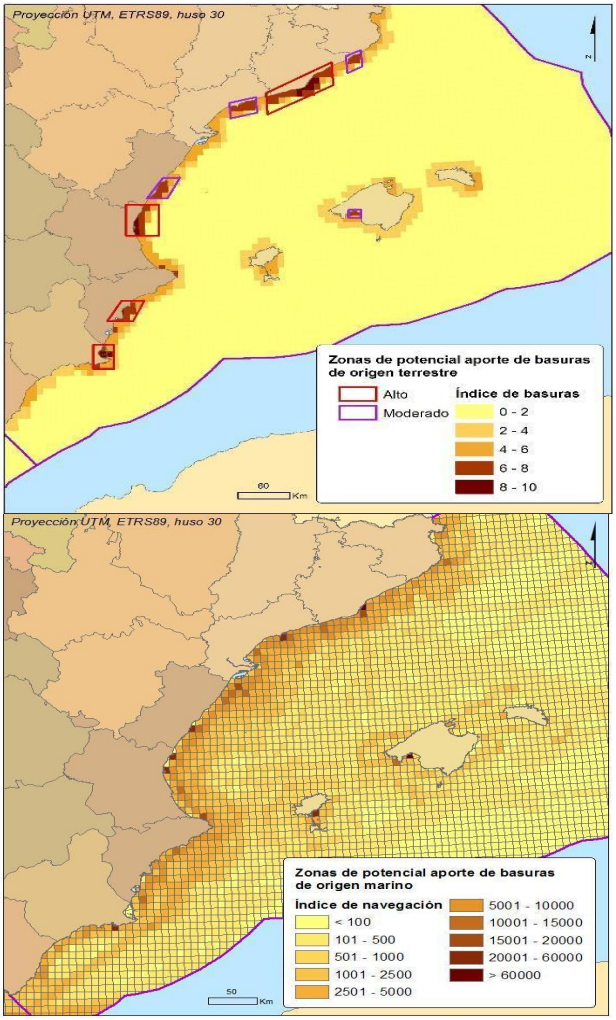


Figure 80,81 Areas of potential input of marine litter from land-based (left) or marine-based (right) sources in Spain.

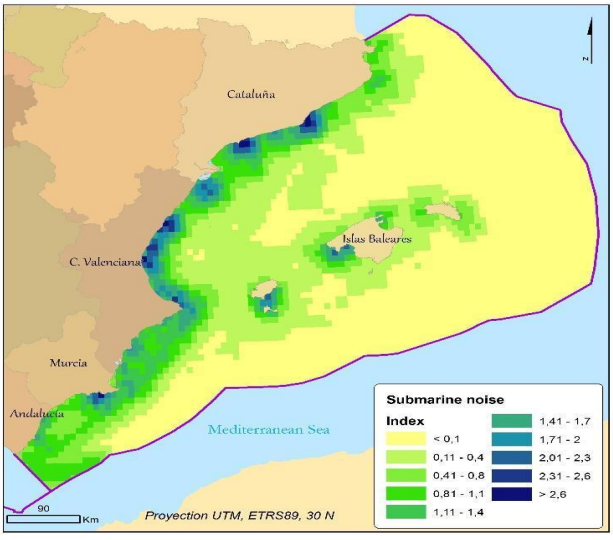


Figure 82 Submarine noise index in Spain.

For the Levantino Balear region, the activities and its location can be identified but the exact magnitude of the pressure is usually unknown for some of the activities, most of them concerning litter and noise introduction, but also for input of substances. For example, for direct discharges, what it is usually known is the maximum authorized mass of a pollutant that a company can discharge, but not the real quantity it discharged in a period of time. Also, the precise location of the outfall is usually unknown. These gaps should be filled through the implementation of the monitoring programs of the Spanish Marine Strategy, in order to obtain a more realistic image of the pressures that affect the marine environment.

The French Mediterranean sub-region is not currently encountering any significant eutrophication problem. Only the Languedoc-Roussillon coastal area (from Sète to Espiguette Point) has a greater than normal frequency of phytoplankton blooms (DCE data). The Rhone, the main Mediterranean river, plays a key role with an annual inflow estimated at one third of the total quantity received by Mediterranean surface waters, taking into account atmospheric inflows and winter mixing of the water column. Coastal and nearshore waters are subject to inflows via outlets and the impact of industrial and port activities, factors which can lead to high local enrichments in nutrients. Around the Rhone river plume there is the main significant area in the Western Mediterranean of nutrient input, its westerly drift, in the Gulf of Lion, and around Marseille (Zone 9, Figure 83). 8 hotspots for specific risks have been identified via the work of monitoring networks: 5 for the Languedoc Roussillon/PACA regions: Port La Nouvelle, Port Saint Louis, Fos-Marseille, Argens and Nice, and 3 in Corsica: Canari, Bonifacio and Porto Vecchio (Figure 83).

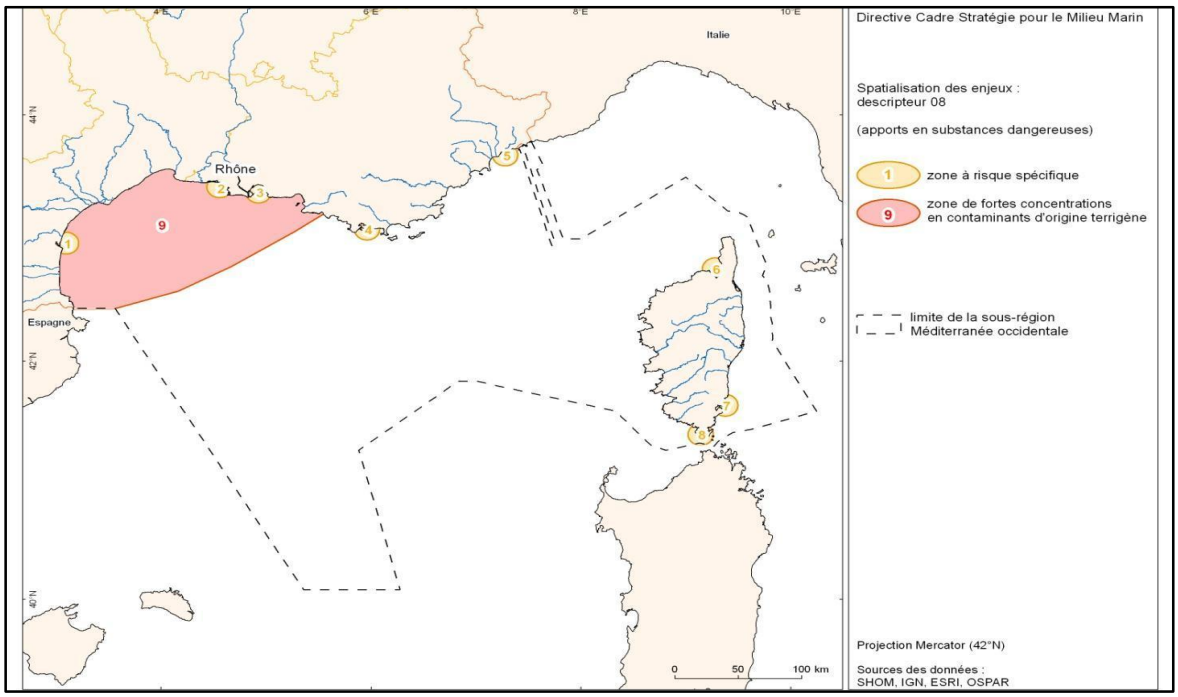


Figure 83 Inputs of contaminants in French waters.

Marine litter is divided into 5 categories: litter on beaches, floating litter, litter on the seabed, micro plastics and ingested litter. There is consistent lack of data and knowledge gaps regarding processes related to ingested litter in marine fauna within the French waters.

Two main sources of litter inflows are cross-border transport in the Mediterranean via the Ligure and Liguro-Provencal currents and similar, and river inflows. More sporadically, the major coastal industrial areas also produce significant inflows.

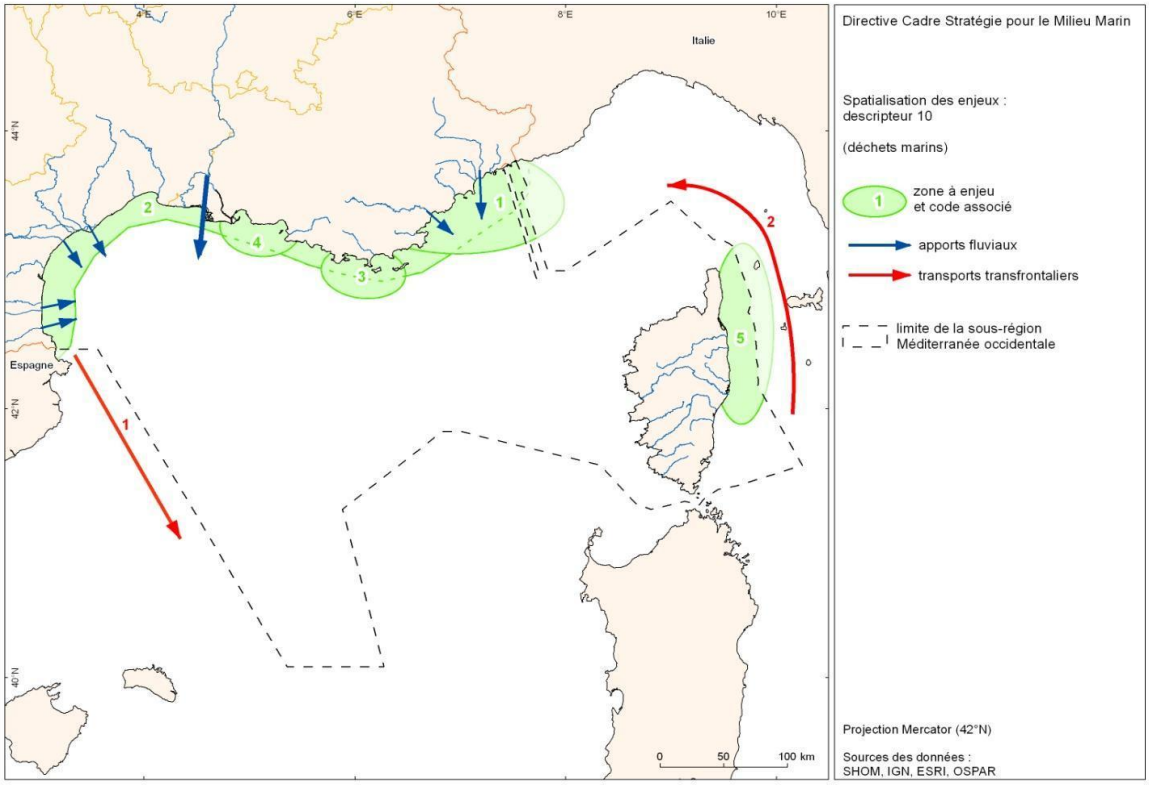


Figure 84 Distribution of marine litter in French waters.

In contrast to Atlantic regions, the French Mediterranean has litter in shallow areas across the whole coastline (Zone 2, Figure 84). This specificity is due to the lack of major tides, which clean the shallow areas in Atlantic regions.

The Côte d'Azur (Zone 1, Figure 84) has heavy accumulation of litter on beaches from tourist activities, along with floating waste from North Africa, transported by the Ligure current (Arrow 2, Figure 83), which continues as the Ligura-Provencal current to reach Spain and turn back South (Arrow 1, Figure 84).

The deep-sea areas opposite to the major cities of Marseille (Zone 4, Figure 84), Toulon (Zone 3, Figure 84) and Nice (Zone 1, Figure 84), along with the trench to the east of Corsica (Zone 5, Figure 84), are also characterised by the presence of litter.

Litter on the seabed in shallow and deep-sea areas results from inflows from one major river, the Rhone, and from small coastal rivers such as the Tet, Tech, Aude, Hérault, Argens and Var.

Industrial microplastics are concentrated around the Fos/Marseille area (Zone 4, Figure 84).

Regarding the hotspots of underwater noise in French Mediterranean waters these were determined by comparing noise pressure areas with the distribution of marine mammals, which are the main ecosystem component affected by this pressure.

Three types of noise pressure were considered: maritime traffic (shipping, ferries and fishing), high-intensity acoustic emissions (sonar), and coastal or offshore work and sites

(aggregate extraction, construction of coastal or offshore infrastructure, such as port development or wind turbines).

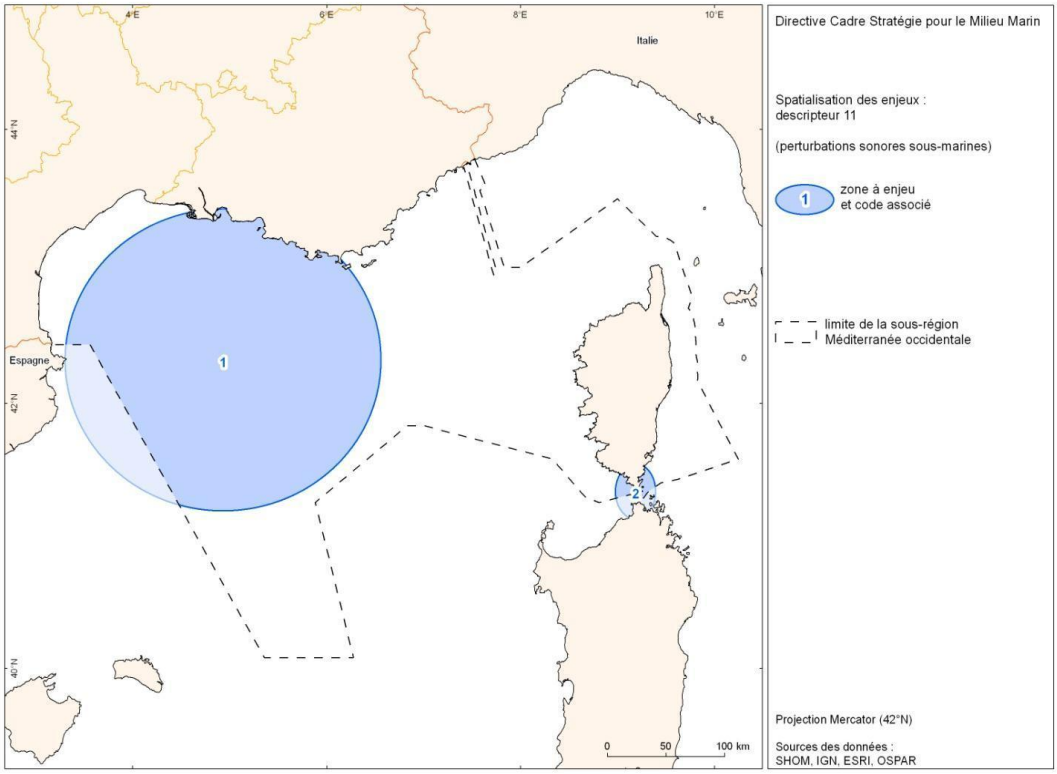


Figure 85 Distribution of underwater noise in French waters.

Pressure from maritime traffic and acoustic experiments mainly occurs in the centre of the French sub-region, covering the slope and coastal areas around Toulon and Marseille (Zone 1, Figure 85). Maritime traffic also represents a significant pressure around the Bonifacio Strait (Zone 2, Figure 85). These areas host fin whales, large coastal dolphins and deep-diving species. It is important to note that maritime traffic in Mediterranean French waters is subject to significant season variability largely due to ferry traffic. This variability has not yet been modelled and data is still lacking for many routes. Consequently, it is highly likely that this pressure is currently underestimated.

In the Northern Tyrrhenian Sea and the Ligurian Sea the area is characterized by oligotrophic and punctual eutrophic zones, due to the presence of outlets of major rivers (e.g. Arno, Magra, Ombrone). The whole coastline is affected both by tourism and industrial activities. In Central Tyrrhenian Sea, the features of the area are characterized by locally eutrophic zones, due to the presence of the outlet of a major river, the Tevere. The whole coast is affected by tourist activity, urban settlements and industrial activity. The Southern Tyrrhenian Sea area is characterized by heavily populated coasts (e.g. metropolitan area of Naples) and by the presence of major industrial pollution sources (e.g. Samo River outlet). At the same time

various situations of oligotrophy (the Sorrento Peninsula, the islands of the Naples Gulf, Capri and Ischia, etc.) make this area especially indicative and vulnerable to the eutrophication risks. In the waters surrounding Sardinia Island there are general oligotrophic conditions, but locally critical situations can be found, due to the presence of the outlets of major lagoons (e.g. Oristano - Stagno di Cabras) or of major urban and industrial settlements (e.g. Cagliari Gulf). The whole coast of Sardinia presents a high tourism activity during the summer months.

For the Italian waters, there are several aspects that need further study to understand the conditions related to nutrient and organic matter enrichment. There is insufficient information on loads input of nitrogen (N) and phosphorus (P), which should be integrated with the aim of defining functional relationships between N and P loads, their seasonal variations and the corresponding concentrations in seawater. There are knowledge gaps on nutrient concentration on the offshore waters. In fact, the N and P concentration data beyond the limit of 3 km from the shore are currently obtained by simulation modelling (MYOCEAN), and should be verified by adequate monitoring campaigns, in the next years. Further, adequate information on the loads of organic matter discharged into the sea should be further explored.

In order to assess marine litter concentrations in the water column for the North Central Tyrrhenian Sea, Sardinia and the Southern Tyrrhenian Sea, some studies have been carried out, still data are not considered sufficient and it appears clear the need to realize a wide monitoring plan following a specific standard protocol to collect and quantify microplastic in marine environment. Information on the concentration of litter on the shore of these marine areas is sparse and it was collected mainly through clean up campaigns not following a systematic manner, consequently so far available data are not useful to assess the general trend of marine litter abundance on the shore.

The presence of marine litter on the sea bottom of the North Central Tyrrhenian Sea have been found to be diffused from the coastal area to 800 m depth (mean waste abundance of 6,15 kg/km^2) with concentration hotspots and a clear influence on the amount of waste abundance related to the ship courses or also near the coast where frequency of recreational boats is higher. In Sardinia and the Southern Tyrrhenian Sea the same campaigns (GRUND and MEDITS) have been carried out yet the collected data still need to be analysed.

In general terms data, available on marine litter in the Italian Western Mediterranean are not sufficient to describe the status and distribution of this impact. Future related studies should address priority topics such as monitoring microplastics on sea surface, effects of plastics on benthic species, ingestion and uptake of plastic by fishes, crustaceans, sea turtles, marine mammals and seabirds.

Overall, for the entire Western Mediterranean Italian waters there are very few data on contamination by hazardous substances, no sea-based sources of anthropogenic radionuclides are known at present and few potential input sources of Naturally Occurring Radioactive Materials (NORM) from phosphogypsum disposal and aluminium industry are present but not yet quantified.

There is presence of continuous and impulsive underwater noise, however at present it is not possible to carry out an initial assessment due to lack of data. It will become possible once the necessary monitoring campaigns will be carried out in strategic sampling stations and for the required length of time in order to give trends.

For Malta islands land based and offshore sources of nutrients into marine waters (including fish farms) have been mapped (Figure 86). Following enforcement action in 2016, the tuna cages along the southern coast, considering one of the nutrient sources, have been relocated to the offshore aquaculture zone whilst the tuna cages in the north have been moved offshore only temporarily.

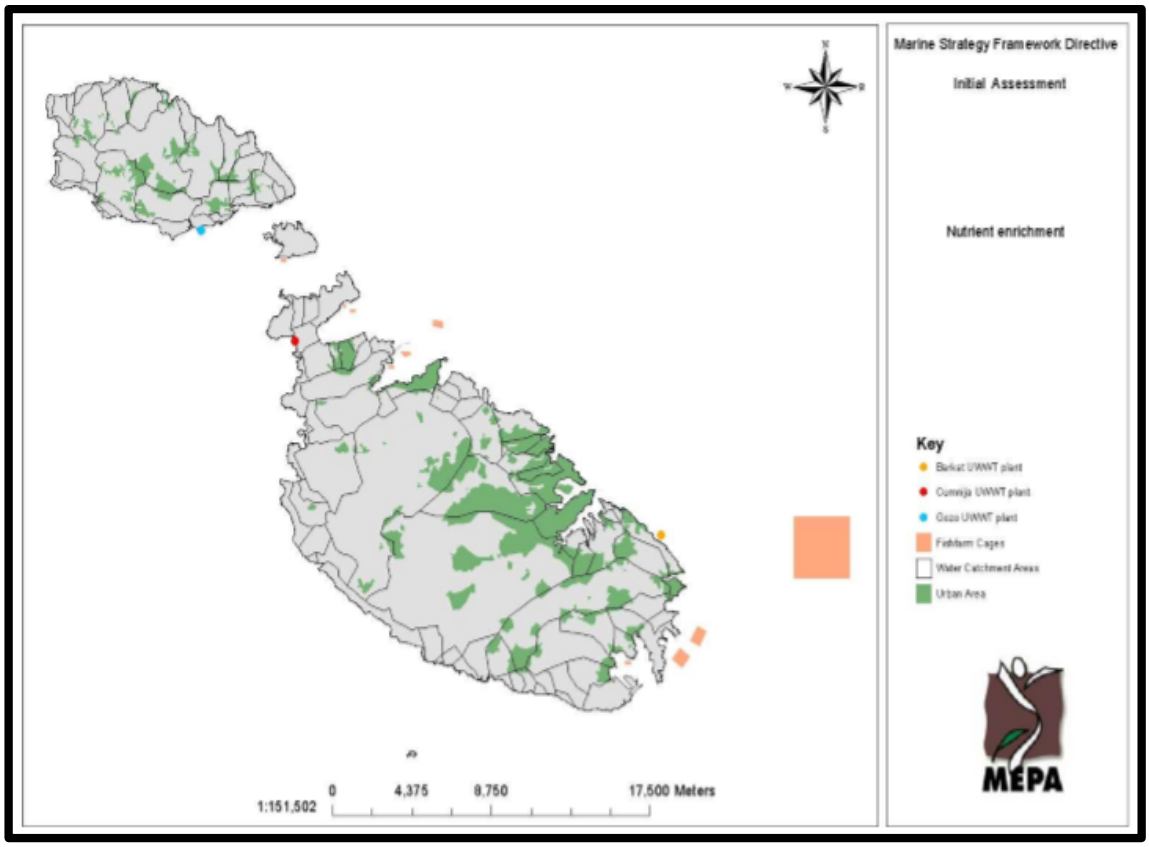


Figure 86 Land based and offshore sources of nutrients into marine waters in Malta.

The occurrence of red tides consequent to human induced eutrophication in Malta was documented in 1969 and 1977. The former event attributes the blooms to the dinoflagellate

Plectodinium nucleovolvatum. Based on a 5-year survey of Marsamxett Harbour, it was recorded that blooms occurred usually in May and, less frequently, also during June – August. Causative organisms included the diatom *Chaetoceros sp.,* and the dinoflagellate genera *Prorocentrum*, *Peridinium, Ptychodiscus, Gonyaulax, Ceratium* and *Cochlodinium*. More recent reports of harmful algal blooms in Malta were documented in 2001 and 2004. Samples were taken from the six fixed stations in the Marsamxett and Grand Harbour areas and showed a high proportion of toxic and harmful phytoplankton species in all locations, with higher percentage relative abundances in Marsamxett than in the Grand Harbour. These studies conclude that probable causative organisms for future algal blooms in the areas investigated would be *C. furca, Prorocentrum* sp. or *Dinophysis* sp. for summer blooms, and *Pseudonitzschia* sp. for winter blooms.

Nutrient and organic enrichment in Malta has being mainly associated with sewage outfalls and overflows, port operations and agricultural runoff. The current infrastructural capability for sewage treatment in Malta consists solely in treated effluent being discharged at sea while there are no natural rivers in the Maltese Islands.

For Malta area in general, there is lack of long term data on nutrient enrichment and very little data in relation to some of the direct and indirect effects of this environmental issue.

The main sources of hazardous substances identified in Malta are point sources that generate chemical pollution such as discharges arising from land and sea-based activities. These include electricity generation, aquaculture, desalination plants, sewage treatment, hotels, oil and fuel terminals and shipyards. Known pollution events in Malta's marine waters include medium and small-scale spills and bilge discharges.

The majority of industrial installations with direct discharges to the marine environment are located in harbour areas. Such installations include oil storage and treatment facilities (oil and fuel supply terminals), as well as the power station in Delimara.

For Maltese waters the most recent measurements of concentration of contaminants (both organic and inorganic) in the water column were made within the framework of the EU Water Framework Directive. The results of the first monitoring year indicate exceedances for non-synthetics mercury, lead, nickel and Polycyclic Aromatic Hydrocarbons (PAHs) in the water column. They also showed no exceedances for synthetic compounds. The results should be interpreted with caution since any exceedances are one-off exceedances recorded during the period between June and November 2012 (including replicate sampling) rather than annual averages as stipulated by the Priority Substances Directive. Such exceedances do not necessarily represent a pollution problem in Malta, and long-term data is necessary for an adequate assessment of background concentrations and interpretation of the status of the water column in Malta in terms of contaminants.

While interpretation of the results in the absence of long-term monitoring is not advisable, the reported exceedances for mercury, lead and nickel, seem to corroborate with past data (specifically that collected in 2004) indicating presence of detectable concentrations of mercury and lead in the water column.

Harbour areas, specifically Marsamxett and Grand Harbour and the Freeport area in Marsaxlokk show consistent exceedances in metal concentrations in sediments throughout the years, with the exception of concentrations of chromium and nickel in 2006, for which no exceedances were recorded for all sampling stations. Although this data should once again be interpreted with caution in view of the potential variations in the methodologies used, it indicates that harbour areas are particularly susceptible to input of contaminants. It could however be suggested that the presence of tin in harbour sediments may be due to persistent sources, yet whose specific origin remains undefined.

Levels of mercury (non-synthetic) and hexachlorobenzene and hexachlorobutadiene (synthetics) were assessed in *Posidonia oceanica.* Concentrations of hexachlorobenzene and hexachlorobutadiene were in all cases below detection limits, while concentrations of mercury were in the range of 0.0025-0.017 mg per kg, wet weight). There are no evident spatial patterns with respect to concentrations of mercury in *Posidonia oceanica*, and further trend data would be necessary in order to be able to derive any conclusions. On the other hand, this data seems to imply that higher concentrations are within enclosed bays which are presumably subject to significant boating activities, areas which are currently subject to discharge of treated sewage effluents and harbour areas (such as Freeport area). However, this inference would need to be confirmed. The analysis of petroleum hydrocarbons in sediment *s*tations within the Grand Harbour and Marsamxett always exhibited values greater than 10 µg CE/g DW, with the Grand Harbour showing the highest recorded levels exceeding 500 µg CE/g DW in summer 2001. When compared to 1987-1993 data, the present analysis has shown that in general, for most stations being monitored, there has not been any dramatic increase in the levels of oil pollution.

Generally, the lack of data prevents trend analysis in the spatial distribution and intensity inputs of contaminants from pollution events in Malta.

The main sources of hazardous substances outside Malta's marine waters pertain to shipping. While discharges of bilges by certain vessels are allowed under specific conditions, it is considered likely that the majority of detected spills are in fact illegal, given the scale of the spills. The marine waters around the Maltese Islands are one of the areas in the Mediterranean where such spills/discharges are most intense (Figure 87). No information on the quantified spatial extent of such pollution events was provided.

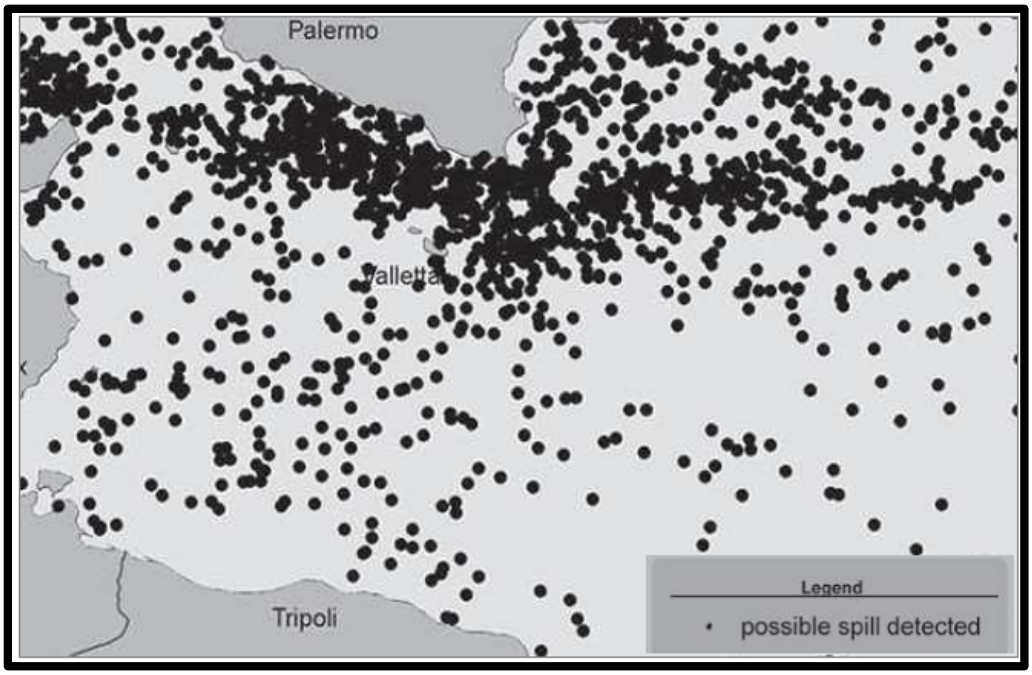


Figure 87 Possible oil spills detected in the Mediterranean.

Although the individual events of illegal discharge may not be considered as significant pollution events, the cumulative effect could be very significant in terms of pressure on the marine environment.

Land based sources in Malta encompass a wide spectrum of activities including industrial and agricultural activities through surface runoff. In this area storm water runoff within urban catchments is generally associated with the transport of debris, litter traces of oil and sewage as well as particulate matter, (such as soot from vehicular and industrial activities) to the water environment. Agriculture, through an excessive use of fertilisers and pesticides, and animal husbandry activities from the mismanagement of wastes, may also lead to the dispersion of fertilisers, pesticides and nutrients into the marine environment through water run-off.

Sea based sources in Malta relate to maritime transport (accidents, illegal discharge of ballast waters, operational and minor losses of fuel and diesel oils from small water craft) and dredging. However, data for Maltese waters on input loads from maritime transport related activities and on the type and quantities of contaminants released through dredging is not available.

Atmospheric inputs from road transport and other sources of fuel combustion have not been assessed.

Levels of contamination in fish and seafood for human consumption in Malta were also examined. Lead and cadmium, were at levels below the maximum permissible limits in the European food contaminants legislation for fish and cephalopods. There were a few occasions

where mercury exceeded the permissible levels stipulated by EC 1881/06 (1mg/kg wet weight) in muscle meat of sampled fresh dogfish, chilled tuna and fresh and frozen swordfish.

In 2007 and 2008, the Fisheries Department investigated the presence of heavy metals (lead, cadmium, mercury, arsenic), polyaromatic hydrocarbons, organochlorine compounds and medicinal active compounds in fish muscle from farmed and wild fish. Such studies reported negligible concentrations of these substances in fish muscle.

Knowledge on the effects of contaminants in biota or ecosystems is very limited for Malta. Research efforts to date have focused on the effects of tributyltin on marine gastropods in relation to the occurrence of 'imposex', that is the imposition of male sexual characteristics on female marine gastropods. Such contaminants (mainly released from antifouling paint) and their correlated effects on gastropods have been found to be higher in the harbour areas and other sites subject to boating and/or shipping activities. Most recent studies observed a decline in the intensity of imposex probably as a consequence of reduced contamination.

Marine litter presence in Malta was monitored and analysed through one-off studies along the shores and beaches where it was found the majority of marine litter items to be composed of plastic, wood, paper and metal. Observations of floating litter are undertaken as part of the monitoring regime for Blue Flag beaches. Such monitoring is carried out throughout the bathing season (between 15 June and 30 September).

The most comprehensive study on litter deposited on the seafloor in Maltese circalittoral waters has been recently published in 2013. The most abundant type of litter was plastic (47%), followed by metal (13%) and glass (13%), with the majority of plastic items being plastic bags, plastic/polystyrene pieces and beverage containers. Source identification of litter observed was not successful. Litter items recorded during this study included limestone slabs, which could be attributed to the use of Fish Aggregating Devices (FADs) targeting the dolphinfish (*Coryphaena hippurus*).

The main causes of shore litter originate from land-based activities in the Maltese Islands. This conforms to the conclusions drawn by MEDPOL's 'Assessment of status of marine litter in the Mediterranean', that most of the Mediterranean marine litter is from land-based sources, rather than ships. As indicated, the shoreline studies undertaken were mainly on popular bathing areas along both the northwest and north-east coast.

In Malta data gaps for all types of marine litter addressed by the MSFD criteria and indicators are significant, particularly in relation to sources. No data is available with respect to microplastics. Furthermore, no trend data is available, and there is no indication of whether litter in the marine environment is increasing, decreasing or has remained stable throughout the past years. The results of initiatives undertaken to date (such as the tax on plastic bags) are still unrevealed.

The main input source of underwater noise generation in Malta is considered to be the marine traffic, and key sources pertain to cargo vessels, cruise liners and to a certain extent fishing vessel within Malta's marine waters, also with potential additional sources from such activities outside the area of competence.

Currently there is no available information with respect to any potential increased level of underwater noise in the Maltese marine environment. Still underwater noise constitutes a relatively new environmental field, for which data are particularly limited.

6. LAND-SEA INTERACTIONS (AREA-BASED) – HOTSPOTS, GENERAL DESCRIPTION, GEOGRAPHICAL SCALE

6.1 INTERACTIONS DUE TO NATURAL PROCESSES

Natural processes which effects are interdependent between land and sea can alter the equilibrium of marine and terrestrial areas. In many cases, their negative effects are enhanced by anthropogenic interventions and impacts, which alter the environmental stability and decrease the resiliency of the natural systems.

6.1.1 Coastal erosion - Sea-Land

Coastal erosion can generate impacts both on the marine and coastal environment and on human activities. Alteration of the marine environment such as construction of coastal infrastructures which act as barrier to sedimentary process, or deterioration of biogenic habitat (e.g. seagrasses) which enhance the deposition of calcareous sediments, are among the main causes of increased loss of sediments on the coastline and consequent coastal erosion. A threat to coastal erosion at global scale is represented by sea level rise, which can drastically change the sedimentary processes.

Land based interventions such as alteration of river input are also potential drivers of coastal erosion.

The impacts of coastal erosion on natural resources and ecosystem services are represented by the loss of habitats, with consequent environmental fragmentation, and loss of biodiversity, as well as of landscaping and environmental heritage.

The impact on human activities is mainly on tourism development but it can also affect fishery, transport infrastructure and physical restructuring of coastline.

On the Spanish coast shore retreat and flooding are risks that have commonly been associated to coastal erosion. In the Mediterranean coast of Spain, such risks are induced by sedimentary deficit due to river regulation or retention by structures like ports, intense storm surges, over wash, and rising sea levels.

Since this area is highly populated by locals and is a major destiny for tourists, these risks have a major socio-economic impact, being damage to property and destruction of coastal infrastructures the most important ones. Therefore, protection in areas with major erosion problems is fundamental for the management of the coastal zone, especially in areas with a high level of occupation. For the Mediterranean coast of France there was no available

information on coastal erosion. In Italy studies conducted at National scale highlight that between 1950 and 1999 the coastal zones subjected to erosion events (1170 km) are more abundant with respect to those that are advancing. Data collected from 2000 to 2007 confirmed this trend with eroded coastal zones (895 km) more abundant than those in advancement (849 km). From 1999 to 2007, 600.000 m^2 of beaches have been lost. Despite the numerous human protection actions to stabilize the coastline there are several erosion phenomena along the Italian coast. Italian coasts are in continuous evolution and data indicate that there is relevant coastal zone that are subjected to a strong backwardness due to erosion events. Coastal defence from erosion in Italy is regulated by several directives and laws that origin from different levels of governance. At the international level the ICZM Barcelona Convention Art.23 Coastal erosion, the Protocol on Integrated Coastal Zone Management in the Mediterranean to the Convention for the Protection of the Marine Environment and the Coastal Region of the Mediterranean (2010/631/EU), the Directive 2007/60/EC on the assessment and management of flood risks. At National level the Italian law identifies the Region as competent authority in terms of protection of the coastal zone with Law n. 179 of 2002. The Art. 109 d.lgs. 152/2006 declares Regions competent authorities in terms of control and evaluation of coastal activities that are established to contrast the coastal erosion as well as all the activities for coastal protection. See "Linee Guida Nazionali per la difesa della costa dai fenomeni di erosione e dagli effetti dei cambiamenti climatici" (2016) established by Ministry of the Environment MATTM with the technical coordination of ISPRA and the Tavolo Nazionale per l'Erosione Costiera (TNEC; National Table for Coastal Erosion) established in 2016 in line with the Memorandum of Understanding signed by the Italian coastal regions and the Ministry of Environment.

In relation to coastal erosion in the Italian coast there are no updated data and there are difficulties on identifying specific priority locations due to the large-scale process.

In Malta, no long-term studies on coastal erosion are available. However, review of aerial imagery and ad hoc cases suggest that erosion is visible where human intervention occurred in the form of development or incompatible activities.

6.1.2 Flooding events – Land-Sea / Sea-Land

Flooding events due to strong storms as well as to river floods lead to flow of water rich of urban material fragments and waste, sludge and alluvial debris, toxic substances and materials that are discharged in the sea thus impacting the interested coastal areas and the marine environment.

It also negatively impacts on activities related to coastal tourism and beach-based activities, fishery, transport infrastructure and physical restructuring of coastline.

Information on flooding events on the Mediterranean coastal area was available only for the Italian territory. Along the Tyrrhenian coast of Italy one strong seaquake was registered in 2002 due to the landslide of Sciara del Fuoco of Stromboli, which affected Eolie Islands, Northern Sicily, Tyrrhenian Calabria and Southern Campania. Other georeferenced catastrophic flooding events verified from 2013 to 2015 in coastal Tyrrhenian zones. The Department of Civil Protection in line with point 8 of DPCM 49/2015 created a web platform with access reserved to Regions, Autonomous Provinces and Basin Authorities, called FloodCAT that corresponds to a Catalogue of Flooding Events with information related to the spatio-temporal localization of past flooding events. Flooding events in Italy are managed in line with the Water Framework Directive 2000/60/CE and the Directive 2007/60/CE on the assessment and management of flood risks that leaded to the establishment of the Italian D.Lgs. 49/2010. Thanks to this law a Management Plan of Flood Risk (PGRA) for each hydrographic district was established with the aim of manage the protection activities in more significant risky areas and define the security objectives and the priorities of intervention at district scale. At the national level the PGRA is coordinated by the Department of Civil Protection (DPCN) and by the Ministry of the Environment (MATTM) through the collaboration of the Higher Institute for Environmental Protection and Research (ISPRA). The PGRA has to consider all the management aspects such as prevention, protection, preparation, restoration and monitoring after the flooding event keep in mind the characteristic of the interested basins (Guidance Document n. 29 – "Guidance for Reporting under the Floods Directive (2007/60/EC)" of EU Commission). The competent authorities identified for the preliminary evaluations, the elaboration of the maps of risk and the redaction of the management plans are the District Basin Authorities, bodies that are constituted by both country and regions. The Regions together with the Department of Civil Protection establish the Management Plans for the hydrographic district of reference related to the national and regional alarm system for civil protection. One data gap for Italy is the lack of updated data on flooding events.

6.1.3 Landslides – Land-Sea / Sea-Land

Landslides determine the movement of a mass of rock, earth or debris down a slope, they can originate both on land and underwater. The main impacts generated by landslide events on natural resources and ecosystem services are the loss of habitats, with consequent

environmental fragmentation, and loss of biodiversity, as well as of landscaping and environmental heritage.

The impact of landslide events on human activities is mainly on tourism development but it can also affect fishery, transport infrastructure and physical restructuring of coastline. In exceptional cases, landslides on the coastal areas, which cause the fall of material into the water, can generate tsunami (e.g. Stromboli tsunami of 2002).

Information on landslides in the Western Mediterranean Sea was available only for the Italian region. The Inventory of Landslide events in Italy (IFFI Project) created by ISPRA and Regions and Autonomous Regions records all the landslide events occurred in Italy and is the most complete and detailed database in the Country (http://www.progettoiffi.isprambiente.it). Along the Tyrrhenian coast landslide events that have to be remembered occurred in 2002 in Stromboli (Sicily), 2008 in Messina (Sicily), 2014 in Joppolo and Bagnara Calabra (Calabria).

The areas at risk of landslide are included within the Plans for the Hydrologic Assessment (PAI), which include both the areas where landslide events have already happened and areas potentially subjected to such events. The PAI are established by the Basin Authorities, the Regions and the Autonomous Provinces, in line with law L. 183/89, D.L. 180/98 and D.Lgs. 152/06. No knowledge gaps were identified on this issue for the Italian territory.

6.1.4 Seismic events – Land-Sea / Sea-Land

Seismic events can propagate both from land to sea and from sea to land depending whether the epicentre is found on land or on the sea bottom. In general, they can have strong impacts on the coast and a single event can affect both the marine and the terrestrial areas. Such events impact the environment mainly provoking habitat loss, with consequent environmental fragmentation, and loss of biodiversity, as well as landscaping and environmental heritage loss. The impact on human activities is mainly on tourism development but it can also affect transport infrastructure and physical restructuring of coastline.

In Spain, a sea-based intervention severely damaged by a seismic event was the project Castor which consisted on the construction of an artificial natural gas reservoir located off the coast of Castellón and Tarragona but was paralyzed by the emergence of seismicity in its implementation.

Only four events of a magnitude > 0 are recorder in the Balearic Promontory east of Ibiza. One of them is located on Mallorca Channel (Acosta et al., 2004).

Through the slope of the French continental shelf numerous canyons are found. In the Gulf of the Lion, they particularly cut the continental shelf.

The deepest seabed areas reach between 2000 and 3000 m and show no significant irregularities. The dynamics of the seabed in this marine sub region are limited. However, many canyons in the slope - for example, the Var Canyon - can undergo morphological changes due to their slope instability context, contribution of sedimentary material and seismic risks. Italy is one of the Mediterranean countries more affected by seismic events for its nature and geographic localization. The highest seismicity is concentrated in the central-southern part of the Country, along the Apennine Ridge, in Calabria, Sicily and some northern areas, as Friuli, Veneto and western Liguria. Numerous seismic events have interested directly the Tyrrhenian Sea and Calabria, Sicily, Campania and Sardinia regions. The Italian Department of Civil Protection gives support to Regions in their planning activities toward minor local bodies, Provinces and Municipalities. There are the "National Plan for prevention of seismic risk" art.11 Law n. 77/2009 and the "National rescue programme for seismic risk" Directive 14 January 2014 that are in act. There was no available information on seismic events in Malta.

6.1.5 Saline intrusion - Sea-Land

Saline intrusion consists in the movement of marine saline water into freshwater aquifers with consequent processes of salinization of the soil, a process that can alter ecosystems and affects coastal organisms provoking habitat and biodiversity loss and community shift.

This phenomenon has a negative impact on freshwater resources and for this reason on all human activities, agriculture and tourism included.

Information on saline intrusion was available only for the Italian territory. Desertification and salinization phenomena in Italy affect five regions: Apulia, Basilicata, Calabria, Sicily and Sardinia, and in particular the territories of competence of the basin authority of Apulia (regional), Lucania (regional), Bradano (interregional), Sinni (interregional), Calabria (regional), Sicily (regional), Sardinia (regional). In 1999 the National Committee approved the "Guidelines of the National action plan for the fight against desertification" (DPCM 26.9.1997 GU n.43 of 21.2.1998). The areas interested by such phenomena in Sardinia are Palmas-S.Giovanni Suergius, San Priamo, Muravera-Villaputzu plain, Marina di Tertenia-Quirra, Oristano-Marefoghe-Arborea plain, Orosei Gulf and plain, Posada, Nurra plain, Porto Torres plain, mainly located along the South-East and North-West coasts of the region. In Sicily, the areas identified subjected to saline intrusion events are Palermo plain, Bagheria plain, Coastal plain of Marsala – Mazara del Vallo, Castelvetrano, Augusta-Priolo plain, Catania plain, Milazzo – Barcellona Pozzo di Gotto plain. Here, a Water Plan was established by SOGEDIS (Society of Geology and Land Protection) for Sicily Region to collect information and data to monitor the

quality of water. In Italy, the saline intrusion is a phenomenon strongly local and not yet supported by an exhaustive detection methodology and a national mapping.

6.1.6 Storms - Sea-Land

Heavy storms that occur infrequently tend to generate significant volumes of runoff. Debris accumulated along urban areas as well as nutrients from agricultural areas is transported to coastal waters. Heavy rains may also contribute to marine litter when land-based litter ends up in the marine environment. Marine litter is difficult to control and requires immediate action to ensure collection. The impacts of marine litter on marine life and on the chemical quality of the water environment are undesirable. Storm water run-off particularly downstream leads to socio-economic impacts where as a result of the volumes of waters damage to property including cars and inundation of basements in buildings were common outcomes of such events. At times, such events also led to loss of life. The impacts of marine litter on marine life and on the chemical quality of the water environment are considered to be aesthetically degrading.

In Malta given the topography of the territory which is characterized by a tilt where the coastal areas along the NE are low lying and the South west coast dominated by cliffs, the main drainage pattern often results in seasonal inundation occurs along the low lying coastal parts.

According to the second water catchment management plan prepared by Malta in response to the Water Framework Directive, storm water runoff within urban catchments is able to transport debris, litter, and traces of oil and sewage as well as particulate matter, such as soot from vehicular and industrial activities to the water environment. Input loads from diffuse land-based sources may ultimately end up leaching into Maltese fresh waters and coastal waters, potentially affecting water quality.

Second Water Catchment Management Plan in response to Directive 2000/60/EC of the European Parliament and of the Council establishes a framework for the Community action in the field of water policy. The Directive was transposed into Maltese Legislation through the Water Policy Framework Regulations under the Environment Protection Act.

Investment through EU funds allowed for the development of storm water related infrastructure to be developed to reduce the impacts of storm water runoff.

Data on storm water quality is limited to a few studies limited to individual catchments in the Maltese Islands. This data gap is considered to be a significant water management issue. A study carried out in 2010 to test storm water runoff quality from an urban catchment, focused

on general physic chemical parameters and a number of additional substances in several monitoring points within the major Msida-Birkirkara water catchment area. These were Total Dissolved Solids and electrical conductivity, pH, Total hardness, calcium, magnesium, chlorides, nitrates, sulphates, Total Organic Carbon, boron, sodium and potassium. The analysis indicated that the quality of storm water exhibits a higher concentration trend as one moves downstream, towards the end of the catchment, at Msida. The results also indicated that most of the water quality parameters increased in concentration after periods of dry weather due to the build-up of contaminants in roads and surrounding areas. For Spain, France and Italy no data related to this specific natural process were available.

6.2 INTERACTIONS DUE TO HUMAN ACTIVITIES

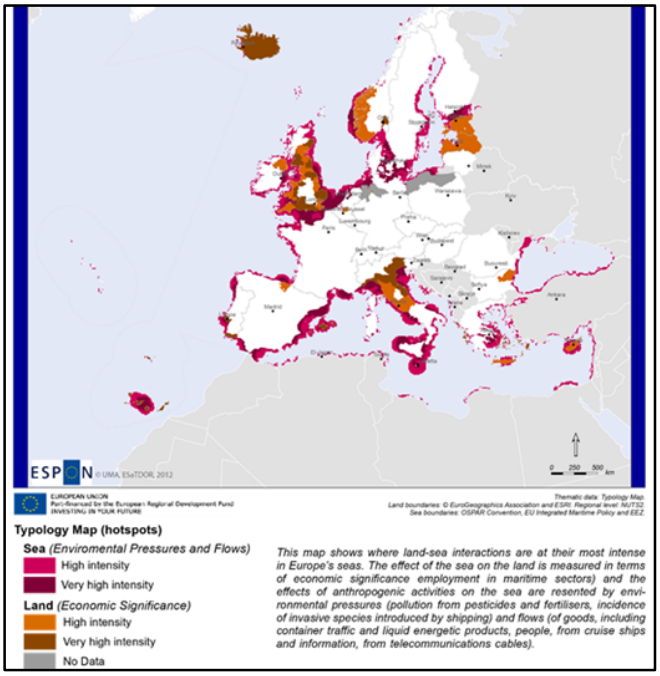


Figure 88. Map of the LSI "hot-spots" in Europe. Source: ESatDOR, 2012

Many maritime uses need support installations on land. Some uses existing mostly on land (e.g., tourism, recreation, ports) expand their activities to the sea as well. These interactions need to be understood, in order to assess their individual and cumulative impacts and potential conflicts and synergies. Generally, land-sea interactions can be measured in terms of: economic significance (employment in maritime sectors), environmental pressures effects of anthropogenic activities on the sea (pollution from pesticides and fertilisers, incidence of invasive species) and flows (goods, including container traffic and liquid energetic products, people, from cruise ships and information, from telecommunication cables).

For spatial allocation of the activities related to LSI refer to section "2.4 Major uses and activities" for hot spots of impact related to LSI refer to "3.1.1. Anthropogenic pressures on the marine environment". The above figure 88 provides an overview of LSI hotspots in Europe.

6.2.1 Human induced eutrophication - Land-Sea / Sea-Land

Substances like nutrients and pollutants enter into the sea from several sources. Among the land sources, direct discharges (from wastewater treatment plants or all kind of industries) and riverine inputs can be found. In areas where agriculture is an important economic sector, nutrients can reach the sea due to runoff. Aquaculture or dumping of dredged material may be also sources of nutrient increase but, in general, they are not as important as the previous ones. Atmospheric deposition also contributes to the entrance of nutrients and heavy metals to the sea.

Human induced eutrophication typically occurs in coastal waters exposed to nutrient input, especially in enclosed bays, lagoons and harbours where nutrients usually concentrate.

Eutrophication can cause proliferation of toxic phytoplankton (harmful algal blooms), anoxia (lack of dissolved oxygen in water) and consequent deterioration of bathing water quality and ecosystem health.

In Italy, different regulations and plans have been implemented to manage this issue. At national level, there is a Directive called "Programme toxic algae", n. GAB/2006/6741/B01 of 10/08/2006 (All.1) that calls for the monitoring of HABs along the Italian coasts and recognized the APAT (Agency for environmental protection and technical services), with the collaboration of IRSA-CNR (Research Institute on Waters of Research National Council), as responsible agency for such programme. In regard of the possible *Ostreopsis ovata* blooms the Italian Ministry of Health together with the Nation Health Council established the guidelines for the risk management in case of such algal blooms (24 May 2007). *Ostreopsis ovata* monitoring is carried out in line with Decree of 30 March 2008 (D. Lgs. 116/08 of bathing). In Basilicata region, there is not a specific monitoring programme for algal blooms since 2011.

No information has been specified by Spain, France and Malta on regulations and plans for the management of this specific issue.

For further information and spatial allocation of nutrients inputs and areas with high eutrophication risk refer to chapter "3.1.1. Anthropogenic pressures on the marine environment -Section iii".

6.2.2 Aquaculture - Sea-Land / Land-Sea

Extensive fish and shellfish culture systems and intensive recirculation systems (RAS) exert low environmental pressure, while intensive systems, such as fish cages and coastal and inland flow through culture systems may have both direct and indirect effects on the environment and on biodiversity (Marino, 2011). On the other hand, aquaculture can represent a significant contribution to the conservation of sensitive environments, reduce the negative impacts of other industrial activities and contribute to the re-constitution of overexploited fish resources and the conservation of cultural heritage, which is a fundamental part of the European development model (Marino, 2011). For further information and spatial allocation of aquaculture sites refer to chapter "2.4 Major uses and activities - Cultivation of living resources - Aquaculture, including infrastructure".

6.2.3 Fishing - Sea-Land

Fishing has a strong impact in the coastal area and is a key activity in relation to LSI. Fishing vessels that operate at sea both inshore and offshore need adequate land based mooring and facilities for their operability (e.g. petrol pumps) and maintenance (e.g. cranes) as well as for the processing and commercialization of the marine products (e.g. warehouse, terrestrial means of transport and connections). The major impacts of fishing activities on natural resources and ecosystems services are overfishing (lowering of fish stocks), loss of biodiversity and marine litter. For further information and spatial allocation of aquaculture sites refer to chapter "2.4 Major uses and activities - Extraction of living resources - Fish and shellfish harvesting (professional, recreational)".

6.2.4 Substances, marine litter - Land-Sea / Sea-Land

Marine litter is a main issue with severe impacts on terrestrial and marine environment. Both terrestrial and marine sources of litter are found within the context of the Western Mediterranean Sea.

The land sources that have been identified are coastal towns, ports, bathing areas, landfills of urban solid waste and rivers while when considering the marine sources, it has been found to come mainly from fishing and navigation activities. In both cases, the litter can be produced by the crew (lost or thrown overboard), and in the case of fishing, it can also come from abandoned gears, causing what is known as "ghost fishing".

At the environmental level the impact is negative on organisms as marine litter is cause of contamination and death. The negative impacts of marine litter on human activities reflect on water and habitat quality and consequent aesthetic degradation and for this reason present a negative impact on tourism activities. Also, fishery in particular small fishery, can be negatively affected by debris that can be a limit to this activity.

Plans and reposes to this issue are: waste disposal system at ports d.lgs. 182/2003; Directive 2000/59/CE modified by Directive 2015/2087/UE; Directive 2008/98/CE; Directive 2009/123/CE Regulation (UE) n. 508/2014; Regional Plan for the marine litter management in the Mediterranean (UNEP (DEPI)/MED WG. 379/5, 28 May 2013); Communication of the European Parliament "Towards a circular economy: a zero waste for Europe" [COM/2014/0398 final/2]

For further information on substances and litter inputs and the spatial allocation of areas with greater input refer to chapter "3.1.1. Anthropogenic pressures on the marine environment, Section iii".

6.2.5 Telecommunication – Sea-Land

Telecommunication facilities, in particular underwater cables have a direct LSI relevance due to the connective role that cables play to transfer information from different terrestrial regions. Proper disposition of cables at sea has direct influence on the quality of the communication service on land. On the other hand, the lay of underwater cables represents a source of physical disturbance for the sea bottom and if not properly planned can damage sensitive ecosystems.

For further information and spatial allocation of telecommunication facilities refer to "2.4 Major uses and activities - Production of energy - Transmission of electricity and communications (cables)".

6.2.6 Extraction of non-living resources: Sand - Sea-Land

Sand extraction is a relevant activity in the context of LSI. It can directly influence the environmental condition of the areas where it is carried out by physically modifying the seabed, increasing water turbidity and sediment resuspension and altering the transport of sediments. Sand extraction may have several impacts on natural resources and ecosystem services as the modifications of benthic populations, the introduction of potential contaminants in solution and morphological modifications of the substrate.

On the other hand, the sand extracted at sea is commonly used for beach nourishment and to constitute construction materials for coastal infrastructures representing the main activity to contrast coastal erosion. For further information and spatial allocation of sand extraction sites refer to "2.4 Major uses and activities - Extraction of non-living resources – Sand extraction"

6.2.7 Extraction of non-living resources: water - Land-Sea

In general water abstraction from the marine environment is carried out to create fresh water from desalination processes. Desalination plants are generally located on land areas on the coast that are directly connected to the sea through underwater tubes.

Although seawater desalination offers a wide range of socio-economic benefits, there are criticalities linked to the possible negative environmental impacts. Specifically, for what concerns the discharge of saline concentrate and chemical agents at sea that can affect the quality and vitality of coastal and marine environments, and the atmospheric pollution due to the strong demand for energy of the process itself. This explains the need for a Strategic environmental assessment (SEA) whenever a desalination plant is under construction, in order to identify all potential impacts and implement appropriate mitigation actions. For further information and spatial allocation of water extraction sites refer to "2.4 Major uses and activities - Extraction of non-living resources – Water extraction".

6.2.8 Farming, livestock farming and industry - Land-Sea

The presence of agricultural nutrients (nitrogen and phosphorus) and industrial pollutants is a main cause of eutrophication of surface waters, river and lake waters, as well as marine areas close to estuaries.

Information on this activity was available only for the areas under Italian jurisdiction.

In general, in the Tyrrhenian Sea and Ionian Sea the runoff from agriculture, farming and industry are lower than in the Adriatic due to the different hydrographic basins and to the oceanography of the area.

In the Italian Western Mediterranean Sea subarea, four evaluation areas for nutrients monitoring have been preliminarily identified: Northern Tyrrhenian Sea and Ligurian Sea, Central Tyrrhenian Sea, Southern Tyrrhenian Sea and Sardinia. The implementation of Legislative Decree 152/99 on the protection of water (and its amendments-Legislative Decree 258/2000), which transposed the Nitrates Directive (91/676 / EEC) and the Urban Waste Water Treatment Directive (91 / 271 / EEC) and the ongoing implementation of the Ippc

Directive are leading to a reorganization of monitoring and monitoring of emissions. This will lead to both a first classification of the environmental status of water bodies and a more significant picture of the pressures and impacts they have suffered. There is a general lack of data on this activity and its consequences in the Western part of the Mediterranean especially concerning the quality over the 3000 m from the coast.

6.2.9 Maritime transport - Sea-Land

Marine transport has a strong relevance at the interface between land and sea. Several activities that take place on land depend on the transference of people and goods through the sea, and on proper structures and facilities that ensure such dynamics (e.g. ports, warehouses, passenger terminals, connective roads and railways). A major environmental impact of the transport sector is represented by the potential accidents and the consequent oil spills. Other pressures on the environment are linked to acoustic and chemical pollution, risk of collision between ships and marine mammals and the introduction of alien species as a consequence of the discharge of ballast waters.
For further information and spatial allocation of marine transport hotspots refer to chapter "2.4 Major uses and activities - Transport - Shipping".

6.2.10 Tourism and Leisure - Land-Sea

Tourism and leisure activities develop in the coastal area both landward and seaward.
Tourism, through transit/transport and out-of-home stays, is a significant source of pressure on natural resources and therefore can cause the alteration of the environment and ecosystems of touristic destinations. High intensity of tourism that might affect the carrying capacity of tourism system in some areas of the Western Mediterranean region include deterioration of water quality (sewage), marine litter, physical alteration of coastlines and landscapes (changes in siltation, abrasion), loss of biodiversity (species and habitats), changes in salinity regime.
Specifically, cruising tourism is an increasing threat in the region linked to serious environmental impacts i.e. air and water pollution, noise pollution, as well as increasing solid wastes and litter. The consumptive level of each passenger on board is much higher than that of local hosting communities; hence cruise tourism has the potential to overwhelm the regions that they visit (Caric & Mackelworth, 2014). For further information and spatial

allocation of tourism and leisure hotspots refer to chapter "2.4 Major uses and activities – Tourism and leisure".

6.2.11 Energy industries - Sea-Land

Energy industries involve several activities such as prospection, extraction, refinement of raw material and transportation of fuel and electric energy, which then is distributed on the market. The complex system on which this activity relies, interests both the terrestrial and the marine side of the coastal area.

The impact that the extraction activities of fossil fuels and the presence of related structures can have on marine environment and natural resources are mainly on the benthic compartment due to habitat fragmentation and/or destruction with consequent biodiversity and habitat loss. The environmental damages are major in case of spills, events that would affect marine environment and organisms on a large spatial scale. This activity can also cause noise from seismic exploration activities with potential impacts on noise sensitive species. Other impacts may arise from the potential introduction of non-synthetic substances and compounds and through physical disturbance of the seabed. Underwater structures, however, can become biodiversity oasis over time by offering an artificial substrate where marine organisms can find food and repair.

Energy industries are fundamental for all the human activities. The presence of underwater structures that can act as biodiversity oasis can attracts the tourism especially interested in doing scuba diving and can also have positive impact on fishery since these structures can become attractive sites for species of commercial interest. For further information and spatial allocation of tourism and leisure hotspots refer to chapter "2.4 Major uses and activities – Production of energy".

7. TRANSBOUNDARY ISSUES (AREA-BASED)

This chapter describes the main transboundary issues in the SIMWESTMED project area. It considers the main negative interactions in terms of marine resources exploitation and maritime activities, as well as in terms of environmental impact due to cross-border pollution phenomena, which are in place among the four countries involved in the project. The rising up of these main transboundary issues is the first step towards an effective cross-border cooperation.

Overall, the main transboundary issues include sectors like maritime tourism, transportation, energy production, fishing activities, and extraction of non-living resources. As a generic spatial overview, transboundary issues in Western Mediterranean Sea are relevant in border areas that are: the Bonifacio Strait (between Corsica and Sardinia) and the Tuscan archipelago, the area of Provence-Cote d'Azur Region, the Principality of Monaco and the Liguria Region and Maltese-Italian marine areas. Considering transboundary issues with non-EU countries it is important to highlight the area of the strait of Sicily between Tunisia and Italy, were interactions of natural resources and activities are evident.

One of the activities that mainly need shared marine resources of common interest in the Western Mediterranean is the fishing activity. The occurrence of shared stocks between regional and international fleets in the Mediterranean Western Seas may lead to possible transboundary issues for fish resources (i.e. between Spanish and French fleets in the north-western Tyrrhenian sea and between Italian and French fleets and at the sea borders with Corsica, as well as between Italian, Maltese and North African fleets Italy-Malta in the South-Western Mediterranean Sea). The main issues related to shared stocks and their management have been known for a long time. This condition may lead to transboundary conflicts for fish resources both at inter-regional and international level, especially when common fishing grounds became overexploited and in absence of an adequate protection of recruitment and spawning areas of target species.

The Code of Conduct for Responsible Fisheries (as formulated by FAO in 1995) in coherence with UNCLOS and accounting for the Declaration of Cancun (1992), the Rio Declaration (1992), the provisions of the Agenda 21 of UNCED, the 1992 FAO Technical Consultation on High Sea Fishing and the EU Common Fisheries Policy (CFP, 2014) further emphasizes the necessity, when in presence of shared stocks, for coastal states to cooperate for fisheries research and management. Moreover, impacts deriving from fishing activities (overfishing) could be more extended because of the mobility of fish stocks, so the activity should be managed in a joint way at a basin scale level.

Concerning Oil and Gas extraction, many countries, such as Malta, are promoting the development of oil & gas resources, focusing on new themes in the field of research and development, even in the deep offshore context (e.g. launch in 2012 of a technical table between Italy and Malta for the study of possible joint exploration and development in a marine area that was subject of contentious). Transboundary issue related to this activity has been raised up also at the border between Spain and France due to the overlapping between their EEZ and the still pending definition of the official boundaries after the agreement signed on 21 March 2015 that is still to be ratified. In fact, this border area includes a relevant reservoir of non-renewable resources potentially representing a shared resource.

Oil and gas exploration is a contrasting activity with the French national strategy for the sea and coast approved by decree n°2017-222 of 23 February 2017, which has established a moratorium on the search for hydrocarbons in the Mediterranean and on the Atlantic coast, even though a law project is currently under discussion in order to end research and exploitation of hydrocarbons in a general way in France. Moreover, this marine area represents a recognized Cetaceans Corridor that has been proposed for its inclusion in the SPAMI List. The proposal was considered in the RAC/SPA Focal Points meeting (2017) and, by the moment, cannot be included on the SPAMI List until it has a protected status recognized at national level.

Because of the location of this potential hydrocarbons reservoir and the presence of the Cetaceans Corridor this area is subjected to cross border issue between France and Spain for MSP (Figure 89, 90).

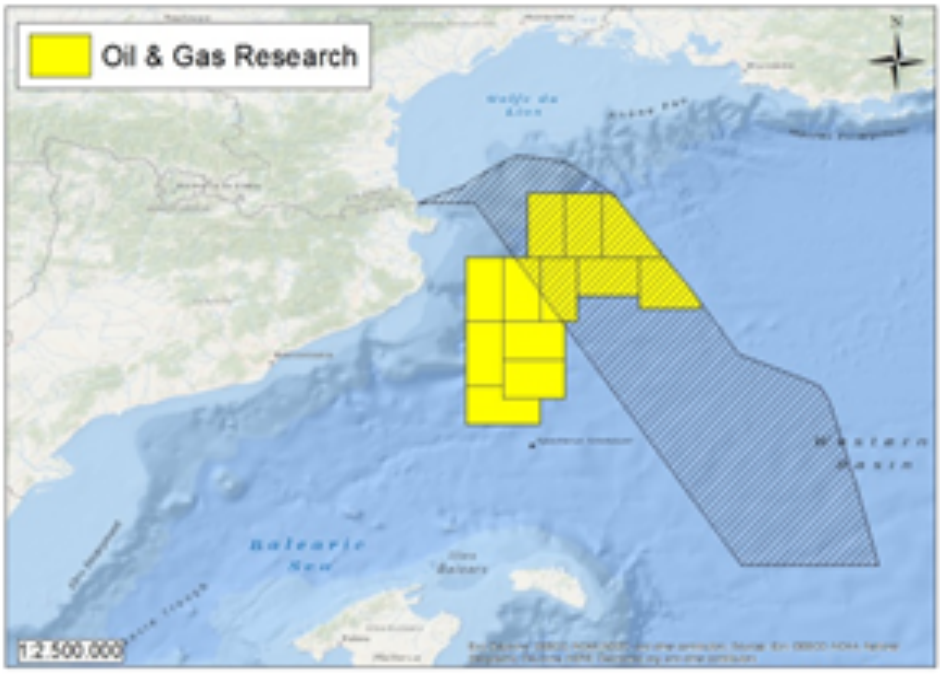


Figure 89 Location of potential oil and gas reservoir. Grey zone represents conflict on the EEZ between France and Spain.

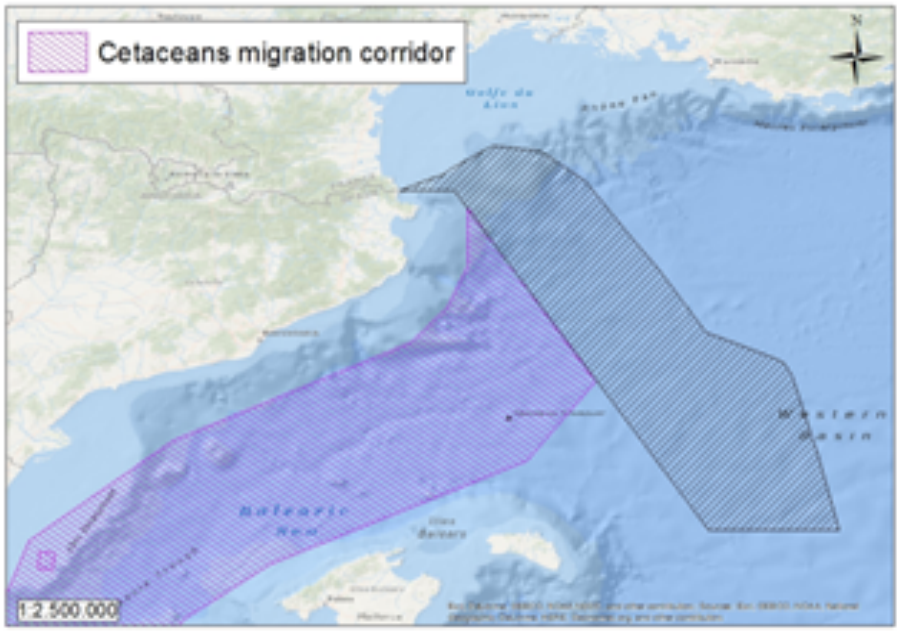


Figure 90 Location of the cetacean corridor. Grey zone represents conflict on the EEZ between France and Spain.

Also shipping activities generate cross-border interactions with a variety of uses carried out in the maritime space, from interactions with inshore fisheries in the coastal zone through to recent challenges like large offshore infrastructure projects associated with marine wind farms. Pollution deriving from shipping activities (ballast waters, noise and pollution) affects marine and coastal biodiversity, tourism and fishing activities, spreading in the marine environment not being contained by any jurisdictional boundaries. A common management strategy aiming at rule such issue is needed as soon as possible to ensure the health of marine environment.

Other relevant transboundary interactions of shipping are related to operational, administrative and custom procedures - land and seaside - safety and security, that have to be managed through national and international regulations, and the policies and strategies of the EU. At the national level, for instance, Italy is directly involved in a number of regional initiatives and projects whose common purpose is to enable and/or to enhance the seamless exchange of data and information related to either safety or security at sea or the protection of maritime environment. To this end, a common platform, named “port management information system” (PMIS), has been implemented and made operational in the most important ports in Italy so far, allowing a significant number of requests per day to be managed electronically on the whole. Moreover, the significant maritime traffic within the

Malta-Sicily channel and the infrastructure development between the Maltese islands, continental Europe and North Africa highlight that the area can be considered a hotspot of such transboundary interactions. At the international level, it is important to remark the future action proposed, the Med Atlantic Ecobonus, which will result in a policy study, in cooperation with the Ministries of Transport of Spain, France, Italy and Portugal aiming at the development of coordinated incentive scheme to support the demand of a Motorway of the Sea, valid for Atlantic and West Mediterranean markets.

Cruise tourism in the Mediterranean is a shared resource with other neighbouring countries in which port authorities, municipalities and shipping companies participate. Sustainability is increasingly being imposed in this activity from the point of view of energy consumption, as well as waste management and pollution prevention. Underwater noise and pollution derived from this cruise tourism are major transboundary issues related to this activity. Moreover, one of the most critical issues accentuated by the increasing size of cruises is the management of cruise passengers because of the saturation of cities and the services they offer. Possible actions to mitigate such issues should aim to address tourist seasonality in a sustainable manner, to diversify products and destinations, to implement sustainable coastal tourism models based on marine coastal ecosystem and changed behaviour of residents and tourists.

One another relevant aspect when facing transboundary issues in MSP context is the possible fragmentation and the existence of different policy framework present in the maritime panorama, even at national level. This is the case of Italy, where sectoral management is a well-established approach (shipping, tourism etc.). This kind of management needs to be integrated with the holistic nature of Maritime Spatial Planning in which the integration of policies, interests and objectives should follow a common line of development. Moreover, it is clear the need of compatible administrative approaches at the Mediterranean scale amongst identified competent authorities that can support MSP implementation.

The presence and/or perception of cross-border issues related to certain activities are not always identical. The extraction of non-living resources, for example, does not generate negative transboundary interactions in France and Spain while in Maltese waters some issues are identified in terms of large-scale maritime pollution incidents. In the military defence context, while for France and Spain no issues were identified, for Malta and Italy migration is a phenomenon of main concern. Especially, the migrant crisis and instability in Libya potentially intensified the need for military operations in Malta, particularly related to illegal activities. On the contrary, there is a common view in considering aquaculture and fish and shellfish processing activities that do not cause any cross-border issues.

As we look at the Western Mediterranean scenario, some example of initiatives aiming at favouring cross-border cooperation in Mediterranean have been already developed and are

here mentioned to be taken into account to favour the creation of new shared initiatives at the basin level. For instance, since 2000, the public bodies located on the Strait of Bonifacio have received European funding (past INTERREG Programmes Italy-France "Islands" and Italy-France "Maritime" 2007-2013) to implement joint projects to support economic development, environmental protection and cultural promotion and transport. The Environment Office of Corsica & the National Park of La Maddalena Archipelago, whose cross-boundary cooperation dates back right to 2000, have set up of a European Grouping of Territorial Cooperation (EGTC) in order to promote joint management and protection of both natural and cultural wealth, but also to prevent natural and technological risks. Significant problems such as the trade traffic in the strait of Bonifacio and the risks of damaging the biological balance of the area in case of accident are now tackled thanks to the creation of the EGTC-PMIBB. The Strait is also covered by the Pelagos Agreement for the Creation of a Mediterranean Sanctuary for Marine Mammals, signed in Rome on 25 November 1999 by France, Italy and the Principality of Monaco. Due to its priceless environmental heritage, in the north-eastern side of the Strait of Bonifacio two protected areas – the Natural reserve of the Strait of Bonifacio and the National Park of La Maddalena Archipelago – were instituted in the 1990's.

Regarding the Corsica Channel in 2015 the Italian and French Governments have signed a Memorandum of Understanding concerning the regulation of international maritime traffic in such area, in order to improve safety of navigation and the marine environment. This agreement closes the commitment taken during the Italian-French summit on 24th February 2015 aimed at strengthening the security of maritime traffic in the Channel. The proposal intends to reduce the risk of accidents in an area characterized by a great environmental sensitivity and will allow to move the traffic of commercial ships from the coast and to separate traffic flows from North and South, while also providing enhanced monitoring to a better and quicker response in case of emergency.

Also, regarding the area between Corsica, Liguria and Cote Azur, issues like environmental protection and pollution are addressed from the RAMOGE Agreement, signed by the Principality of Monaco, France and Italy in 1976. It works to protect and preserve the marine environment. From the outset, it was conceived as a sub-regional implementation of the Barcelona Convention, constituting a pilot marine pollution prevention and control zone. The Agreement represents an instrument for scientific, technical, legal and administrative co-operation in order to implement actions to promote integrated coastal management and thus preserve the marine environment. This need intensified after the Haven disaster on 11 April 1991, near the Port of Genoa. It was in this context that in 1993 an Intervention Plan to fight against accidental pollution, the RAMOGEPOL Plan was set up in the framework of the RAMOGE Agreement. The plan describes all the operational procedures, the means made

available and the deadlines of intervention. It reinforces co-operation in cases of serious accidental pollution and made available ships and aircrafts of the three countries (i.e. France, Italy, Monaco). RAMOGEPOL PLAN is continuously updated. The last version of the plan was signed in April 2016.

8. MAJOR GAPS AND DIFFERENCES (AREA-BASED)

Based on the initial analysis of available knowledge specific data gaps where future research should focus to provide a more inclusive overview of the area, the ecosystems and human activities on the study area, have been reported. For the entire Spanish coast, there are knowledge gaps regarding fundamental information on seagrass habitats such as unavailable complete habitat mapping, unavailable species distribution maps, unavailable relation among cause-effect of drivers and its consequences.

On the Italian coast information gaps relate mostly to the lack of updated information on habitat distribution, extend and condition cartography and dataset that are not enough updated.

Specific monitoring surveys (side scan sonar, multibeam and R.O.V.) and macro structural, functional and ecological investigations should be planned for a better understanding of seagrass population estate and trends.

For the marine areas of the Tuscan Archipelago, the Southern Tyrrhenian Sea, Southern Sardinia and Central Tyrrhenian Sea the available data on coralligenous beds are insufficient both in terms of distribution and habitat conditions, since no dedicated-on field activity has been carried out along the Italian coasts. These information gaps should be addressed with the development of specific and standardized protocol for the collection and analysis of the data. Moreover, it is important to investigate the sensitivity of this habitat to human-induced impacts.

In Malta coralligenous beds are also found but no data have been provided on its distribution and trend.

For the marine areas of the Tuscan Archipelago, the Central Tyrrhenian Sea, Western Sicily and Northern Sardinia the available data on maërl beds are insufficient both in terms of distribution and habitat conditions, since no dedicated-on field activity has been carried out along the Italian coasts. These information gaps should be addressed with the development of specific and standardized protocol for the collection and analysis of the data. Moreover, it is important to investigate the sensitivity of this habitat to human-induced impacts.

No data were provided on the trends of seaweed species in the entire study area.

The ecosystems associated with the French abyssal plain and its reliefs are not known. Deep habitat distribution in Italian waters is not available.

Data on reference conditions, as well as extent and nature of impacts, is also limited, as a result of which this assessment was strongly based on expert-judgement. Overall quantitative data as well as data on impacts of native communities is lacking, with only recent published literature documenting new records providing quantification of abundance and mapping distributions.

Data on trend, distribution and abundance of marine mammals, sea turtles and marine birds have not been provided for French waters. Current data on large pelagics in Malta is restricted to stock assessments of the main commercial species (*Thunnus thynnus* and *Xiphias gladius*) carried out at the regional scale in the framework of the International Commission for the Conservation of Atlantic Tunas (ICCAT). Maltese ecosystem functions and the spatial and temporal distribution of the selected species should be further analysed. Such knowledge is currently limited, thus also limiting the interpretation of the results of this analysis. Information on spawning sites in Malta is either very limited or not available. The availability of data on all components affecting biological resources, which is detailed, homogeneous and shared, especially at the international level, is a goal not yet fully achieved. No official data are available about recreational catches in Malta. For Maltese fisheries and there is lack of systematic long-term monitoring. The main knowledge gaps for sand extraction within Italian marine jurisdictions is the precise spatial distribution of the extraction sites and the absence of detailed monitoring systems.

Despite of the above cited specific identified knowledge gaps the data gathered for the present report did not include some relevant information: on the Spanish area there is lack of spatial information for relevant marine ecosystems other than seagrasses; no information was provided for the French area on fish and shellfish processing, coastal defence, military areas, coastal tourism activities, shipbuilding, shipping and transport infrastructures, while information available on aquaculture, fish and shellfish harvesting, was limited to spatial data represented through maps; within the Italian area no information was provided on salt extraction**,** coastal defence and transport infrastructures and there is a general lack of mapping for MSP purposes; on the Maltese area no information was provided on fish and shellfish processing, coastal defence, shipbuilding and salt extraction.

9. CONCLUSIONS

As stated in the Grant Agreement, the basin scale analysis/initial assessment strongly MSP oriented sub-component entails a rapid collation of information across the project sub-area, through an initial overview of the area's characteristics including: the marine environment; maritime activities; key sectorial and socio-economic trends and emerging pressures, legal issues, governance. The assessment used existing information gathered in the framework of Barcelona convention, MSFD, CFP, WFD, HBD, SEA/EIA, PELAGOS and official projects. This action was based mainly on desk-based reviews and aims at building a shared synthetic view on the Western Mediterranean region, identifying key issues (main activities and priority conservation issues) and data gaps. It must be underlined that cross-border planning was considered relevant for the projects purpose and has been included in the basin scale analysis. The resulting output is a summary of information on the marine and maritime aspects relevant for MSP in the Western Mediterranean, particularly cross-border issues, starting from existing work of relevance to MSP.

As overall conclusions, the identification of relevant difficulties in drafting this report as well as the recognition of its value in the framework of an MSP process is essential to further ameliorate and make stronger the Initial Assessment phase in relation to its objective, in the view of future MSP initiatives.

During the definition of the methodology to create the Initial Assessment of SIMWESTMED Project, partners of each country involved in the project were asked to provide selected information related to the marine area under their national jurisdiction. From an overall analysis of all the knowledge collected the main criticism that arose during the drafting of the IA report was the general lack of coherency and homogeneity between the information provided by each partner. We suggest that this problem could be partially avoided through a redefinition of the enquiring procedure designed to collect information from the partners involved in the IA. The type of data that each partner should provide from its side should be clearly specified in terms of typology and minimum amount of data for each single topic of the report, by specifying for example, how to include the spatial information (typology of data layout), and a quantitative indicator of the amount of data required (e.g. number of maps by topic). Further, a main obstacle for the obtainment of coherent and homogeneous data can be a non-common interpretation of the terminology among partners. The possible diverse interpretation of some terms (e.g. Land-sea interaction, Coastal zone, Transboundary issues) between partners of different countries can be a major issue in order to collect the same typology of information under a single topic. A previous discussion to agree on unambiguous meaning of terminology between partners during the project meetings phases preceding the

IA drafting could facilitate the homogenization of the information provided by different partners. The gathering of more homogenized knowledge should favour an easier understanding and further analysis of the information delivered by contributing partners, potentially leading to a more comprehensive and informative final report avoiding any misunderstanding and negligence in information reporting.

Overall, this collation of information for the basin scale analysis/initial assessment strongly MSP oriented is born as starting point for all the activities programmed within the SIMWESTMED Project and is essential to feed all the project phases in the framework of the collected knowledge. Thus, this report represents the collective effort of the partners of all countries involved within the SIMWESTMED Project to make the first step toward the common understanding of the Western Mediterranean area in its environmental and socio-economic characteristics and needs, considering planning priorities and addressing the cross-border critical issues and data gaps. It can be considered as the first product of the cross-border cooperation between France, Spain, Italy and Malta toward the establishment of the potential best shared planning and management strategies related to the maritime space and activities.

Appendix 1. Marine environment - General description of main ecosystem characteristics

Table 1.1 Description of the marine habitats representative of the West Mediterranean in terms of map distribution availability, status description, knowledge gaps identification for each country.

	Individuated	**Described**	**Mapping**	**Available information on the status (country based)**	**Gaps**
Representative habitats	Seagrass Meadows	France Italy Spain Malta	France Spain Malta	Spain: A fragmentation and regression of the upper and lower limit of *P. oceanica* habitat has been observed within its distribution areas in Balearic Islands and in Catalonia. Italy: The habitat conditions are very heterogeneous, with unstable trends in particular near the urban and industrial-agricultural sites and near the ports and river mouths	Spain: Unavailable complete mapping Unavailable species distribution mapping Unavailable relation among cause-effect Italy: lack of updated information on habitat distribution, extend and condition cartography and dataset that are not enough updated
	Coralligenous and Maerl Beds	France Italy Spain Malta	Spain France	Italy: regressions trends have been observed near areas of intense human activities, while negative impacts from fishery have been observed in offshore sites.	Italy: Restricted information is available for this area on the distribution and extension of coralligenous beds Spain: Deficit of cartography of biological communities present on rocky and sedimentary infralittoral and medio littoral habitats
	Macroalgae	France Spain Malta	Malta	N/A	No data were provided on the trends of seaweed species in the entire study area.
	Marine caves, Deep water coral reefs, Pelagic habitats	France Spain Malta	N/A	France: relevant deep habitats were listed. Malta: reported the presence of biogenic reefs with unknown distribution Data on marine caves are limited, and good examples of such habitat are indicated only for the Balearic area, in the Bouches du Rhône département and Corsica.	These types of habitats were listed as representative but no or little information was provided.

Table 1.2 Description of the marine species representative of the West Mediterranean in terms of map distribution availability, status description, knowledge gaps identification for each country.

	Group	**Species**	**Status**	**Gaps**
Representative species	Benthic animal species	- *Pinna nobilis* -*Patella ferruginea*	- well represented - in decline	- severe lack of information on this species ecology, population trends and distribution - absence of knowledge on spatial distribution
	Seabirds	-Scopoli's Shearwater -Mediterranean Shag -yelkouan shearwater -European Storm Petrel	important nest-building areas for marine avifauna in all the Western Mediterranean	Population distribution, abundance and trends on coastal and marine areas were not provided. Monitoring program during the breeding season must be implemented and knowledge gaps on demographic trends and importance of pressures should be filled
	Cetaceans	-bottlenose dolphin -striped dolphin -beaked whales - fin whale	Important summer feeding grounds and corridor	Little is known on their distribution and abundance. Data sets collected by different studies, must be homogenized and a systematic monitoring programme should be implemented through initiatives of international cooperation
	Sea turtles	mainly loggerhead sea turtles	Distributed in all the Western Mediterranean. West-East Mediterranean migration	There are no available data on population trend. Need further studies with particular attention to the anthropogenic impacts sensibly affecting the estate of conservation of this species
	Elasmobranchii	white skate, sawback angel sharks, gulper sharks, Porbeagles, basking sharks, blue sharks	highly unfavourable conservation status on an international level	Scant knowledge on their distribution and trends
	Species of commercial interest	sprats, anchovies, sardines, jack mackerels, hake, tuna, sole, gurnard, red mullet, common octopus and cuttlefish	Abundance and biomass of target species in this area has decreased since 1994 but has been stable at low levels for the last 2-3 years	Need of incorporating additional datasets on biological compartments that are not currently included, investigating the influence of various anthropogenic pressures, exploring finer geographic scales, and further defining assessment values

Appendix 2. Major uses and activities – Description of the main socio-economic activities, trends and national strategies

Table 2.1 Fish and shellfish harvesting.

		ITALY	FRANCE	SPAIN	MALTA
Fish and shellfish harvesting	Socioeconomic Value	The fleet is dominated by small-scale vessels. High cultural value.	N/A	Largest producer and consumer of fish in the EU by volume. Total income from fishing activities in 2015 accounted for 303,3 million euros. Fishing provides employment to roughly 41500 people .	The fleet is dominated by small-scale vessels. High cultural value.
	Maps	Yes (not fishing effort)	Yes	Yes	Yes (not fishing effort)
	Gaps	No official data are available about recreational catches.	N/A	N/D	No long-term strategy exists for the management of Maltese fisheries and there is lack of systematic long term monitoring.
	Strategies	Italian National Triennial Fishing and Aquaculture Programme 2017-2019.	N/A	Specific legislations concerning fishing methods.	Specific legislations concerning fishing methods.
	Trans.	N/D	N/A	N/D	N/D

Table 2.2 Fish and shellfish processing.

		ITALY	FRANCE	SPAIN	MALTA
Fish and shellfish processing	Socioeconomic Value	One of main activity present in the study area. 356 enterprises that generate job for 3484 employees and at about 1.180 million € of revenue	N/A	Turnover of around €4.6 billion and total employment estimated at 18,390 in 2014; 640 companies mainly located in the Atlantic coast In the last few years mixed trends more or less stable	N/A
	Maps	N/A	N/A	Yes	N/A
	Gaps	N/D	N/A	N/D	N/A
	Strategies	Specific legislations are in place regarding shellfish fishing activities (D.M. 22/12/2000) and related to the healthy foodstuff and relative controls intended for human consumption	N/A	There isn't a specific national strategy for the shellfish processing activity, but a piece of legislation has been adopted to regulate this activity	N/A
	Trans.	N/A	N/A	N/A	N/A

Table 2.3 Aquaculture including infrastructures.

		ITALY	FRANCE	SPAIN	MALTA
Aquaculture including infrastructures	Socioeconomic Value	Maximum value was recorded in 2007, nearly 600.000.000 € General decrease of sector	N/A	One of the European countries with greater aquaculture production Value of production in 2015 estimated at 241.250.425,8 €. Expected to grow in the next decades	N/A
	Maps	Yes, only for molluscs farming facilities	Yes	Yes	Yes
	Gaps	Need of strong and robust scientific data availability followed by an improvement in new technological knowledge	N/A	N/D	N/D
	Strategies	Italian Strategic Plan for Aquaculture 2014-2020	N/A	Strategic Plan for Spanish Aquaculture, part of the Common Fisheries Policy (CFP) and European Maritime and Fisheries Fund (FEMP). Respond to the Strategic Guidelines for the Sustainable Development of Aquaculture proposed by the Commission	Aquaculture strategy for Malta was adopted in 2014 covering the period up to 2025
	Trans.	N/D	N/A	N/D	N/D

Table 2.4 Extraction of sand (*This activity is strictly related to the chapter of Physical restructuring of coastline or seabed).

		ITALY	FRANCE	SPAIN	MALTA
Extraction of sand*	Socioeconomic Value	N/A	N/D	N/A	N/D
	Maps	N/A	N/A	Yes	Yes*
	Gaps	No precise spatial distribution of the extraction sites and the absence of detailed monitoring systems.	N/A	N/A	N/D
	Strategies	Specific legislation regarding extraction of seabed materials	N/A	Specific legislation regarding extraction of seabed materials	Specific legislation regarding extraction of seabed materials
	Trans.	N/D	N/A	N/D	N/D

Table 2.5 Extraction of salt.

		ITALY	FRANCE	SPAIN	MALTA
Extraction of salt	Socioeconomic Value	N/A	Production generally amounts to 1 million tons a year High cultural value	Employs approximately 2,000 people The production capacity is 4 to 5 million tons per year and its turnover is around 150 million euros per year	N/A
	Maps	N/A	Yes	Yes	N/A
	Gaps	N/A	N/A	N/D	N/A
	Strategies	N/A	N/D	N/D	N/A
	Trans.	N/A	N/D	N/D	N/D

Table 2.6 Extraction of water.

		ITALY	FRANCE	SPAIN	MALTA
Extraction of water	Socioeconomic Value	The extraction of marine or brackish water for domestic use is just 0.1% of the total levy	N/D	More than 900 desalination plants and is the first country in Europe for this activity	Freshwater resources in the Maltese Islands are scarce During 2015, the total desalinated water produced was 17.8 million cubic metres
	Maps	N/A	N/A	Yes	Yes
	Gaps	N/A	Lack of accurate and detailed socio-economic data.	N/D	N/A
	Strategies	N/D	N/D	N/A	N/D
	Trans.	N/A	N/D	N/D	N/D

Table 2.7 Oil & gas research and exploitation.

		ITALY	FRANCE	SPAIN	MALTA
Oil & Gas research and exploitation	Socioeconomic Value	The annual gas production accounts approximately to 7.29 GSm3 of gas and 5.75 Mton of oil. Offshore gas and oil production contributes about 7% and 1% respectively to the national energy supply.	No activity in place.	Spain imports more than 99% of the hydrocarbons it consumes and the energetic trade deficit is 45.000 M€ per year, equal to 4% of GDP.	No exploitation activity has taken place to date
	Maps	Yes	N/D	Yes	Yes
	Gaps	N/A	N/D	N/D	N/A
	Strategies	Specific legislation regarding offshore oil and gas exploitation	N/D	The National Energetic Security Strategy which was approved by the National Security Council at its meeting of July 20, 2015.	N/D
	Trans.	Issues with Malta in the assignment of areas not yet defined by a bilateral agreement	Exploration areas near the French water borders	Cross border issues with France (cetacean corridor)	N/D

Table 2.8 LNG facilities.

		ITALY	FRANCE	SPAIN	MALTA
LNG facilities	Socioeconomic Value	3 operational regasification terminals: 2 offshore (OLT near Livorno and Adriatic LNG near Rovigo) and 1 on-shore (Panigaglia) for a total capacity of 15.2 bcma In the period 2017-2030, establish the Italian Network of Infrastructures of Alternative Fuels for maritime and surface transport	No activity in place. Potentially in Corsica	In Barcelona four pilot tests and a study of the 25 actions that will take shape in the coming months in Spain and Portugal	No activity in place
	Maps	N/A	N/A	N/A	N/A
	Gaps	N/A	N/A	N/A	N/A
	Strategies	Alternative Fuels Directive transposition law n. 257 of 16/12/2016 that set out the LNG National Policy Framework	Multiannual energy plan approved by decree n°2015-1697 of 18 December 2015	N/A	N/A
	Trans.	N/A	N/A	N/A	N/A

Table 2.9 Transmission of electricity and communications.

		ITALY	FRANCE	SPAIN	MALTA
Transmission of electricity and communications	Socioeconomic Value	N/A	With a fleet of 13 units, France is, in number of ships, the country worldwide with the higher number of cable ship owners	N/A	N/A
	Maps	Yes	Yes	N/A	Yes
	Gaps	N/A	N/D	N/A	N/A
	Strategies	National Energy Strategy	National maritime security strategy adopted by the Inter-Ministerial Committee for the Sea of 22 October 2015	Specific legislation regarding laying of cables	N/D
	Trans.	N/D	Cables connection with Italy	N/D	Cables connection with Italy

Table 2.10 Coastal defence (*This activity is strictly related to the chapter of Physical restructuring of coastline or seabed).

		ITALY	FRANCE	SPAIN	MALTA
Coastal defence*	Socioeconomic Value	N/A	N/A	High risk with high socio-economic impact i.e. During the first half of 2017, 25 million euros were necessary in the study area due to severe storms	N/A
	Maps	N/A	N/A	N/A	N/A
	Gaps	N/A	N/A	Majorly related to the employment rate	N/A
	Strategies	N/A	N/A	Act on coastal protection and sustainable use of the seashore was approved in 2013 and the General Directorate for the Sustainability of the Coast and the Sea develops strategies for the protection of specific stretches of coast "Strategy for the adaptation of the coast to the effects of climate change" will be presented in 2019	N/A
	Trans.	N/A	N/A	N/A	N/A

Table 2.11 Restructuring of seabed morphology (*This activity is strictly related to the chapter of Physical restructuring of coastline or seabed).

		ITALY	FRANCE	SPAIN	MALTA
Restructuring of seabed morphology*	Socioeconomic Value	Estimation have been developed, mainly regarding cost/benefit (cost/avoided-costs) analysis	In the Occitanie region, which is highly affected by erosive process, on the basis of ongoing projects, sand requirements are estimated to be around 6 million m3 by 2020.	Since 1975, the volume of dredged material in all Spanish ports is almost 330 million m^3 with an annual average of 9 million	N/A
	Maps	N/A	Yes	Yes	N/A
	Gaps	There isn't a recognized and certified method to develop an accurate assessment of the economic value of the erosion phenomenon	N/A	Information on dredging sites is scattered areas in which dredging and dumping of dredged materials is located are not always provided impacts at a general level cannot be assessed.	N/A
	Strategies	No national policy in matter Tavolo Nazionale sull'Erosione Costiera (giudelines)	National strategy for a sustainable management of marine and terrestrial aggregates and quarry materials and substances National strategy for an integrated coastline management	Specific legislation regarding extraction of seabed materials	N/A
	Trans.	N/A	N/A	N/D	N/A

Table 2.12 Defence/Military areas

		ITALY	FRANCE	SPAIN	MALTA
Defense/Military areas	Socioeconomic Value	N/A	N/A	Defence budget is equivalent to around 0.9% of the GDP, and it is expected to grow to 2% in 2024.	N/A
	Maps	Yes	N/A	Yes	N/A
	Gaps	N/A	N/A	N/A	N/A
	Strategies	White Paper on International Security and Defence	N/A	National Maritime Security Strategy	N/A
	Trans.	N/A	N/A	N/A	N/A

Table 2.13 Coastal tourism and beach-based activities.

		ITALY	FRANCE	SPAIN	MALTA
Coastal tourism and beach-based activities	Socioeconomic Value	Largest maritime activity in terms of numbers of enterprises with more than 74.000 enterprises related to accommodation and restaurant sector (40,7% of total enterprises of maritime economy) and more than 28.000 enterprises related to sports and recreational activities	N/A	holiday tourism accounts for 11% of Spanish GDP the product sun and beach, which concentrates 75% of the receiving demand	important economic sector post-independence in 1964
	Maps	Yes*	N/A	Yes*	N/A
	Gaps	N/A	N/A	N/A	N/A
	Strategies	National Strategic Plan for Tourism	N/A	Spanish Horizon 2020 Tourism Plan	N/A
	Trans.	High competition with Mediterranean countries	N/A	N/D	N/A

Table 2.14 Maritime tourism.

		ITALY	FRANCE	SPAIN	MALTA
Maritime tourism	Socioeconomic Value	Direct expenditures in 2014 were equal to 4,601 Millions of euros Italian ports that handled the most passengers in 2016 were Civitavecchia (2.339.676), Venice (1.605.660) and Naples (1.306.151). ferry traffic per country, the majority of this traffic is taking place in the Mediterranean ports located in Italy (37,3%, more than 28,7 million ferry passengers)	N/A	Cruise passenger traffic amounted to 8,435,966 cruisers in 2015 Mediterranean with Barcelona in the first position ante Balearic in the third. In the last five years, Barcelona experienced a rise of cruise passengers by 11,4%. Nautical this sector contributes around 5,700 million euros each season to the national economy, which is around 0,5% of the GDP. For the employment, it creates more than 115,000 direct and indirect jobs	N/A
	Maps	N/A	N/A	N/A	N/A
	Gaps	N/A	N/A	N/A	N/A
	Strategies	National Strategic Plan for Tourism	N/A	Spanish Horizon 2020 Tourism Plan	N/A
	Trans.	N/A	N/A	N/D	N/A

Table 2.15 Shipbuilding.

		ITALY	FRANCE	SPAIN	MALTA
Shipbuilding	Socioeconomic Value	Contribution to the national gross domestic product with 32.6 billion euros (2.03%) and employing approximately 2% of the country's workforce (471 thousand people Italy maintains its European leadership in cruise sector (with 6.2 million passengers and 4,600 port calls) and in the construction of passenger ships and luxury motor-yachts	N/A	Shipyards in 2015 has increased by 17% compared to 2014 in terms of cgt. 44,273 jobs, comprising 16% of employment direct and 84% corresponding to the auxiliary industry	N/A
	Maps	N/A	N/A	Yes	N/A
	Gaps	Lack in increasing public awareness on benefits of the new European requested standard in shipbuilding industry in terms of safety and environmental impact	N/A	N/A	N/A
	Strategies	Specific legislation regarding shipyards	N/A	N/D	N/A
	Trans.	N/A	N/A	N/D	N/A

Table 2.16 Shipping.

		ITALY	FRANCE	SPAIN	MALTA
Shipping	Socioeconomic Value	Maritime transports are in first place in terms of production value with 11.8 billion euros and also for labour productivity with 339 thousand euros/employee	N/A	In 2014 the total of the traffic of merchandise in the Spanish ports reached 482 million tons, 5,12 % more than in the previous year. In 2013 the occupation of the maritime transport sector represents 0.02% of the total occupation in Spain.	Number of ships registered under the Merchant Shipping Act had reached 7,249, for a total gross tonnage of 66.2 million largest register in Europe
	Maps	N/A	Yes	Yes	N/A
	Gaps	N/D	N/A	N/A	N/A
	Strategies	National Strategic Plan for Ports and Logistics	N/A	National Maritime Security Strategy	Transport Masterplan 2025
	Trans.	The transboundary component of the activity is evident	N/A	Transboundary projects	The significant maritime traffic within the Malta-Sicily channel

Table 2.17 Transport infrastructures.

		ITALY	FRANCE	SPAIN	MALTA
Transport infrastructures	Socioeconomic Value	N/A	N/A	State-owned port system has reached in 2015 a volume of investment of 632 million of euros Spanish Port System includes 46 ports of general interest, managed by 28 Port Authorities	Malta constitutes an important hub for the shipping industry
	Maps	N/A	N/A	Yes	Yes
	Gaps	N/A	N/A	N/A	N/A
	Strategies	N/A	N/A	Each port authority will develop a Strategic Plan	N/A
	Trans.	N/A	N/A	N/D	N/A

Appendix 3. Conflict and synergies (Area-based) – Description of the conflicts and synergies identified

Table 3.1 Conflicts and synergies identified among uses.

	Professional Fishery	Recreational Fishery	Aquaculture	Maritime transport	Energy	Coastal & Maritime Tourism
Professional Fishery						
Recreational Fishery						
Aquaculture						
Maritime transport						
Energy						
Coastal & Maritime Tourism						

Conflict - Competition for Resources	
Conflict - Competition for Space	
Potential Synergies	
No available information	

Table 3.2 Description of the main biological pressures that affect the marine environment in the Western Mediterranean, in terms of description of the environmental effect of each pressure, the pressure distribution maps and the identification of the limits and knowledge gaps. Symbol X means information presence.

ANTHROPOGENIC PRESSURES ON MARINE ENVIRONMENT							
	Type	**Italy**	**France**	**Spain**	**Malta**	**Main activities' causes involved**	**Gaps**
Biological	**Non-indigenous species (NIS)**	X	X	X	X	Mariculture, shipping, aquarium, ornamental escapees and floating structures climate changes	Lack of quantitative knowledge and on distribution, vectors, and impact
	Toxic algal blooms	X	X	N/A	X	Euthrophication, shipping, climate changes	No clear trend in abundance
	Pathogens	X	N/A	N/A	N/A	Euthrophication, climate changes	Improve monitoring
	Extraction of species	X	X	N/A	X	By-catch, fishery	Improve monitoring also related to recreational fishery

Table 3.3 Description of the main physical pressures that affect the marine environment in the Western Mediterranean, in terms of description of the environmental effect of each pressure, the pressure distribution maps and the identification of the limits and knowledge gaps. Symbol X means information presence.

ANTHROPOGENIC PRESSURES ON MARINE ENVIRONMENT							
	Type	**Italy**	**France**	**Spain**	**Malta**	**Main activities' causes involved**	**Gaps**
Physical	**Physical loss and alteration**	X	X	X	X	Fishing, anchoring, solid extraction, dredging port, discharges of dredging port material, beach regeneration, creation of artificial beach, cables and pipelines, artificial reefs, wrecks sinking, marine wind farm, hydrocarbons exploitation and exploration, marine litter	Specific campaigns and monitoring studies
	Changes hydrographic conditions	X	X	X	X	Land-based activities, climate changes, man-made structures	Lack of monitoring and indicators
	Changes in siltation	X	N/A	N/A	N/A	man-made structures, in particular ports, bottom trawling, shipping and river inputs	Data and methodologies to improve monitoring study

Table 3.4 Description of the main chemical pressures that affect the marine environment in the Western Mediterranean, in terms of description of the environmental effect of each pressure, the pressure distribution maps and the identification of the limits and knowledge gaps. Symbol X means information presence.

ANTHROPOGENIC PRESSURES ON MARINE ENVIRONMENT							
	Type	**Italy**	**France**	**Spain**	**Malta**	**Main activities' causes involved**	**Gaps**
Chemical	**Input of nutrient and pollutants**	X	X	X	X	Agriculture, aquaculture or dumping of dredged material, oil or chemical spills, tourism, desalination plants, electricity generation, shipping	Exact magnitude of the pressure and location unknown. Scant data on the effect and accumulation in marine organisms
	Marine litter	X	X	X	X	Coastal towns, ports, bathing areas, landfills of urban solid waste, rivers, fishing and navigation activities	Exact magnitude of the pressure and location unknown, sparse information, no information on trends
	Underwater noise	X	X	X	X	Commercial and recreational navigation, research activity using seismic methods, and dredging and dumping of material	Exact magnitude of the pressure and location unknown

Appendix 4. Land-Sea Interactions (Area-based) – Hotspots, general description, geographical scale

Table 4.1 Description of the main land-sea interactions that involve the coastal and marine environment and that originate from natural processes.

Hotspots of Land-Sea Interactions due to natural processes				
	Spain	**France**	**Italy**	**Malta**
Coastal erosion	Shore retreat and flooding events associated to c. e. River regulation or retention by structures like ports, intense storm surges, over wash, and rising sea levels are among the main causes.	N/A	C. e. balance: from 1950 to 1999 more erosion (1170 km) than regeneration; from 2000 to 2007 more eroded coastal zones (895 km) than in advancement (849 km). From 1999 to 2007, 600.000 m^2 of beaches lost. several directives and laws to regulate coastal defense measures for the reduction of c.e.	Erosion is visible where human intervention occurred in the form of development or incompatible activities.
Flooding events	N/A	N/A	Tyrrhenian coast: strong seaquake in 2002 after landslide of Sciara del Fuoco (Stromboli), affected Eolie Islands, Northern Sicily, Tyrrhenian Calabria and Southern Campania. Catastrophic flooding event from 2013 to 2015 in coastal Tyrrhenian zones. Management framework for flooding events exists.	N/A
Landslides	N/A	N/A	Coastal landslide along the Tyrrhenian: 2002 in Stromboli (Sicily), 2008 in Messina (Sicily), 2014 in Joppolo and Bagnara Calabra (Calabria). Areas at risk of landslide included within the Plans for the Hydrologic Assessment (PAI). Landslide events included in the inventory built within the IFFI Project.	N/A
Seismic events	Project Castor paralyzed by the emergence of seismicity in its implementation. 4 events of a magnitude > 0 are recorder in the Balearic Promontory east of Ibiza. One of them on Mallorca Channel (Acosta et al., 2004).	N/A	Highest seismicity in the central-southern part of the Country, along the Apennine Ridge, in Calabria, Sicily and some northern areas, as Friuli, Veneto and western Liguria. Numerous seismic events have interested directly the Tyrrhenian Sea and Calabria, Sicily, Campania and Sardinia regions.	N/A

Saline intrusion	N/A	N/A	Affect 5 regions: Apulia, Basilicata, Calabria, Sicily and Sardinia. In particular the territories of competence of the basin authority of Apulia (regional), Lucania (regional), Bradano (interregional), Sinni (interregional), Calabria (regional), Sicily (regional), Sardinia (regional). S. i. is not yet supported by an exhaustive detection methodology and national mapping.	N/A
Storms	N/A	N/A	N/A	Input loads from land-based sources leach into fresh and coastal waters, affecting water quality. Specificities for storm effects management on the coast within the legal framework. Limited data on water quality during storms.

Sea-Land	
Land-sea	
Land-sea/Sea-land	

Table 4.2 Description of the main land-sea interactions that involve the coastal and marine environment and that originate from anthropogenic activities.

Hotspots of Land-Sea Interactions due to human activities				
	Spain	**France**	**Italy**	**Malta**
Eutrophication	Identified potential hotspots of human induced high nutrients concentration at sea.	Identified potential hotspots of human induced high nutrients concentration at sea.	Identified hotspots of potential risk of human induced e. at sea. Regulations and plans implemented to manage this issue.	Identified potential hotspots of human induced high nutrients concentration at sea.
Aquaculture	Main aquaculture sites were identified.	Main aquaculture sites were identified.	Main aquaculture sites were identified.	Main aquaculture sites were identified.
Fishing	Distribution of main fishing areas	Distribution of main fishing areas was	Distribution of main fishing areas was	Distribution of main fishing areas was

	was identified.	identified.	identified.	identified.
Substances, marine litter	Main input areas of marine litter identified. International and EU plans and reposes to this issue.	Main input areas of marine litter identified. International and EU plans and reposes to this issue.	Main input areas of marine litter identified. International and EU plans and reposes to this issue.	Main input areas of marine litter identified. M. l. presence monitored and analysed. International and EU plans and reposes to this issue.
Telecommunication	Spatial allocation of telecommunication facilities identified.	Spatial allocation of telecommunication facilities identified.	Spatial allocation of telecommunication facilities identified.	Spatial allocation of telecommunication facilities identified.
Sand extraction	Spatial allocation of main s. e. sites identified.	No marine areas of s. e. were identified.	Presence of plans concerning beach nourishment. Unknown spatial allocation.	Spatial allocation of main s. e. sites identified.
Water extraction	Sites were w. e. take place identified on the coast.	Sites were w. e. take place identified on the coast (no desalination plants in French Mediterranean).	Sites were w. e. take place identified on the coast.	Sites were w. e. take place identified on the coast.
Farming and industry	N/A	N/A	N/A	N/A
Tourism and Leisure	National laws regulate beach use and coastal tourism. Regions of mayor touristic activities reported.	N/A	National Strategic Plan for Tourism (2017-2022). No specific hotspots reported.	No specific hotspots reported.
Maritime transport	Most important areas for shipbuilding and ports identified.	Most important areas for shipbuilding identified.	Most important areas for shipbuilding identified.	N/A
Energy industries	Information on LNG facilities. Pipelines allocation described.	Information on LNG facilities.	3 operational regasification terminals.	Pipelines allocation described.