MarSP
Macaronesian Maritime Spatial Planning

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"CURRENT MARITIME USES, ACTIVITIES AND CONSTRAINTS IN MACARONESIA"

Azores – Madeira – Canary Islands

MarSP Deliverable:

D.2.5 Report on current maritime uses and constraints in each region of Macaronesia

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Summary

The MarSP project aims to develop concrete actions for the EU Member States (Portugal and Spain) to build the necessary capacities and tools for the implementation of the EU Directive on MSP (Directive 2014/89/EU) in the Macaronesian region, including mechanisms for cross-border cooperation.

This report delivers the identification of current maritime uses, activities and constraints, under MarSP's Work Package 2. "Mapping the current conditions and creating a vision for the MSP in Macaronesia", namely Task 2.3. "Mapping the maritime uses and activities and defining the MSP current conditions".

This deliverable is based on a shared initial approach for the identification and mapping of existing maritime uses and activities, as well its constraints and restrictions, with the necessary flexibility to be adapted to the particular features and needs of each archipelago (Azores, Madeira and Canary Islands). This is a dynamic document, open to necessary updates as the planning process moves forward.

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Introduction

The European Union (EU) Directive on Maritime Spatial Planning (MSP), the Directive 2014/89/EU, establishes a framework for MSP aimed at promoting the sustainable growth of blue economy, the sustainable development of maritime areas and the sustainable use of marine resources. The MarSP project aims to develop concrete actions for the Member States (Portugal and Spain) to build the necessary capacities and tools for the implementation of the EU Directive on MSP (Directive 2014/89/EU) in the Macaronesian archipelagos (the Azores, Madeira and Canary Islands), including mechanisms for cross-border cooperation. MarSP project was also designed to engage stakeholders and to integrate their knowledge in its results. The identification of existing uses and activities developed in the maritime space, as well as its constraints and restrictions, is a fundamental step to the MSP process and to achieving realistic and comprehensive plans that take into account conflicts and compatibilities among existing human uses and also between existing human uses and the environment occurring in the MSP area.
The task underpinning this deliverable entails the collecting and mapping of information about existing human uses and activities, for each of the Macaronesian regions, taking into consideration not only the specific features and particularities of the three archipelagos, but especially the distinct MSP implementation stage that each region currently stands at. The fact that each archipelago stands at different development stages also means that complete harmonization of approaches and methodologies for the three regions is not possible and neither it is desirable. Such differences can actually represent a positive aspect, given that confronting distinct MSP processes, designed to deal, in some cases, with similar problems due to the same geographical context, will shed more light on the opportunities and challenges faced at each development stage and may represent an opportunity for learning and adapting the process as it is being developed. On the other hand, despite the existing differences, a common approach for identifying current uses and activities is proposed, with the necessary adaptations to the particular context of each region.

Purpose

This report delivers the identification of current maritime uses, activities and constraints, under MarSP Work Package 2. "Mapping the current conditions and creating a vision for the MSP in Macaronesia", namely Task 2.3. "Mapping the maritime uses and activities and defining the MSP current conditions".
The main objective of this report on the current maritime, uses and constraints at the level of Macaronesia is to identify and map the existing maritime uses and activities, while also analysing the associated constraints, restrictions, conflicts and synergies. Such a task relied on gathering information and data from several sources to feed the characterization and mapping on the main sectors. It also entailed consulting the competent authorities, experts and stakeholders to develop and validate the sector characterization and the analysis of conflicts, synergies and interactions. Existing mechanisms for spatial management of uses and actitivies in the maritime space in the three Regions is also addressed.
Significant maritime human uses in Macaronesia include, for example, commercial and recreational fisheries, aquaculture, mineral extraction, maritime transport, prospecting of natural resources, marine transportation, cruise and cargo shipping, harbour operations, submarine cables and transmission lines, pipelines, recreational maritime activities, coastal and maritime tourism,

coexisting with areas of interest for scientific research, zones dedicated to marine conservation (Marine Protected Areas, MPAs), underwater cultural heritage sites, observatories/monitoring stations, as well as with areas reserved to military operations.
This document was produced collaboratively between MarSP partners and informs the MSP process in the Macaronesia regions (Azores, Madeira and Canary Islands). However, to facilitate reading and consultation, it includes three annexes relating to each of the three archipelagos, where the specific methodology and the identification of existing human uses and activities is presented.

General methodological approach

This deliverable is based on a shared initial approach for the identification and mapping of existing maritime uses and activities, conflicts and constraints, as well with the necessary flexibility to be adapted to the particular features and needs of each archipelago.
Task 2.3. "Mapping the maritime uses and activities and defining the MSP current conditions" involves gathering information and compiling data from several sources concerning the human uses and activities happening in the maritime space of the three archipelagos, with reference to the sector characterization, the relevant legal framework, spatial distribution, interactions with other sectors, with the environment and land-sea interactions.
An integrated mapping and fine-tuned spatial design is needed, in order to bring together a wide range of scattered baseline information and to make it compatible when existing under different formats. Such inventory should also take account any obvious trends and it should be refined throughout the MSP process to reflect modified objectives, stakeholder input and additional data sources.
This is a dynamic deliverable, open to updates throughout the project lifetime, given the analysis of existing conditions may change as new information is identified and incorporated into the planning process, especially considering the fact that the results coming from the stakeholder engagement process will be integrated into the MSP process as it develops over time.

References

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Macaronesian Maritime Spatial Planning

ANNEX I. CURRENT MARITIME USES AND CONSTRAINTS - THE AZORES

List of acronyms

ACPA: Association of Fish Merchants of the Azores
AIS: Automatic Identification Systems
APA: Aquaculture Offshore Production Areas
APASA: Association of Producers of Tuna and Similar of the Azores
APEDA: Association of Producers of Demersal Species of the Azores
ARA: Autonomous Region of the Azores
Bern Convention: Convention on the Conservation of European Wildlife and Natural Habitats
Bonn Convention: Convention on the Conservation of Migratory Species of Wild Animals
CASA: Underwater Archaeological Chart of the Azores
CBA-Açores: Biotechnology Centre of Azores
CBD: Convention on Biological Diversity
CIBIO-Açores: Research Centre in Biodiversity and Genetic Resources
CITES: Convention on International Trade in Endangered Species of Wild Fauna and Flora
CMS: Comma Separated Value
CNADS: National Center for Nautical and Underwater Archeology
CFP: Common Fisheries Policy
COM: Communication
DGEG: Directorate-General of Energy and Geology
DGRM: General-Directorate of Natural Resources, Security and Maritime
DOP/UAc: Department of Oceanography and Fisherires of the University of the Azores
DRA: Regional Directorate for the Environment
DRAM: Regional Directorate for Sea Affairs (Direção Regional dos Assuntos do Mar)
DRC: Regional Directorate of Culture (Direção Regional da Cultura)
DRCT: Regional Directorate for Science and Technology
DRP: Regional Directorate for Fisheries (Direção Regional das Pescas)
DRT: Regional Directorate for Transport (Direção Regional dos Transportes)
DRTourism: Regional Directorate for Tourism (Direção Regional do Turismo)
DSPEP: Directorate for Fisheries Planning and Economics Services
DSRFPA: Directorate for Resources , Fishing Fleet and Aquaculture Services
EBSA: Ecologically or Biologically Significant Marine Areas
EC: European Commission
EEA: European Environment Agency
EEZ: Exclusive Economic Zone
EMFF: European Maritime and Fisheries Fund
ER: Recreational boats
ETI: Equivalente a Tempo Integral ('Full Time Equivalent')
EU: European Union
FAO: Food and Agricultural Organization of the United Nations **FPA:** Federation of Fisheries of the Azores
FAO DSF Guidelines: FAO International Guidelines for the Management of Deep-sea Fisheries in the High Seas
FRCT: Regional Fund for Science and Technology
GDP: Gross Domestic Product
GPS: Global Positioning System
GT: Gross Tonnage
GVA: Gross Value Added
IBA: BirdLife's Important Bird and Biodiversity Area

IMAR: Institute of Marine Research
IMO: International Maritime Organization
INE: National Statistics Institute (Instituto Nacional de Estatística)
INP: Island Natural Park
IRP: Regional Inspection of Fisheries (Inspeção Regional das Pescas)
IUCN: International Union for Conservation of Nature
IUU: Illegal, unreported and unregulated
MARNA: Mid-Atlantic Ridge North of the Azores
MarSP: Macaronesian Maritime Spatial Planning
MCDM: Multi-criteria decision-making
MMSI: Maritime Mobile Service Identity
MPAs: Marine Protected Areas
MSFD: Marine Strategy Framework Directive
MSP: Maritime Spatial Planning
MU: Multi-use
MWT: Marine wildlife tourism
NEAFC: North-East Atlantic Fisheries Commission
OMT: Maritime-Touristic Operators
OSPAR Convention: Convention for the Protection of the Marine Environment of the North-East Atlantic
OTA: Azores Tourism Observatory (Observatório de Turismo dos Açores)
PA: Protected area
PEMTA: Strategic and Marketing Plan for Tourism in the Azores
POOC: Coastal Zone Spatial Plan (Plano de Ordenamento de Orla Costeira)
POTRAA: Tourism Planning Plan of the Autonomous Region of the Azores
RAA: Autonomous Region of the Azores (Região Autónoma dos Açores)
RAMSAR: Convention on wetlands
RAMTA: Azores Regulation of the Maritime Activity
RIAC: Integrated Network Citizen Support
R&D: Research and Development
RIS3: Research and Innovation Strategies for Smart Specialization
RJIGT: Legal Regime of the Territorial Management Instruments of the Azores
SAC: Special Areas of Conservation (EU Habitats Directive/Natura 2000 Network)
SCI: Sites of Community importance (EU Habitats Directive/Natura 2000 Network)
SCTA: Scientific and Technological System of the Azores
SPA: Special Protection Areas (EU Birds Directive/Natura 2000 Network)
SPEA: Portuguese Society for the Study of Birds
SREA: Azores Regional Statistics Service (Serviço Regional de Estatística dos Açores)
SREAT: Regional Secretariat for Energy, Environment and Tourism
SRMCT: Regional Secretariat for the Sea, Science and Technology
S&T: Science and Technology
SWOT: Strengths, Weaknesses, Opportunities, and Threats
TACs: Total Allowable Catches
TUPEM: Title of Private Use of the National Maritime Space
UAc: University of the Azores
UNESCO: United Nations Educational, Scientific and Cultural Organization
VHF: Very High Frequency
VMS: Vessel Monitoring System

Existing Maritime Uses, Activities and Constraints in the Azores

FISHERIES

Introduction

To characterize the existing conditions in the Azorean maritime space, several sectors and activities need to be considered. In the context of the MarSP project, fisheries is an important sector as it is one of the main sources of income with great social and economic impact that function as a source of healthy food, creating employment and establishing communities (Santos R. , 2017).
The available areas for fishing in the Archipelago is limited by topographic factors, such as the absence of continental shelf and the surrounding great depth (Menezes G. S., 2006). Azorean fishing takes place mainly in the nearby banks and seamounts (<1000 meters) and in the vicinity of the islands. The fisheries sector exploits about 50 out of 500 marine species identified in the ecosystem, mainly with hooks and lines fishing gear. The Azorean fishing fleet is small-scale and composed by wooden boats up to 12 meters (length overall) with little engine power (Carvalho, Jones, & Isidro, Defining scale in fisheries. Small versus largescale fishing operations in the Azores., 2011). The fishing industry currently contributes more than 20% to the total exports with great economic impact on several communities across the islands (Santos R. , 2017). In fact, fisheries are one of the main economic driver in the local economy being the Regional Government committed with the sustainable development of this activity. Regarding the Research and Innovation Strategies for Smart Specialization (RIS3) under the Europe 2020 strategy framework, the three main priorities are (i) agriculture, livestock and agroindustry; (ii) fisheries and sea; and (iii) tourism (SPI, 2014).

Purpose

This document aims to summarise the status of the fisheries sector in the Autonomous Region of the Azores (Portugal), under MarSP project work package 2. "Mapping the current conditions and creating a vision for the MSP in Macaronesia" and Task 2.2. "Mapping the maritime uses and activities and defining the MSP current conditions". It includes the characterization of the current situation of fisheries in the Azores, the proposed methodology to map the activity, a sector diagnosis and its main interactions with other sectors, as well as the environment and the land-sea interactions for fisheries.

PART I

Sector characterization

The Azores is an oceanic archipelago, in the middle of the North Atlantic Ocean, between continental Europe and North America. With a maritime territory of about 1 million km2, which represents 57% of the Exclusive Economic Zone (EEZ) of Portugal and approximately 30% of the maritime dimension of the European Union, it is easy to understand the importance that the sea and the fisheries have for the Autonomous Region of the Azores. With the absence of a continental shelf and surrounding great depths, fishing occurs around the island slopes and the seamounts present in the area (Silva & Pinho, 2007; Morato, et al., 2008). This represents less than 1% of the total area that can potentially be used up to a depth of 600 meters (Morato, et al., 2008). The uniqueness of the Azorean waters, besides limiting the available areas for fishing activity, requires a very careful application of the precautionary principle in order to guarantee the biological conservation of the fishery resources.

In the Azores, fishing was a traditional activity for subsistence of the local communities dating back to the colonization of the islands in the XV century (Fructuoso, 1873; Menezes G. , 1996). The commercial whaling was the first large-scale fishing activity that begun at the end of the XVIII century by whalers of the United States of America (Carvalho, Jones, & Isidro, Defining scale in fisheries. Small versus largescale fishing operations in the Azores., 2011). The Azorean whaling was influenced by the Americans and operated as an economic activity from the mid-XIX century to 1984 when this activity was replaced by more profitable activities such as tuna pole and line fishing and hand lines for demersal species, which are currently the main fisheries in the Azores (Martin & Melo, 1983; Prieto, Pham, Brito, & Morato, 2013; Carvalho, Sea to shore: an economic evaluation of the Azorean commercial fisheries. PhD thesis., 2010). Initially fishing was limited to the proximity of the islands being the target almost exclusively coastal species (Menezes G. , 1996). In the mid-80s, an increase in public investment in the sector allowed the development of larger and better equipped fishing vessels, which had boosted tuna fisheries as well as surface and deep water longline fishing in the Azores. Additionally, since the 80s fish exportation to mainland Portugal, as well as other destinations allowed the disposal of Azorean fish that led to an intensification and expansion of fishing activity in the Region.

Nowadays, the main fisheries components in the Azores, as described by Carvalho (unpublished data) and Morato (Morato T. , Description of environmental issues, fish stocks and fisheries in the EEZs around the Azores and Madeira, 2012), can be resumed as:

i) The deep-water bottom longline and handline (hooks and lines) fisheries targeting mostly deep-water demersal fishes such as blackspot seabream (*Pagellus bogaraveo*), Atlantic wreckfish (*Polyprion americanus*), alfonsinos (*Beryx* spp.) and the blackbelly rosefish (*Helicolenus dactylopterus*);

ii) The Azores pelagic longline, Portuguese mainland pelagic longline, and the foreign pelagic longline fisheries targeting swordfish (*Xiphias gladius*) and blue shark (*Prionace glauca*);

iii) The pole and line tuna fishery (including the live-bait);

iv) The small-size pelagic fisheries targeting mostly blue jack mackerel (*Trachurus picturatus*) and chub mackerel (*Scomber colias*);

v) The drifting deep-water longline targeting black scabbardfish (*Aphanopus carbo*) (Machete, Morato, & Menezes, 2011; Morato, et al., 2016);

vi) The commercial coastal invertebrates;
vii) The recreational fishing;
viii) And the squid (*Loligo forbesii*) fisheries.

The bottom hook and line fishery targeting deep water and demersal species is the main fishery in the Azores in terms of landed value, number of boats and jobs (Carvalho, Jones, & Isidro, Defining scale in fisheries. Small versus largescale fishing operations in the Azores., 2011). It is a small-scale fishery operating from coastal areas to offshore seamounts, within ICES sub-area 10, all year round. Total landings of the commercial bottom fisheries contributing in average to 40% of all landed weight in the Azores. Considering the landed value is by far the most valuable representing about 75% of all landed value in the Azores. The current active fleet that operates with hook and lines is composed by 463 vessels, which represent 80% of the regional fishing fleet (SRMCT, 2018). It comprises about 2,500 fishermen and for many families it represents the only form of income. It should also be noted that many fishing communities are located in remote villages with few employment alternatives other than fishing.
Furthermore, in the Azores occurs other fisheries component, the small scale coastal fisheries or artisanal fisheries (Morato T. , Description of environmental issues, fish stocks and fisheries in the EEZs around the Azores and Madeira, 2012; Ojamaa, 2015). The Azorean artisanal fisheries are characterized by:

i) Traps that are being used both for invertebrates and fish but data on their catch composition or catch amounts were not found in the literature (Morato T. , Description of environmental issues, fish stocks and fisheries in the EEZs around the Azores and Madeira, 2012);
ii) Coastal net fisheries, targeting mostly the species parrotfish (*Sparisoma cretense*), grey mullet (*Chelon labrosus*), Atlantic bonito (*Sarda sarda*), yellowmouth barracuda (*Sphyraena viridensis*), pompano (*Trachinotus ovatus*), white seabream (*Diplodus sargus*) and salema (*Sarpa salpa*) (Morato T. , Description of environmental issues, fish stocks and fisheries in the EEZs around the Azores and Madeira, 2012). This fisheries is performed in vessels less than 12 m long the set gill nets dominate as main gear (Ojamaa, 2015);
iii) And hand collecting.

Fishing fleet

The Azores fleet is dominated by small-scale vessels (Carvalho, Jones, & Isidro, Defining scale in fisheries. Small versus largescale fishing operations in the Azores., 2011; Morato T. , Description of environmental issues, fish stocks and fisheries in the EEZs around the Azores and Madeira, 2012) with lengths less than nine meters which (Ojamaa, 2015), despite decreasing over time, still account for around 62% of the Azorean fishing fleet in 2018 (Figure 1). Oppositely, the large-scale or semi-industrial vessels (i.e. > 16 m) account for around 5% of the whole fleet.

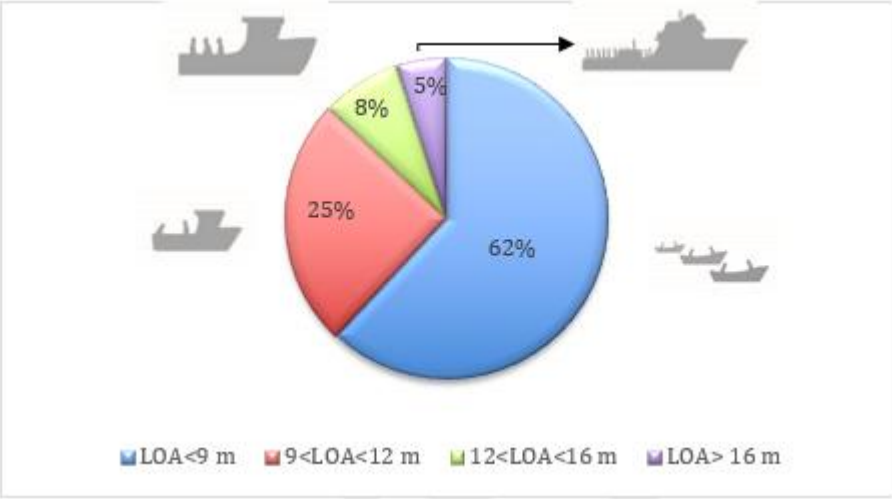


Figure 1.Fleet composition of the Autonomous Region of the Azores in 2018 by length classes.

The vast majority of the regional fleet (70% of the vessels), given their size, have their operating area limited to 6 nautical miles away from the coast and only 18% can operate at distances greater than 30 miles (Figure 2).

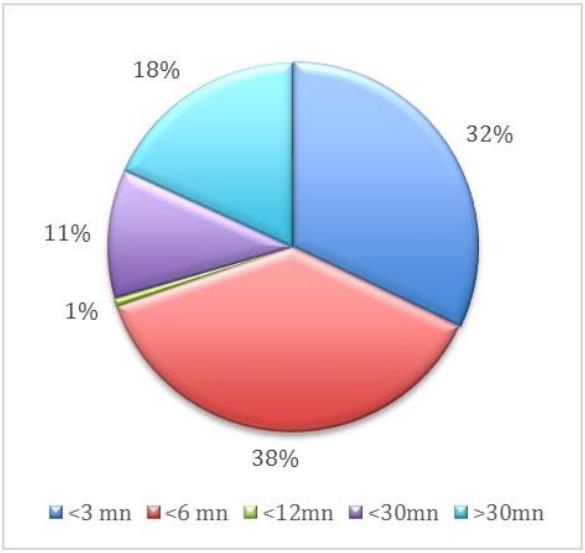


Figure 2. Operating area of the Azorean fishing fleet.

The evolution of the number of fishing vessels in the Azores during the period 1991-2018 is shown in Figure 3. As a result of a set of incentives created in the Region to restructure the fishing sector and provide it with adequate technical conditions, the number of licensed vessels has declined significantly over the last 27 years (-43%). In 1992 the fishing fleet was composed by 959 vessels while in 2018, 548 vessels were licensed to fish in the Region with a total capacity of around 6800 GRT and engine power of 41500 kW (SRMCT, 2018).

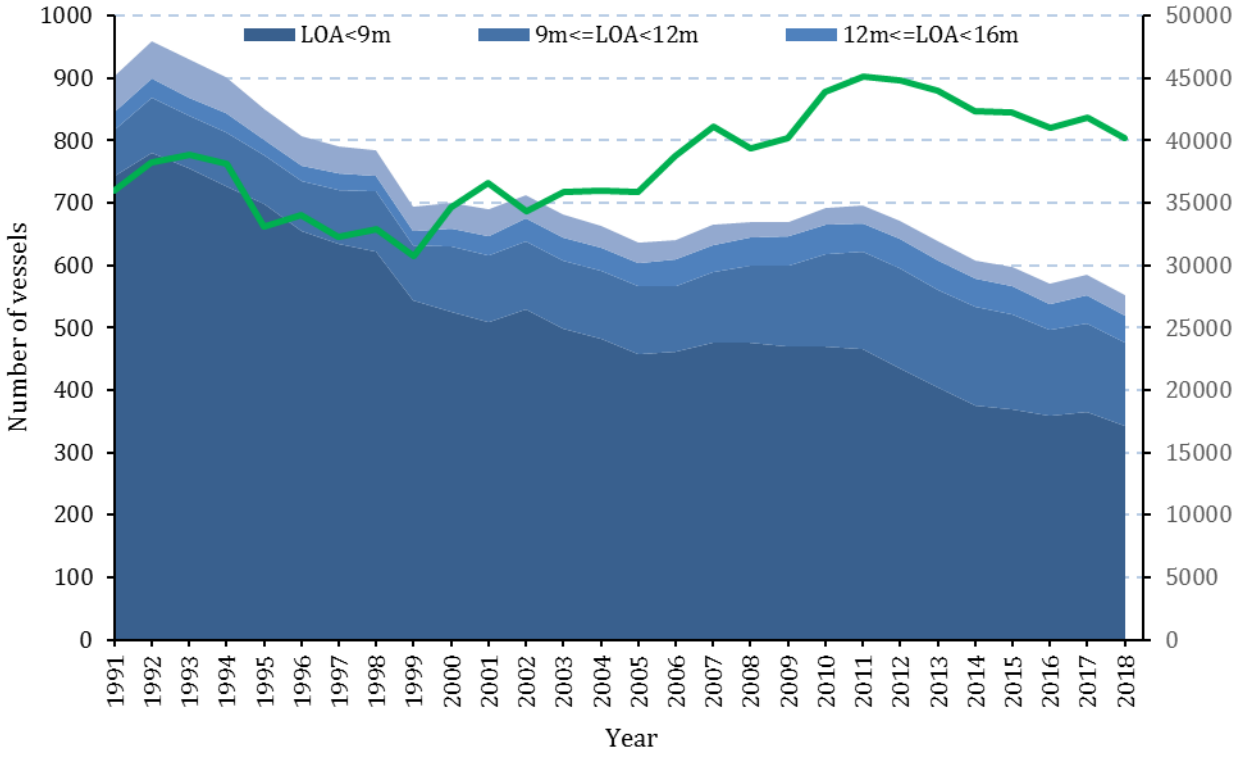


Figure 3. Evolution of the number of licensed fishing vessels and capacity in the Azores between 1991 and 2018.

The Region has also been reducing the number of licenses to fish with trammel nets and bottom longlines (Figure 4) favoring the handline fishing gear. Additionally, following some experiment of deep-sea bottom trawling to target orange roughy (*Hoplostethus atlanticus*), that were undertaken in 2001 and 2002 (Melo & Menezes, 2002), the Regional Government of the Azores (RGA) required deep-sea bottom trawling to be forbidden inside the Azores EEZ in order to keep the sustainability of the fishing sector. This prohibition of deep-sea bottom trawling became an EC regulation in 2005 (EC 1568/2005) after the RGA's request.

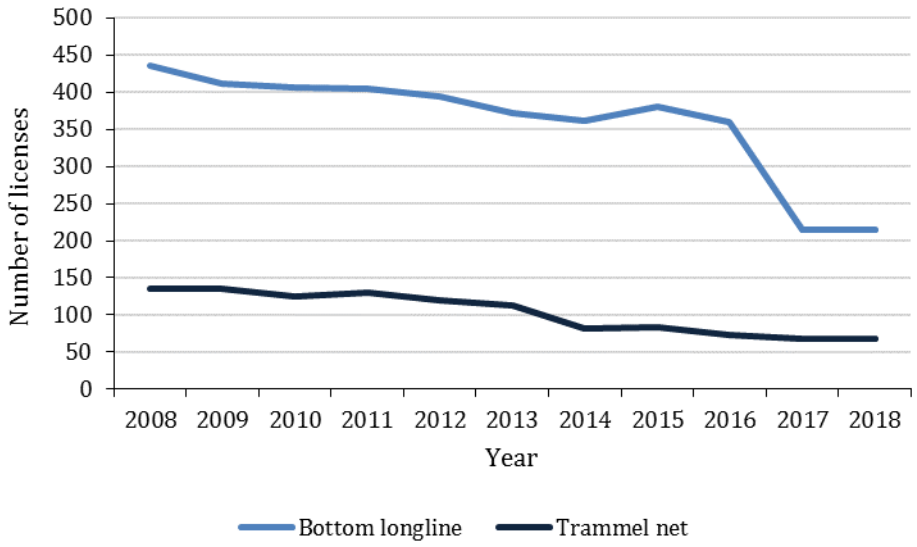


Figure 4. Evolution of the number of licensed fishing vessels to fish with bottom longline and trammel net in the Azores between 2008 and 2018.

Of the 580 vessels licensed in 2019, 58% have length less than 12m with a total capacity of around 3712 GRT and engine power of 16245 kW. This segment of the fleet operates mainly near the islands' coast or on the nearest seamounts. About 5% belong to the segment 12m-24m with a total capacity of around 158 GRT and engine power of 3851 kW. The segment with length overall higher than 24m represents 3% of the entire fleet. This segment operates exclusively on seamounts on intermediate (200-700m) and deep (>700m) strata (SRMCT, 2018).

The fishing fleet is distributed by 11 registry ports in the Azores archipelago (INE, 2019). However, the main ports in the Azores are 14:

- Port of Ponta Delgada (São Miguel Island);
- Port of Vila do Porto (Santa Maria Island);
- Port of Praia da Vitória (Terceira Island);
- Port of Angra do Heroísmo (Terceira Island);
- Port of Praia da Graciosa (Graciosa Island);
- Port of Horta (Faial Island);
- Port of São Roque do Pico (Pico Island);
- Port of Madalena do Pico (Pico Island);
- Port of Lajes do Pico (Pico Island);
- Port of Velas de São Jorge (São Jorge Island);
- Port of Calheta de São Jorge (São Jorge Island);
- Port of Lajes das Flores (Flores Island);
- Port of Poças (Flores Island);
- Port of Casa (Corvo Island).

Fishing Licenses in the Azores

The Azorean fleet is classified as polyvalent with licenses to fish with several fishing gears that may vary throughout the year according with the abundance and/or price of the target species. In 2019, a maximum of 9 licenses to fish with a certain gear was given to only one boat being the mean for the entire fleet 4 licenses per boat, it means that the same boat can use 4 different gears during the year. A higher number of licenses was given for handline accounting 27% of the total followed by pole and line (20%). The lower figure was achieved for drift longline with 5 licenses. Figure 5 showed the number of licenses attributed by group of gear in 2019.

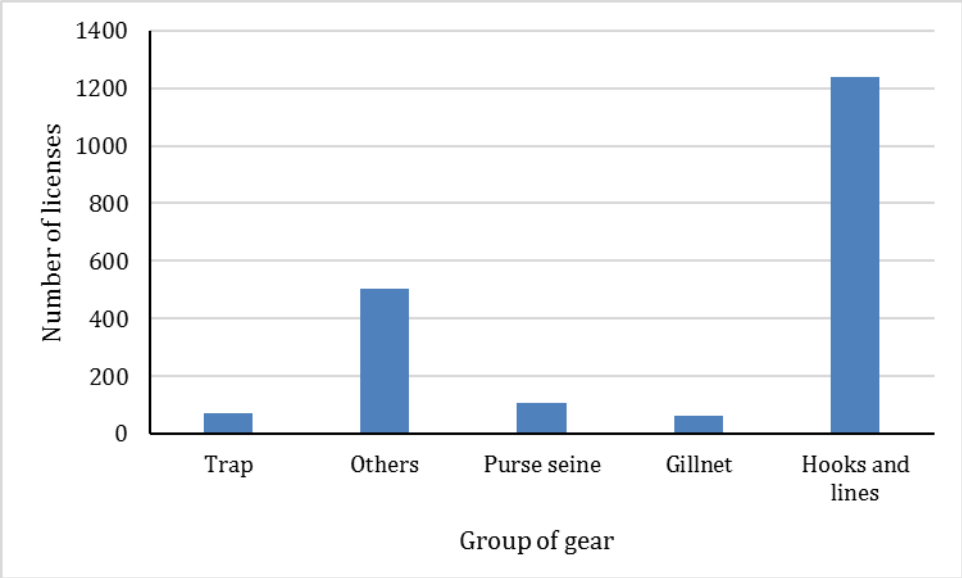


Figure 5. Number of licences by gear group in 2019.

As shown in Figure 6 the fleet segment below 12 m have a higher diversity of fishing gears. In fact, this is the segment most represented in the Azorean fleet as well as the hooks and lines fishing gears.

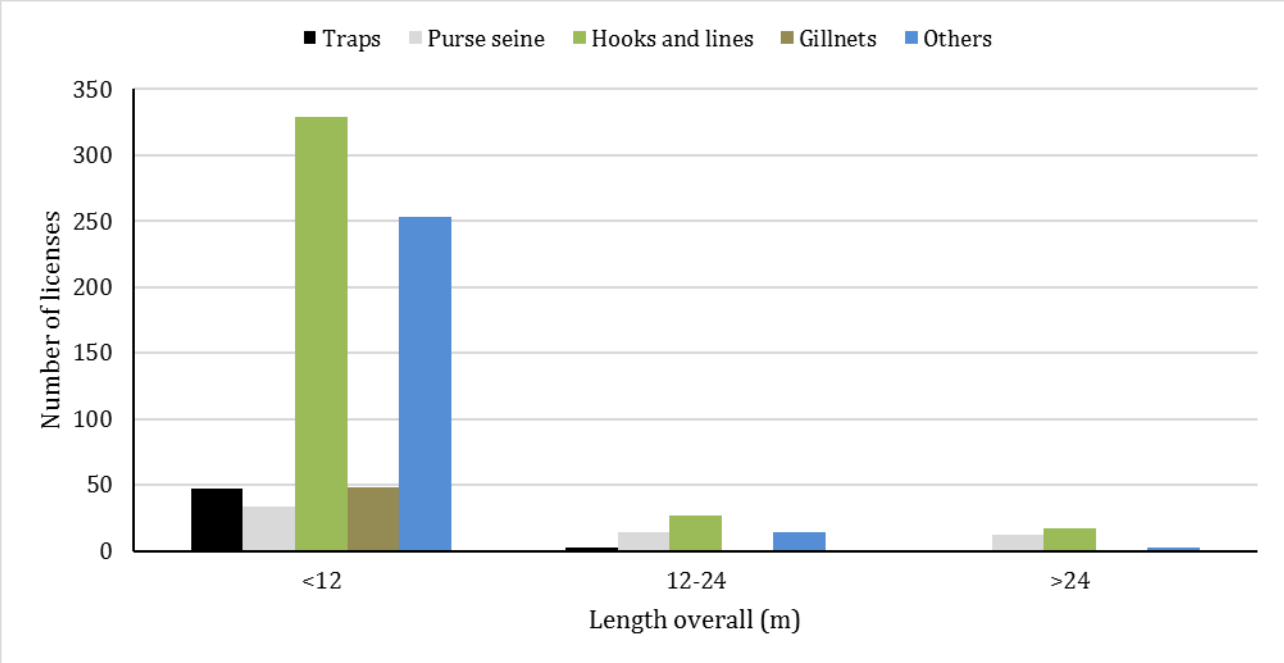


Figure 6. Number of licenses by gear and fleet segment.

Landings composition

During the period between 1994 and 2017, the average annual landings made in archipelago's fish auctions represented 11,994 tons corresponding to approximately 28.4 million euros. The fish traded in the auctions present a decreasing trend since the 2010 as a result of a significant reduction in tuna catches in the Azorean Seas (Figure 7). However, it should be noted that fish traded in the

Region's auctions during 2017 amounted to about 29.5 M €, which represent a significant increase when compared to the value recorded in 2016 (SRMCT, 2018).

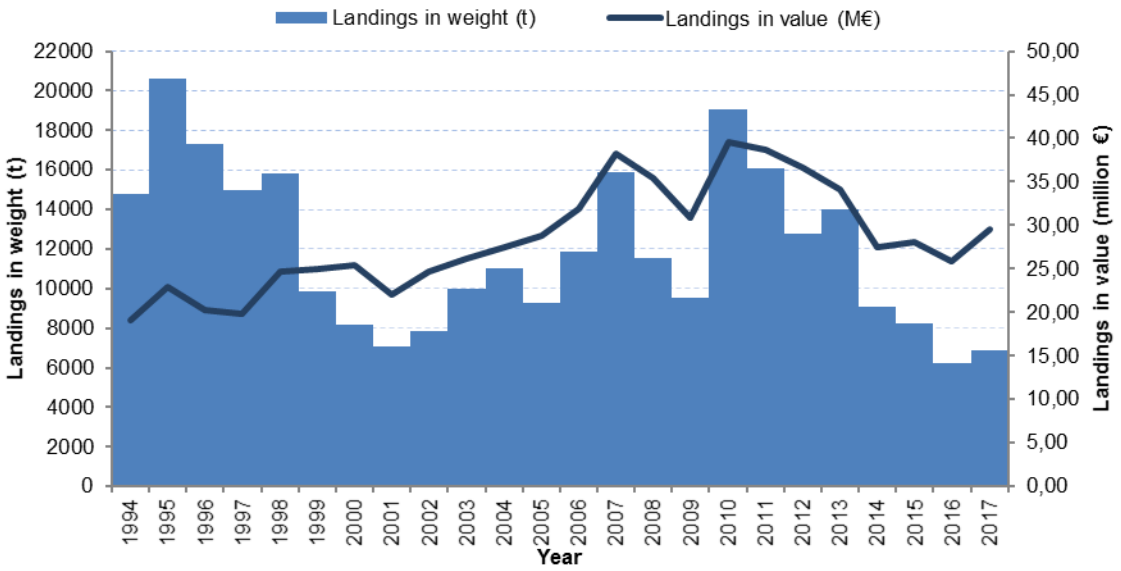


Figure 7. Evolution of landings by weight (tonnes) and value (million euros) during the period between 1994 and 2017 (Source: Statistical Regional System and Regional Auction).

The analysis of catch composition per species group revealed that during the period between 1994 and 2017, landings by weight were dominated by pelagic species, which represented an average of 63% of the total landings (Figure 8). Considering the landings by value, it is possible to verify that the demersal species represent about 61% of the total value traded in the region auctions (Figure 9).

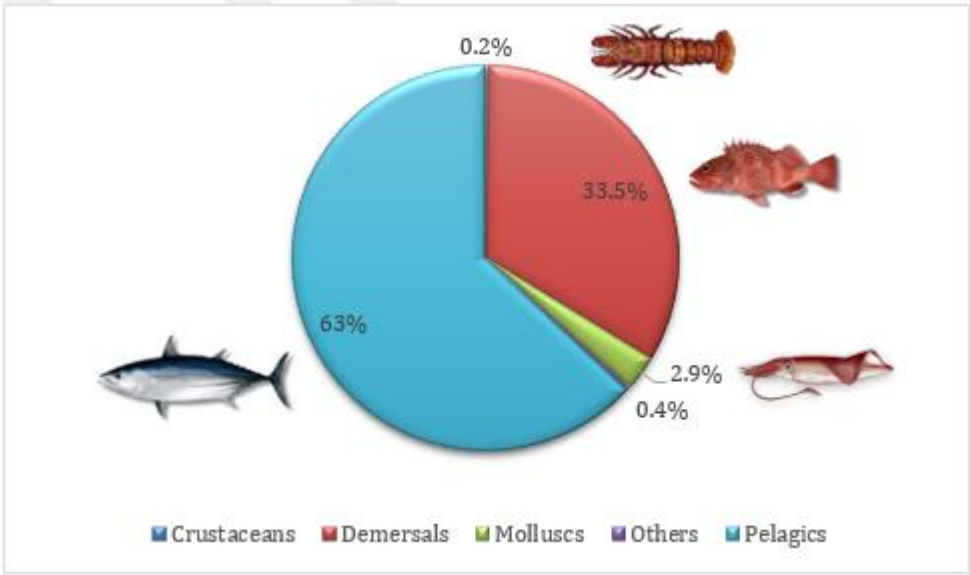


Figure 8. Relative composition of landings by weight during the period between 1994 and 2017 (Source: Statistical Regional System and Regional Auction).

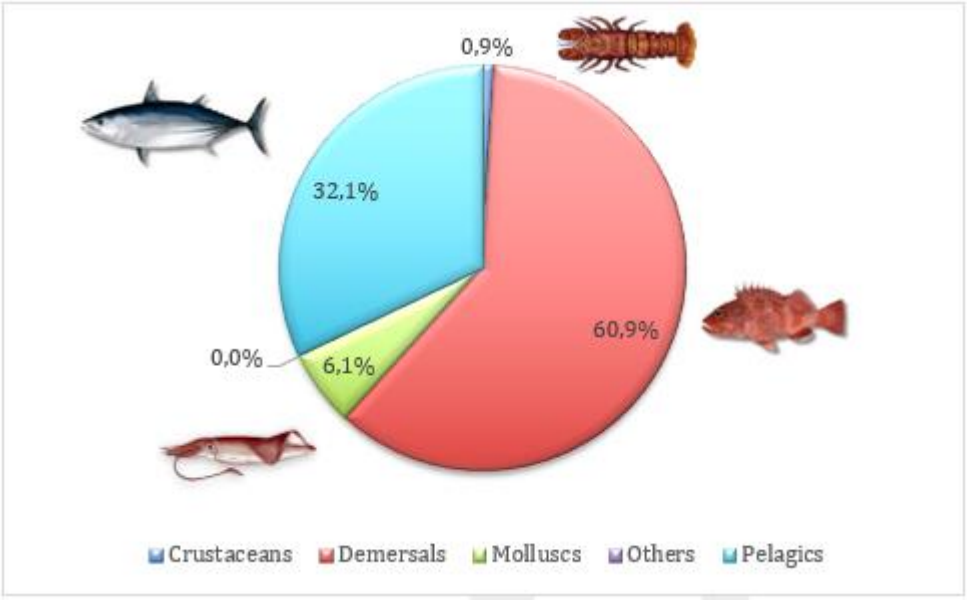


Figure 9. Relative composition of landings by value during the period between 1994 and 2017 (Source: Statistical Regional System and Regional Auction).

Regional Fisheries System

In the Azores, according to the Regional Regulatory Decree n. ° 4/2015/A, of February 20, the Regional Directorate for Fisheries (DRP), which is part of the Regional Secretariat for the Sea, Science and Technology (SRMCT), is responsible for contributing to the definition of the regional policy for fisheries and aquaculture, including the processing industry and related activities, as well as for guiding, coordinating and controlling its execution.

The Lotaçor - Serviço de Lotas dos Açores, S.A., belongs to the public business sector of the RAA and its purpose is to carry out all first sale operations of control and liaison between the extractive subsector and the consumer, as well as support to the fishing industry and its ports in the nine islands of the archipelago through holding of the auctions and refrigeration and freezing facilities and/or equipment. It also operates services of general public interest at farm level, provision of services and investments in fishing ports and vessels of the Region, as well as a social role among fishing communities. Lotaçor is doubly supervised by the SRMCT and the Vice-Presidency of Government, Employment and Business Competitiveness.

The Regional Inspection of Fisheries (IRP) is an entity of the SRMCT with administrative autonomy, which is responsible for planning, coordinating and carrying out, in collaboration with other bodies and institutions, the monitoring and control of fishing, aquaculture and related activities.

The dissemination of decrees and regulations regulating fishing activities in the Region, the sharing of information on legislation to carry out the activity, the marketing of fish and the rules applicable to its production are mainly done via producer organizations, ship owners' associations or fishermen, business associations and trade unions, thus making cooperativism and associativism of especial importance in the Azorean fishing industry.

Among the several organizations/associations, are included the Azores Fisheries Federation (FPA) which defends and represents the fishermen's associations of the nine islands of the Azores; the Association of Producers of Demersal Species of the Azores (APEDA), which ensures rational

demersal fishing activity among the members; the *Cooperativa Porto de Abrigo*, an organization of producers and fishermen's unions; the Association of Tuna and Similar Producers of the Azores (APASA) representing the tuna owners; Pão do Mar, association of fish canning industry of the Azores; and the Association of Fish Merchants of the Azores (ACPA), which represents the companies related to the sector.
In the Azores, occurs 24 Fishing Associations and three GAL (Local Action Groups) associated to fisheries sector (source DRAM and DRP, 2019). Below it is possible consult the complete list.

Fishing Associations:
- Associação de Pescadores da Ilha do Corvo;
- Associação Açoreana de Pesca Desportiva de Mar;
- Associação de Armadores de Pesca Artesanal do Pico;
- Associação de Mulheres na Pesca nos Açores - Ilhas em Rede (Rede de Mulheres da Pesca);
- Associação de Pescadores da Ilha de Santa Maria;
- Associação de Pescadores da Ilha de São Jorge;
- Associação de Pescas de Rabo de Peixe;
- Associação dos Pescadores Florentinos;
- Associação dos Pescadores Graciosenses;
- Associação Pesca Lúdica Açores;
- Associação Terceirense de Armadores;
- Associação de Conserveiros de Peixe dos Açores - Pão-Do-Mar;
- Associação de Produtores de Atum e Similares dos Açores;
- Associação de Produtores de Espécies Demersais dos Açores;
- Associação dos Comerciantes de Pescado dos Açores;
- Associação SeteMares;
- Associação Marítima de Pescas e Aquicultura da Ilha Terceira;
- Associação de Produtores de Amêijoa da Fajã de Santo Cristo;
- Bom Porto - Associação de Pescadores da Lagoa;
- Associação de Apanhadores do Pico;
- Cooperativa de Economia Solidária Pescadores de Ribeira Quente C.L.R;
- Cooperativa de Pesca Açoriana, OP. CRL;
- Sindicato de Pescadores da Ilha Terceira;
- Sindicato Livre dos Pescadores, Marítimos e Profissionais Afins dos Açores.

Fisheries Local Action Groups:
- MarAçores Oriental (GAL Pescas);
- Federação das Pescas dos Açores;
- Porto de Abrigo, Organização de Produtores de Pesca, CRL.

Additionally, the numbers of associates in the Azores on December 31 of 2018 were 518, representing 24.4% of the total of the associates in Portugal (Figure 10) (INE, 2019).

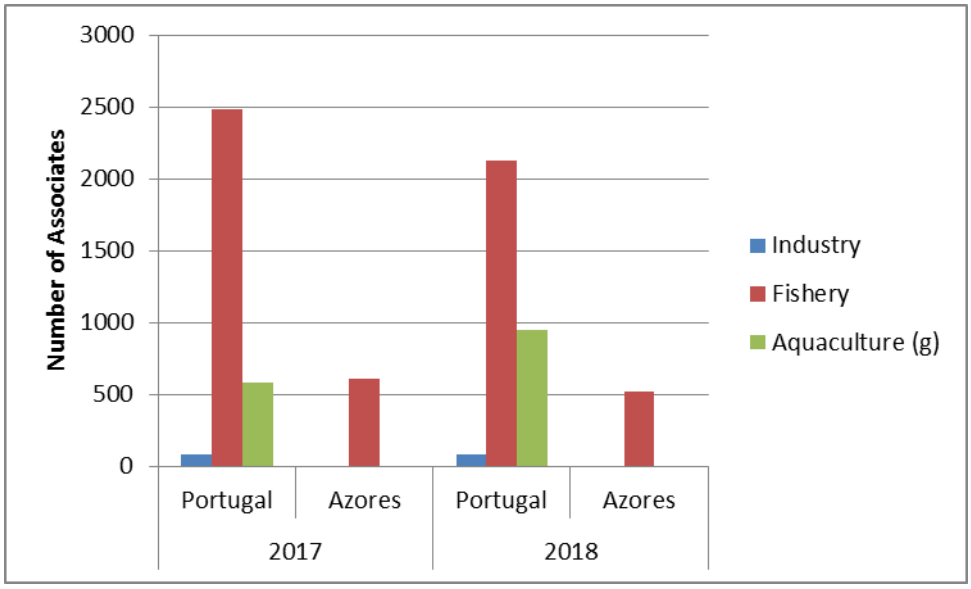


Figure 10. Number of associates of Associations of fishermen, aquaculture, markets and manufacturing industry in Portugal and Azores, in 2017 and 2018 (Source: DGRM in the report INE, Estatísticas da Pesca 2018).

Legal framework and constraints

This section had the collaboration of the MarSP Deliverable D.6.5. (MSP Governance Analysis of the Macaronesia) (Pallero, Cordero, García-Onetti, García-Sanabria, & Andrés, 2019).

The Autonomous Region of the Azores was constitutionally established by the Portuguese Republic in 1976, with its own government, political and administrative status. The fisheries sector was recognized in the Constitution of the Portuguese Republic (Law-Decree n.º 278/87, of June 7) as belonging to the exclusive competences of the Government of the Azores (Regional legislative decree n.º 15/89/A, of August 25). However, by joining the European Community, where the Azores are considered as one of the Outermost Regions (Articles n.º 349 and n.º 355 of the Treaty on the Functioning of the EU), the fisheries policy power has changed to European Union under the Common Fisheries Policy (CFP). The Government of the Azores has responsibility for the management of the fishing industry and commercialization of fish products in the Azorean region and in the development and implementation of the framework regulated by Regional Legislative Decree n.º 29/2010/A, of 9 November (altered by Regional Legislative Decree n.º 31/2012/A, of July 6), with rules adapted to the specific characteristics of the Azores maritime territory. The document sets regulations relating to fisheries on inland waters and territorial waters, aiming for the conservation, management and operation of sustainable use of marine resources: i) legal limits on fishing by regional vessels; ii) allocation of quotas, fishing licenses and authorized maximum catch; iii) fishing gears; iv) minimum sizes of fish, crustaceans and molluscs; v) areas or periods of fishing ban or restriction; vi) authorization and licensing regimes; vii) classification of regional fishing vessels; viii) loads of regional fishing vessels; ix) maritime registration and its classification, category and access requirements and functions, and its certification; x) inspection and administrative misdemeanor; xi) fishing ports and villages (Santos R. , 2017).

In the following list it is possible to verify the legislation in force for the fisheries sector in the Autonomous Region of the Azores (Table 1). Part of the documents have a regional scope[1].

[1] Additional related legislation might be found at the Azores Government Portal: https://www.azores.gov.pt/Gra/SRMCT-PESCAS/menus/principal/Legisla%C3%A7%C3%A30/

Table 1. Main legal documents ruling the fisheries sector in the Azores.

Regional Law	Observations
Main regulations	
Regional legislative decree n.° 29/2010/A, of November 9	which defines the Legal Framework for Azorean Fisheries, amended and republished by Regional legislative decree n.° 31/2012/A, of July 6.
Regional legislative decree n.° 15/2012/A, of April 2	which approves the legal regime of nature conservation and protection of biodiversity.
Legislative order n.° 15/2017, of May 16	which determines the criteria and conditions related to the licensing for the exercise of the fishing activity.
Order decree n.° 4/2018, of January 22	which establishes the regulation of commercial fishing in the modality of line fishing in the Autonomous Region of the Azores.
Order decree n.° 73/2014, of November 7	which approves the license model for the exercise of commercial sea fishing in the Azores, with the aid of a fishing vessel registered in a port in the Autonomous Region of the Azores.
Order decree n.° 51/2013	it establishes norms regarding the licensing for the extraction of rolled pebble destined to be exclusively used in the preparation of professional fishing gear.
Regional Regulatory Decree n.° 1/2017/A, of March 15	which designates the competent authority for the application of the points system in the Autonomous Region of the Azores.
Size limits, seasons, closed areas, TAQs and quota	
Order decree n.° 21/2019, of March 19	which amends and republishes the Order decree n.° 74/2015, of June 15, which specifies the minimum sizes and closure periods applicable to marine organisms caught in the fishing territory of the Azores or by regional vessels, without prejudice to the minimum sizes and closed seasons laid down by Community rules.
Order decree n.° 94/2017, of December 28	which approves the regulation of specific access for the exercise of fishing and access to and permanence of vessels at Banco Condor.
Order decree n.° 55/2016, of June 21	which regulates fishing in the maritime area around the Graciosa island.
Order decree n.° 54/2016, of June 21	which regulates fishing in the Ribeira Quente marine area.
Order decree n.° 53/2016, of June 21	which regulates the fishing of protected areas in the maritime zone around Faial and Pico islands.
Order decree n.° 87/2014, of December 29	which regulates the use of protected areas in the maritime zone around Santa Maria Island.
Order decree n.° 97/2018, of August 6	which regulates fishing in the maritime area "Quatro Ribeiras" in Terceira island.
Order decree n.° 73/2015, of June 15	fixing the maximum daily catch limit for commercial marine species *Patella aspera* (lapa-brava) and *Patella candei gomesii* (lapa-mansa) in the Autonomous Region of the Azores.
Order decree n.° 132/2018, of December 21	approving the regulations which set the total permitted catches for the red seabream and associated conditions for fishing vessels registered in the ports of the Autonomous Region of the Azores for 2019 and 2020.
Tourism-fishing	
Regional legislative decree n.° 36/2008/A, of July 30	which defines the legal framework for pescatourism in the waters of the Azorean subarea of the Portuguese EEZ.
Regional legislative decree n.° 23/2007/A, of October 23	which approves the regime of the Maritime Tourist Activity in the RAA. Amended by Regional legislative decree n.° 3/2017/A, of April 13.
Council Resolution of the Government n.° 39/2017, of May 9	which approves the new amounts of the fees to be charged for the issuance and endorsements of the maritime-tour operator licenses, exempting the pescatourism. Revoke the Council Resolution of the Government n.° 67/2013, of June 21.
Order decree n.° 45/2009, of June 4	which approves the licensing process and the registration books of the customers that are shipped and of the discharges made by theme in the development of the pescatourism activity.
Recreational fishing	
Legislative Order n.° 62/2007, of December 21	which regulates the licensing of recreational fishing in the RAA. Amended by the Legislative order n.° 19/2015, of May 8.
Regional legislative decree n.° 9/2007/A, of April 19	which approves the legal framework for recreational fishing in Azorean waters.
Vessels and port system	

Order decree n.° 53/2012, of May 14	which approves the models related to the crew role and relation of non-maritime individuals of regional fishing vessels. Amended by Order decree n.° 72/2014, of July 4.
Order decree n.° 105/2011, of December 30	which allows for exemption of regional fishing vessels of overall length of 12 meters or more and less than 15 meters from the requirement to use a satellite-based vessel monitoring system and the recording and transmission by electronic means of the fishing activity.
Government Council Resolution no. 161/2016, of December 23	approving the distribution of class D ports and fishing centers in the Azores.
Order decree no. 17/2014, of March 28	approving the regulations for the management of class D ports and fishing centers in the Azores.
Commercialization	
Regional legislative decree n.° 15/2016/A, of July 22	which defines the legal regime for the first sale of fresh fish in the RAA.
Order decree n.° 93/2016, of September 7	which establishes the rules which regulate the authorization to sale the fresh fish directly to the final consumer.
Order decree n.° 64/2014, of September 26	which establishes the minimum selling price for sale in the auction market of fresh fish caught cautiously as a result of the practice of infraction in relation to sea fishing, as well as the definition of the procedures to be carried out in situations where, for legal reasons or resulting from established rules, it is not possible to sale at fish auction markets.
Order decree n.° 76/2013, of September 30	which approves the regulation of the fish auction market of the Autonomous Region of the Azores.
Order decree n.° 24/2018, of March 19	which establishes the procedures and means involved in the operations inherent to the first sale of fresh fish unloaded in the Autonomous Region of the Azores, as well as the general operation of the auctions, warehouses, collection points and collection vehicles. Amended by the Order decree n.° 42/2019, of June 18.
Fishing methods	
Order decree n.° 79/2017, of October 18	which approves the regulation of the trap fishing method.
Order decree n.° 113/2015, of August 10	which prohibits fishing for "fazer mancha" by inshore fishing vessels, less than 15 nautical miles from the coast, as well as by local fishing vessels, less than 6 nautical miles from the coast and beyond 12 nautical miles from the coast.
Order decree n.°116/2018, of October 25	which approves the regulation for line fishing in the Autonomous Region of the Azores.
Order decree n.° 128/2018, of December 3	amendment and republishing, in its current version, of the Order decree n.° 66/2014, of October 8, which approves the restrictions to purse seine fishing and fishing with lift nets.
Order decree n.° 65/2014, of October 6	which approves the regulations applied to purse seine fishing and fishing with lift nets.
Order decree n.° 7/2012, of January 11	which prohibits the landing by fishing vessels in the ports of the Region of any fish caught using fishing trawls using bottom trawls or similar towed nets operating in contact with the bottom.
Order decree n.° 91/2005, of December 22	which regulates fishing with gillnets in the Autonomous Region of the Azores. Amended by Order decree n.° 24/2006, of April 27, and by the Order decree n.° 34/2006, of April 27, and by the Order decree n.° 48/2006, of June 22.
Harvesting	
Order decree n.° 57/2018, of May 30	which approves the regulation establishing the legal framework harvesting marine species in the Azores. Amended by Order decree n° 69/2018, of June 22.
National Law	Observations
Main regulations	
Law-Decree n.° 10/2017, of January 10	establishing a community control system in order to ensure compliance with the rules of the Common Fisheries Policy and introducing changes to Law-Decree n.° 278/87, of July 7, that regulates the practice of sea fishing and the cultivation of marine species mended by Law-Decree n. ° 218/91, of June 17 and by Law-Decree n.° 383/98, of November 27.
Law-Decree n.° 278/87, of July 7	which regulates the practice of sea fishing and the cultivation of marine species, amended by Law-Decree no. 218/91, of June 17, Law-Decree n.° 383/98, of November 27, Law-Decree no. 10/2017, of January 10, Law-Decree n.° 40/2017, of April 4 and Law-Decree n.° 35/2019, of March 11.

Implementing Decree n.º 16/2015, of September 16	which proceeds with the seventh amendment and republishing of the Implementing Decree n.º 43/87, of July 17, which defines national measures for the conservation of living resources applicable to fishing in waters under Portuguese sovereignty and jurisdiction.
Law-Decree n.º 101/2013, of July 25	which proceeds with the third amendment and republishing of the Law-Decree n.º 246/2000, of September 29, which defines the legal framework for the exercise of sea fishing directed at animal and plant species for recreational purposes.
Law n.º 15/97, of May 31	that establishes the legal framework of the contract on board fishing vessels. Altered by Law n.º 29/2018 of 16 July.
Law-Decree n.º 265/72, of July 31	that establishes the General Regulation of the Captaincies, in its current version.
TACs and Quota	
Order decree n.º 161/2017, of May 15	establishing the key for allocating the quota of emperors (*Beryx* spp.) granted by European regulations to Portugal in Union waters and international waters of the sub-areas III, IV, V, VI, VII, VIII, IX, X, XII and XIV, of the International Council for the Exploration of the Sea (ICES) by the fleet registered in the Mainland and by the fleet registered in the Autonomous Region of the Azores.
Order decree n.º 286-C/2014, of DEcember 24	which defines the management model for the Portuguese share of mackerel (*Scomber scombrus*) in the areas VIIIc, IX and X defined by the International Council for the Exploration of the Sea (CIEM) and in the division 34.1.1 defined by the Fisheries Committee for the Eastern Central Atlantic (CECAF). Amended by Order decree n.º 322/2016, of December 16 and by Order decree n.º 62/2019, of February 14.
Order decree n.º 90/2013, of February 28	which defines the management model and the allocation of quotas for the fishing of swordfish with surface longline in the Atlantic Ocean and the Mediterranean Sea. Amended by Order decree n.º 119/2014, of June 3, Order decree n.º 247/2016,, of September 14, Order decree n.º 330-B/2016, of December 21 and Order decree n.º 271-A/2018, October 1.
Order decree n.º 153/2013, of April 17	which defines the increase in the share of the national mackerel quota (*Scomber scombrus*) available to the national fleet operating in the VIIIc, IX and X areas of the CIEM (International Council for the Exploration of the Sea) and division 34.1.1 by the Fisheries Committee for the East Central Atlantic (CECAF).
Order decree n.º 20/2013, of January 22	which prohibits directed fishing of certain species by allowing by-catches only in a given percentage. Amended by Order decree n.º 388-B/2015, of October 29, Order decree n.º 226/2016, of August 22, Order decree n.º 243/2016, of September 6 and Order decree n.º 293/2016, of December 18.
Order decree n.º 90/2013, of February 28	which defines the management model and the allocation of quotas for the fishing of swordfish with a surface longline in the Atlantic Ocean and the Mediterranean Sea. Amended by Order decree n.º 119/2014, of June 3, by Order decree n.º 247/2016, of September 14, by Order decree n.º 330-B/2016, of December 21 and by Order decree n.º 271-A/2018, of October 1.
Order decree n.º 898/2004, of July 22	which sets the share of swordfish for 2004 on the Mainland and in the Autonomous Regions.
Monitoring	
Law-Decree n.º 310/98, of October 14	establishing and regulating the system of continuous monitoring of fishing vessels by satellite for the purpose of monitoring and controlling the exercise of fishing activity.
Order decree n.º 31/99, of June 4	establishing the Observation Program for the Fisheries of the Azores (POPA).
EU Law	**Observations**
Main regulations	
Regulation (EU) 2017/2092 of the European Parliament and of the Council, of November 15	amending the Regulation (UE) n.º 1380/2013 of the European Parliament and of the Council, of December 11 of 2013, on the common fisheries policy.
Regulation (EU) 2015/812 of the European Parliament and of the Council, of May 20	on the landing obligation, in its current version.
Commission Delegated Regulation (EU) 2015/242, of October 9	which establishes detailed rules for the operation of the Advisory Councils under the Common Fisheries Policy.

Regulation (EC) n.° 218/2009 of the European Parliament and of the Council, of March 11	regarding the submission of nominal catch statistics by Member States fishing in the north-east Atlantic, in its current version.
Regulation (EU) 2019/1241 of the European Parliament and of the Council, of 20 June 2019	concerning the conservation of fisheries resources and the protection of marine ecosystems through technical measures, implicitly repealing Council Regulation (EC) n.° 1568/2005 of 20 September 2005 as regards the protection of deep-water coral reefs from the effects of fishing in certain areas of the Atlantic Ocean.
Council Regulation (EC) n.° 734/2008, of 15 July 2008	concerning the protection of vulnerable marine ecosystems in the high seas from the adverse impacts of bottom fishing gears.
Council Regulation (EC) n.° 1954/2003, of November 4	concerning the management of the fishing effort relating to certain community fishing areas and resources.
Regulation (EU) 2017/2107 of the European Parliament and of the Council, of November 15	establishing management, conservation and control measures applicable in the area covered by the Convention of the International Commission for the Conservation of Atlantic Tunas (ICCAT).
Implementing Regulation (EU) n.° 2017/787	which establishes a minimum conservation reference size for the seabream in the northeastern Atlantic Ocean.
Commission Delegated Regulation (EU) n.° 2015/98, of November 18	concerning the implementation of the Union's international obligations in accordance with the article 15.°, n.° 2, of the Regulation (UE) n.° 1380/2013 of the European Parliament and of the Council under the International Convention for the Conservation of Atlantic Tunas and the Convention on Future Multilateral Cooperation in the Northwest Atlantic Fisheries. Amended by the Delegated Regulation (EU) 2016/171 of the Commission, of November 20 of 2015, by the Delegated Regulation (EU) 2017/1352 of the Commission, of April 18 of 2017 and by the Delegated Regulation (EU) 2018/191 of the Commission, of November 30.
Council Regulation (CE) n.° 520/2007, of May 7	laying down technical measures for the conservation of certain stocks of highly migratory species and repealing Regulation (CE) n.° 973/2001. Amended by the Regulation (CE) n.° 2017/2107 of November 15 (CE), that establish the management, conservation and control measures applicable in the area covered by the Convention of the International Commission for the Conservation of Atlantic Tunas.
Commission Regulation (EU) n.° 227/2013 of the European Parliament and of the Council, of March 13	amending the Regulation (CE) n.° 850/98 for the conservation of fishery resources through technical measures for the protection of juveniles of marine organisms.
Council Regulation (EC) n.° 850/98 of 30 March	relatively to the conservation of fishery resources through technical measures for the protection of juveniles of marine organisms.
Council Regulation (EU) n.° 2018/120, of January 23	which fixes, for 2018, for certain fish stocks and groups of fish stocks, the fishing opportunities applicable in Union waters and those applicable for Union fishing vessels in certain non-Union waters and amending the Regulation (EU) n.° 2017/127. Rectified by the rectification of the Council Regulation (EU) 2018/120, of 23 January 2018, and amended by the Council Regulation (EU) 2018/915, of 25 June 2018, by Implementing Regulation (EU) 2018/1496, of 8 October, and by the Council Regulation (EU) n.° 2018/1628, of January 23.
EU Regulation n.° 315/2014, of March 23	amending the Regulation (EU) n.° 43/2014 as regards certain catch limits.
Regulation (EU) n.° 640/2010 of the European Parliament and of the Council, of July 7	establishing a catch documentation program for bluefin tuna (*Thunnus thynnus*) and amending Regulation (EC) n.° 1984/2003.
Commission Implementing Decision 2013/432/EU of 13 August 2013	amending the Decision 2011/207/EU establishing a specific control and inspection program concerning the recovery of bluefin tuna in the Eastern Atlantic and Mediterranean.
Regulation (EU) 2017/1130 of the European Parliament and of the Council, of 14 June 2017	defining the characteristics of fishing vessels.
Commission Delegated Regulation (EU) n.° 1394/2014, of 20 October 2014	that establishes a refund plan for certain pelagic fisheries in the south western waters. Amended by Commission Delegated Regulation (EU) 2016/2377, of 14 October 2016, and by Commission Delegated Regulation (EU) 2018/188, of 21 November.

Regulation (EU) n.° 1026/2012 of the European Parliament and of the Council, of October 25	relative to certain measures for the conservation of fish stocks in relation to countries which permit unsustainable fishing.
Commission Implementing Regulation (EU) n.° 433/2012 of 23 May 2012	laying down detailed rules for the implementation of Regulation (EU) n.° 1236/2010 that establish a control and enforcement regime applicable in the area covered by the Convention on Future Multilateral Cooperation in the North-East Atlantic Fisheries. Amended by Commission Implementing Regulation (EU) 2015/746, of 11 May 2015.
Regulation (EU) n.° 1236/2010 of the European Parliament and of the Council, of 15 December 2010	establishing a control and enforcement regime applicable in the area covered by the Convention on Future Multilateral Cooperation in the North-East Atlantic Fisheries. Amended by Commission Delegated Regulation (EU) 2015/1341, of 12 March 2015, and Regulation (EU) 2016/96 of the European Parliament and of the Council, of 20 January 2016.
Commission Regulation (EU) n.° 468/2010, of 28 May 2010	establishing the EU list of vessels engaged in illegal, unreported and unregulated fishing. Amended by Commission Implementing Regulation (EU) 2017/2178, of 22 November 2017.
Commission Implementing Regulation (EU) n.° 404/2011, of 8 April	laying down detailed rules for the application of Council Regulation (EC) n.° 1224/2009 establishing a Community control system for ensuring compliance with the rules of the Common Fisheries Policy. Amended by Commission Implementing Regulation (EU) 2015/1962, of 28 October 2015.
Council Regulation (EC) n.° 1224/2009, of 20 November 2009	establishing a Community control system in order to ensure compliance with the rules of the Common Fisheries Policy. Amended by the Council Regulation (EU) n.° 1379/2013 of the European Parliament and of the Council, of 11 December 2013, by Regulation (EU) n.° 1380/2013 of the European Parliament and of the Council, of 11 December 2013, by Regulation (EU) n.° 508/2014 of the European Parliament and of the Council, of 15 May 2014, and Regulation (EU) 2015/812 of the European Parliament and of the Council, of 20 May 2015.
Regulation (EU) 2016/1627 of the European Parliament and of the Council, of September 14	establishing a multi-annual recovery plan for bluefin tuna in the Eastern Atlantic and Mediterranean.
Commission Implementing Decision 2014/156/EU, of March 19	establishing a specific control and inspection program for fisheries exploiting bluefin tuna stocks in the Eastern Atlantic and Mediterranean and swordfish in the Mediterranean and for fisheries exploiting sardine and anchovy stocks in the northern Adriatic.
Council Regulation (EC) n.° 2406/96, of 26 November	laying down common marketing standards for certain fishery products. Amended by Commission Regulation (EC) n.° 323/97, of 21 February 1997, by Council Regulation (EC) n.° 2578/2000, of 17 November 2000, by Regulation (EC) n.° 2495 / 2001, of 19 December 2001, and Commission Regulation (EC) n.° 790/2005, of 25 May 2005.
Commission Regulation (EC) n.° 517/2008, of June 10	laying down detailed rules for the application of Council Regulation (EC) n.° 850/98 as regards the determination of mesh size and the assessment of the thickness of the fishing line.
Commission Regulation (EC) n.° 1010/2009, of October 22	laying down detailed rules for the implementation of Council Regulation (EC) No 1005/2008 establishing a Community system to prevent, deter and eliminate illegal, unreported and unregulated fishing.
Council Regulation (EC) n.° 1936/2001 of September 27	laying down control measures applicable to fishing for certain stocks of highly migratory fish.

The Azorean fisheries management strategy is based on the EU Common Fisheries Policy (CFP), first implemented through Total Allowable Catches (TACs) for a number of species including some of the above mentioned species and for sharks as *Deania* spp., *Centrophorus* spp., *Etmopterus* spp., *Centroscymnus* spp., and *Dalatias licha* (EC Reg. 2340/2002; EC Reg. 2270/2004). In addition to the quotas, the Regional Government of the Azores has implemented technical measures over the years, such as minimum landing size or weight, season species closure, minimum mesh or hook size, limitation of licenses for certain types of fishing gear (e.g., temporal closures, and prohibition in the use of specific devices). One example is the regulation prohibiting deep bottom trawling, which became a European Commission regulation (EC 1568/2005, currently enforced by EU 2019/1241). Illegal, unregulated and unreported (IUU) fishing within the Azores was estimated (Pham et al., 2013) to be much higher than the official statistics (15%), excluding whales and catches landed

outside of the Azores. The low level of unreported catches in comparison with other regions is a reflection of the small scale nature of fisheries and also of the geographic isolation of the islands, and the small fishing community. Furthermore, for the purposes of national MSP, pursuant to Law n.º 17/2014 and Decree-Law n.º 38/2015, fishing is considered a common use, with the exception of fishing associated with fixed infrastructure, which implies space reserve, which lacks Titles of use of maritime space (TUPEM). This type of fishing does not exist in the Azores, only in the Algarve, and it is not expected to occur in the Archipelago.

Stakeholder's perception on the legal frameworkThe stakeholders' consultation developed in the context of the MarSP project allowed the gathering of information on stakeholder's perceptions about the Azorean legislative context of maritime sectors. Selected stakeholders include representatives of the regional and/or local administration and fishing associations were consulted through individual interviews. Stakeholders were asked if they agreed with the legislative context for fisheries and what type of changes would they recommend. In a general way, stakeholders identified the need for changes in the legal framework in the Azores for this maritime sector. It was referred that the existing legislation is sufficient but there is the need to rethink and adapt it considering the reality of the Archipelago and the fisheries sector, and to improve the capacity to implement and enforce it. Regulations should be improved in line with changes in blue growth and technological development and stakeholders/governmental agencies should work closer and improve cooperation. For a number of stakeholders, in some of the seamount and banks, fishing needs to be forbidden in order to allow the recovery of fish stocks (e.g. some stakeholders suggested banning fishing from these places for some days of the week, thus reducing fishing effort; reducing the number of hooks used in the bottom and surface longline fisheries is another alternative way). Also, for some stakeholders there is an urgent need to quantify the biomass of the existing marine resources, for example, by research projects. The resulting data would be an important support to decision making to make the necessary alterations to the legislation. Another issue that concerned stakeholders was related to the EU regulations on fisheries, as most feel they are not adapted to the reality of the Azores (e.g. modernization of the fleet required by the EU regulation is a major problem). Several stakeholders are of the opinion that bottom and surface longline licenses should be limited or even non-existent in the Azores and that measures should be taken by the Regional Government, since this fishing gear and its users are impacting the seamounts and banks of the Azores (e.g. some stakeholders' believe that this gear has the biggest impact on large pelagic species in the Azorean waters). For several stakeholders, the existing regional legislation on recreational fishing needs to be revised and more restrictions applied to its practice (e.g. it was mentioned that several professional fishermen gave up practicing the profession and dedicated themselves to recreational fishing since it is not supervised and has much less restrictions). Some stakeholders believe that with a rotating system of fishery by fishing zones (e.g. only allow fishing every two years in some areas) it is possible protect the marine resources. Also, some stakeholders agree that fishing licenses should be limited and there must be fishing quotas and these have to be fulfilled. The fishing quotas must have limits (study limits) and must take into account the livelihood of families. Stakeholders reported that is urgent create restrictive rules for professional fishing, in particular reducing catches. Also, end net fishing. For several stakeholders is urgent to create closed periods for fish species.

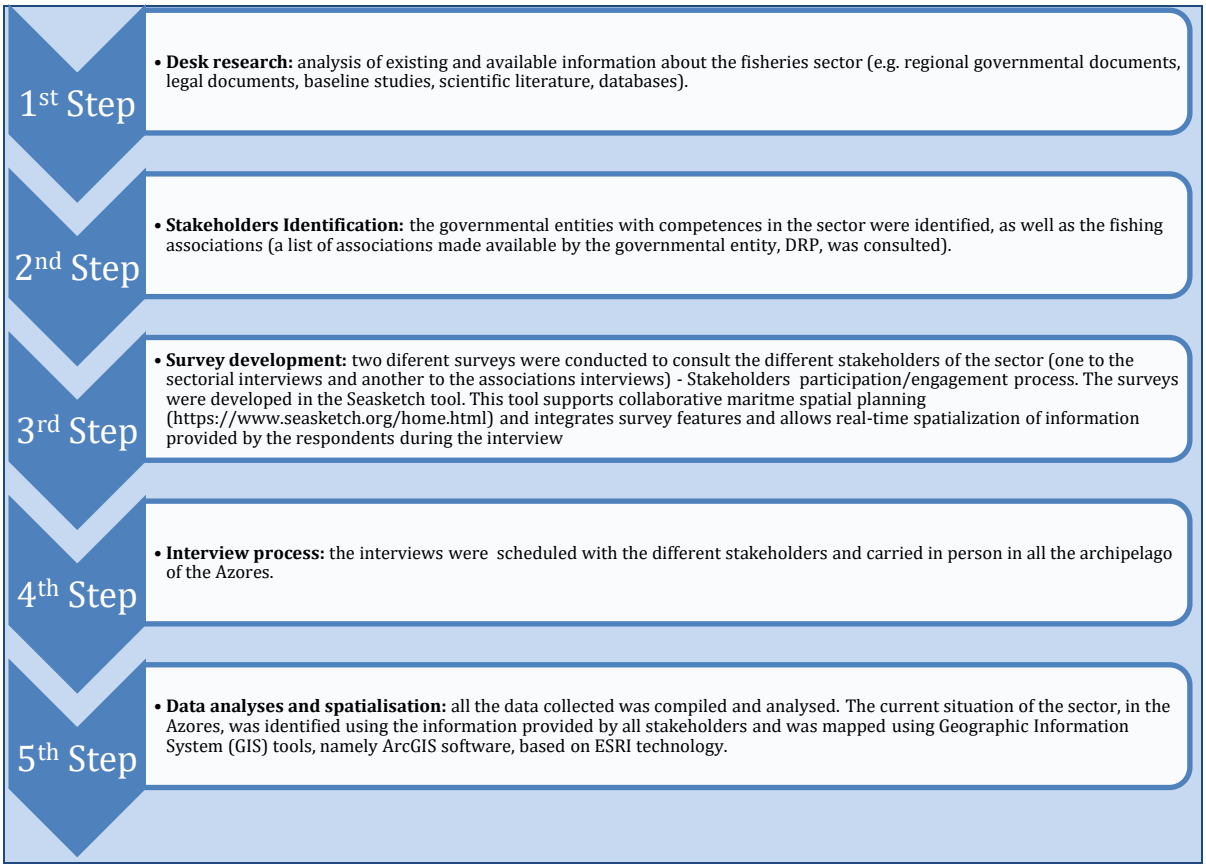
PART II

Methodology for mapping sector activity

Current spatial distribution

The methodology for mapping the current situation of the fisheries sector in the Azores is based on the available information. Databases were consulted. Also, consultation of the various stakeholders, namely governmental entities and fishing associations were performed. It is important to emphasise that, according to Kafas, et al. (Kafas, et al., 2017), the analysis of this sector within a participatory process with interviews to the interested parties to collect data and map fishing activities is crucial. Several databases, legislation as well as the list of associations, was made available by governmental entities with competence in the area of fisheries, namely the Regional Directorate for Fisheries (DRP).

The following diagram represents an outline of the methodology used to characterize the current fisheries sector in the Azores.



The current spatial distribution of areas for fisheries sector in the Azores is featured below and includes the following information (**Figure 11** to **Figure 19**) :

- Ports of the Azores with fishing cores/nucleus;
- Fish auction centers;
- Distances to the coast line defined by the Azorean fisheries legal framework (Regional Legislative Decree 31/2012 / A), which represent the areas where each type of vessel can exercise the activity;
- Most frequented areas/spots used for fishing, identified by stakeholders, during the

interviews;

- Spatial distribution of fishing effort (bottom longline fisheries) according to Diogo et al. (Diogo, Pereira, Higgins, Canha, & Reis, 2015);
- Azorean Fishing Territory (inland waters and territorial sea).

In general, and according to Diogo et al. (Diogo, Pereira, Higgins, Canha, & Reis, 2015), the areas < 50 NM from shore are the most important grounds in terms of fishing effort relatively to bottom longline fisheries (**Figure 15** to **Figure 19**). However, effort, and consequently landings, from the areas contiguous to the islands (< 12 NM) fell such that the fishing effort decreased. During the period that this study took place, was verified a strong intensification of fishing effort and production in areas 50-200 NM from shore, mainly on the seamounts situated on the Mid-Atlantic Ridge (M. A. R) banks.

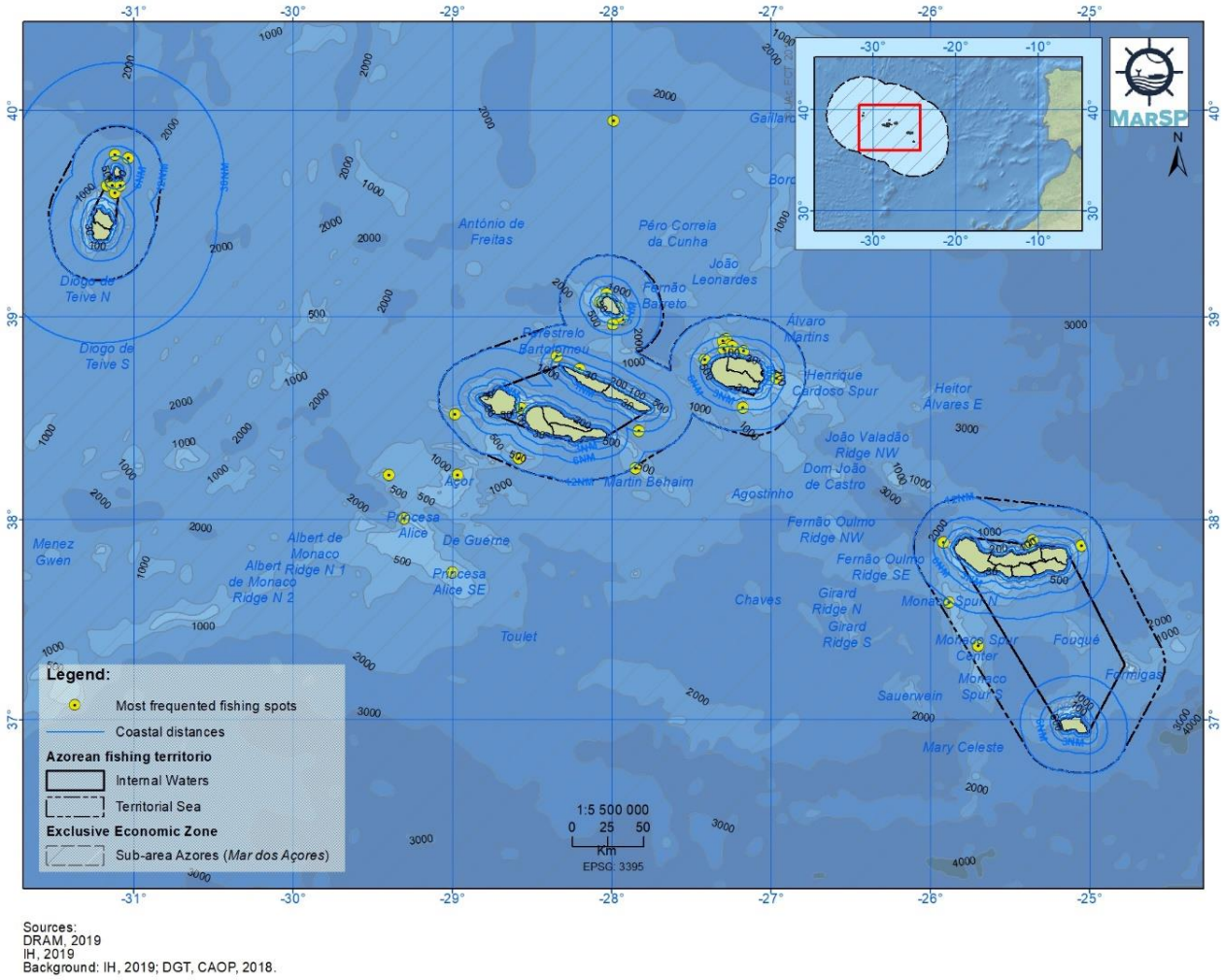
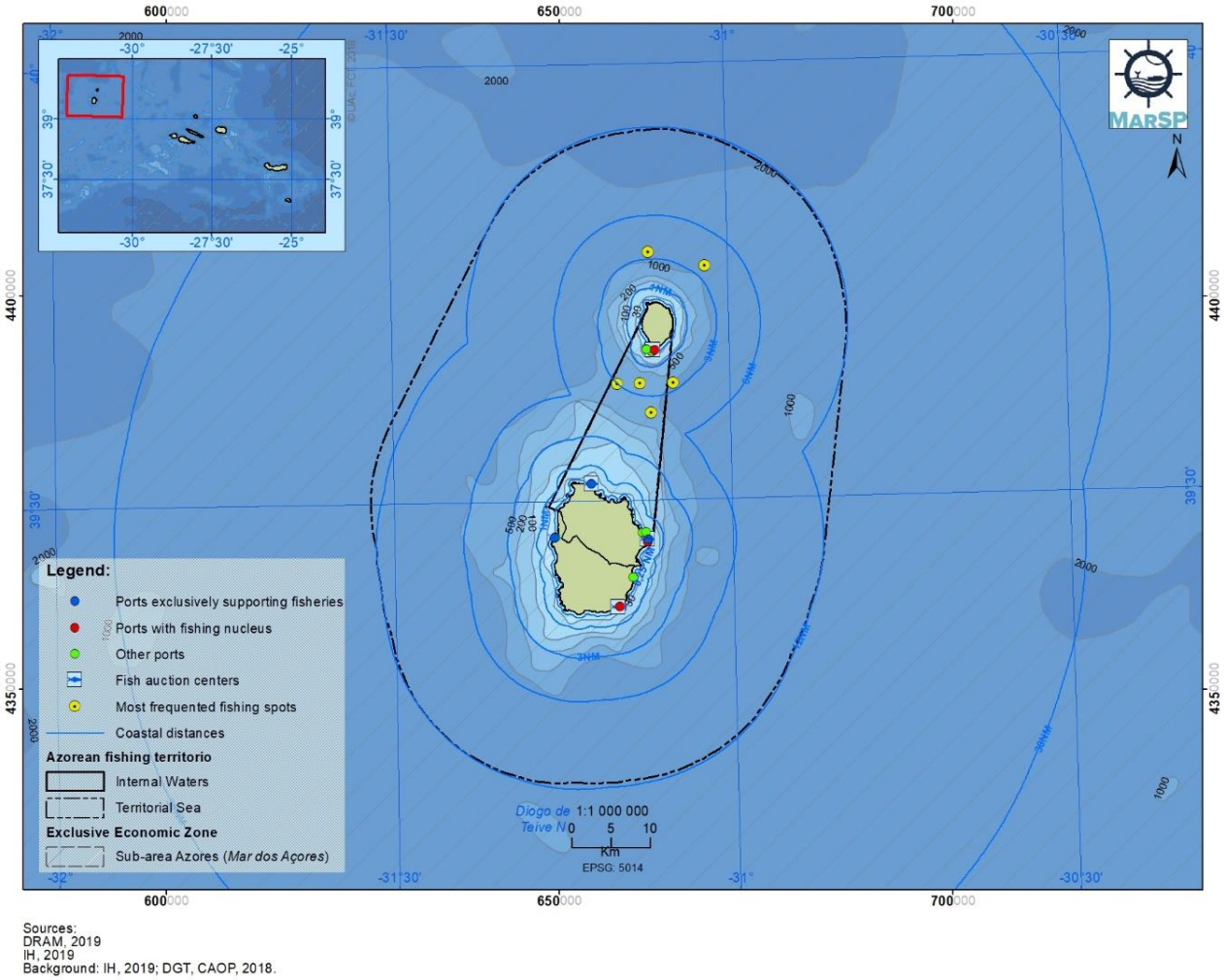


Figure 11. Current spatial distribution of areas for fisheries sector at the Azores archipelago scale.



Sources:
DRAM, 2019
IH, 2019
Background: IH, 2019; DGT, CAOP, 2018.

Figure 12. Current spatial distribution of areas for fisheries sector at the Azores western group scale.

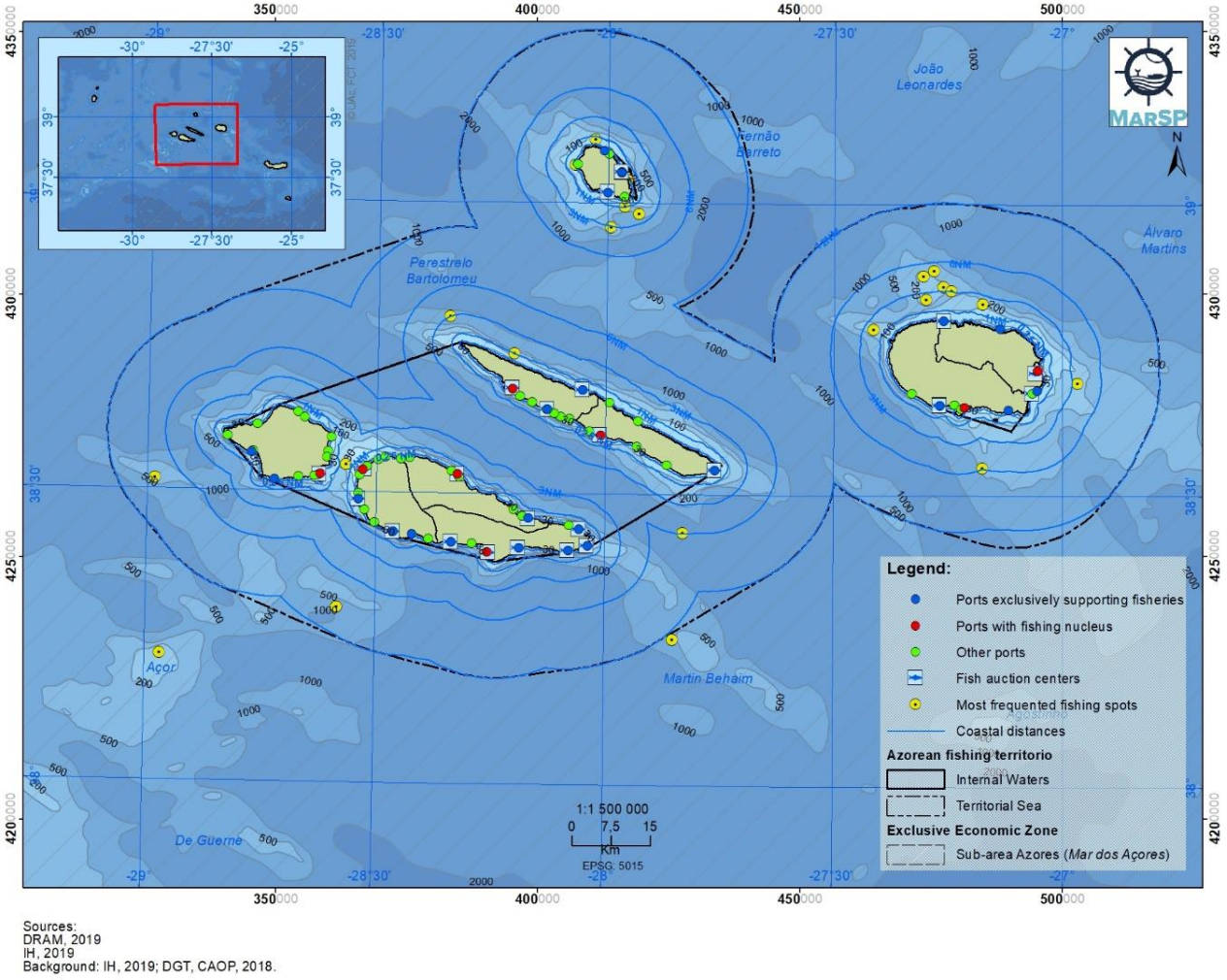
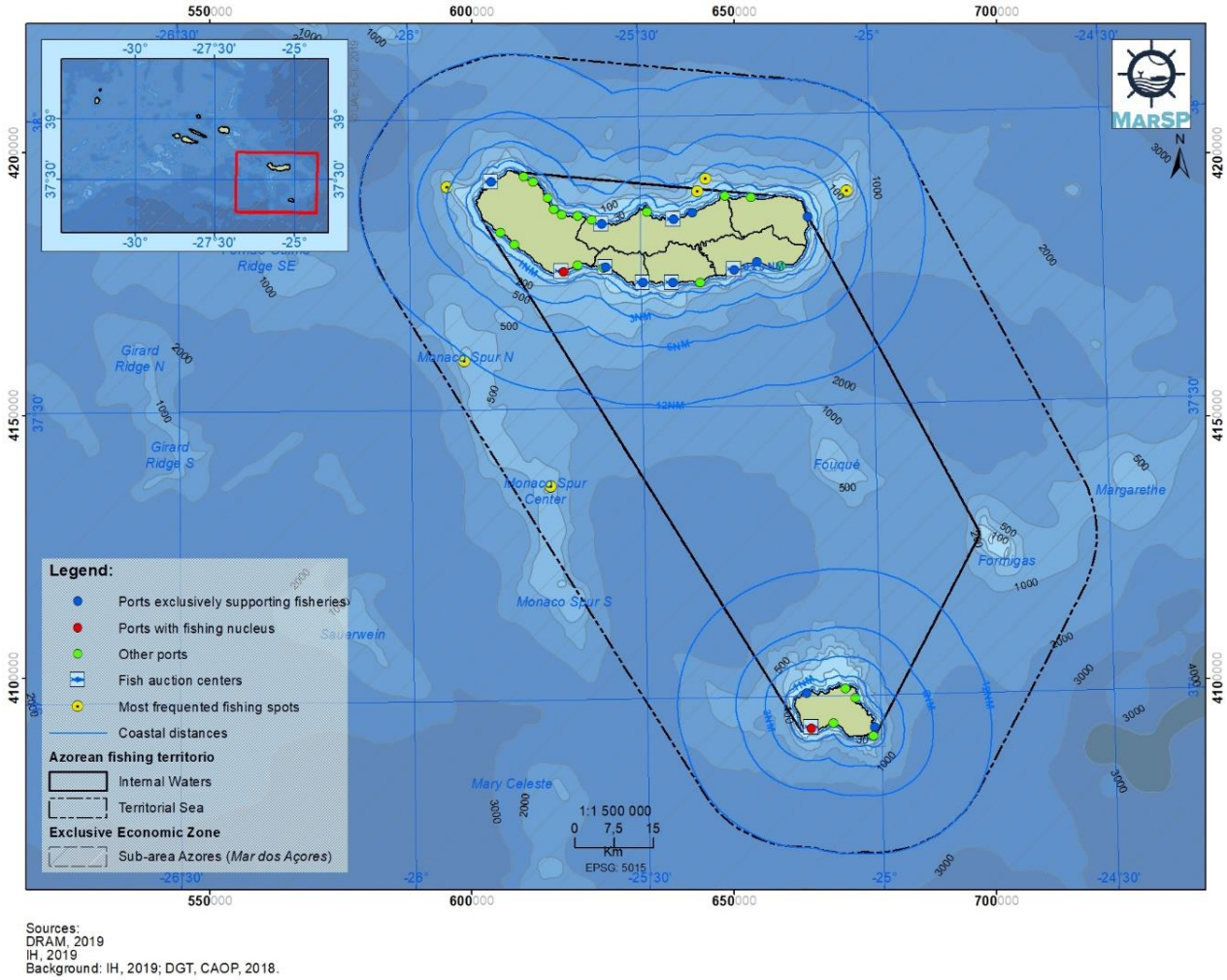


Figure 13. Current spatial distribution of areas for fisheries sector at the Azores central group scale.



Sources:
DRAM, 2019
IH, 2019
Background: IH, 2019; DGT, CAOP, 2018.

Figure 14. Current spatial distribution of areas for fisheries sector at the Azores eastern group scale.

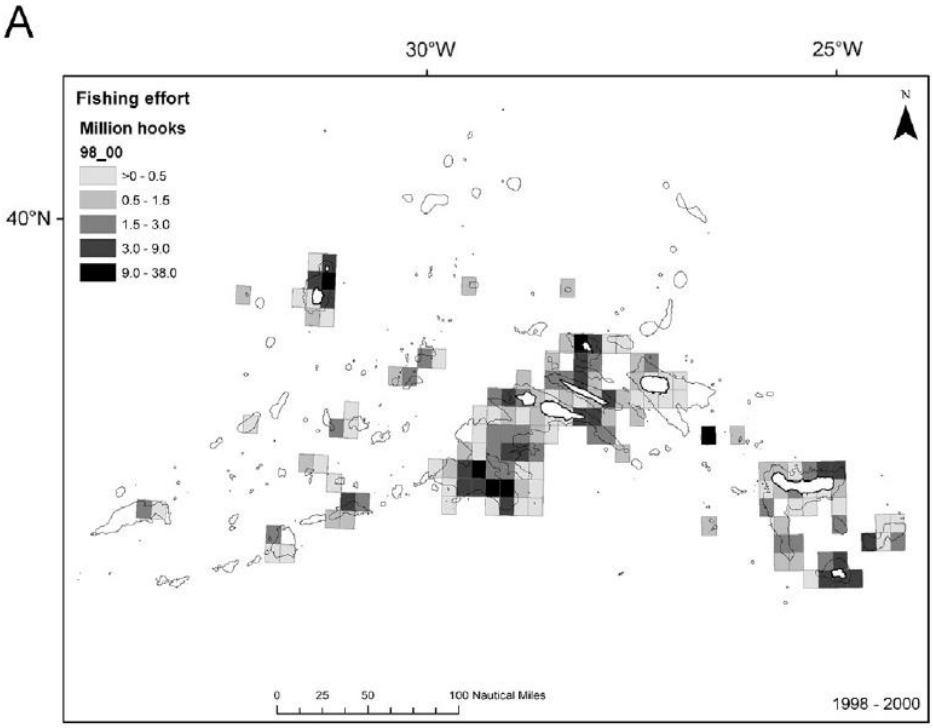


Figure 15. Spatial distribution of fishing effort (number of hooks) of bottom longline fleet (pooled) for1998–2000 (Source: (Diogo, Pereira, Higgins, Canha, & Reis, 2015)**).**

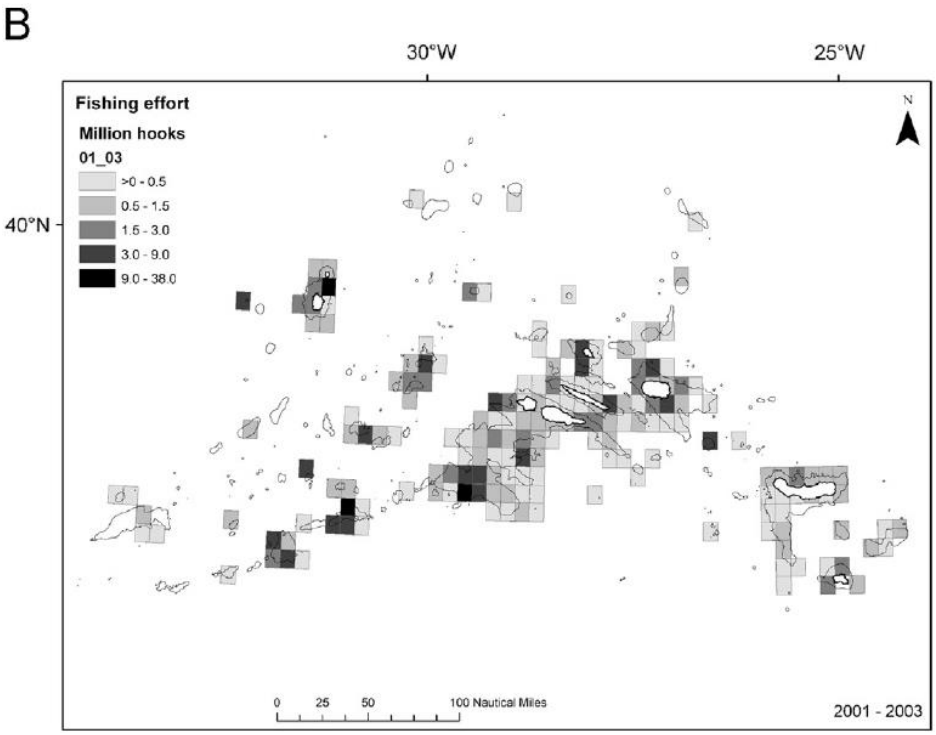


Figure 16. Spatial distribution of fishing effort (number of hooks) of bottom longline fleet (pooled) for 2001–2003 (Source: (Diogo, Pereira, Higgins, Canha, & Reis, 2015)**).**

C

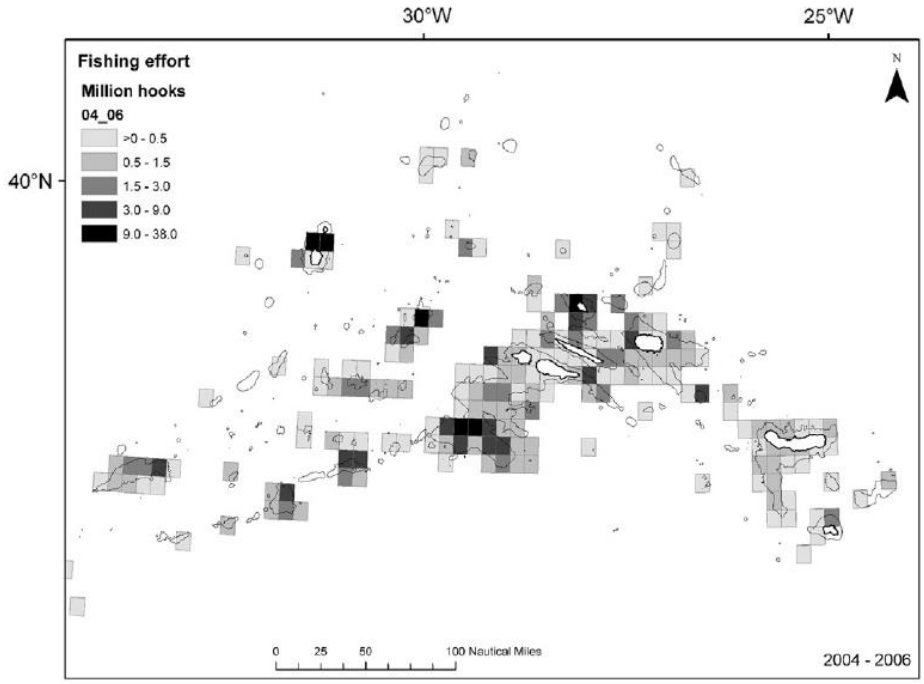


Figure 17. Spatial distribution of fishing effort (number of hooks) of bottom longline fleet (pooled) for 2004–2006 (Source: (Diogo, Pereira, Higgins, Canha, & Reis, 2015)**).**

D

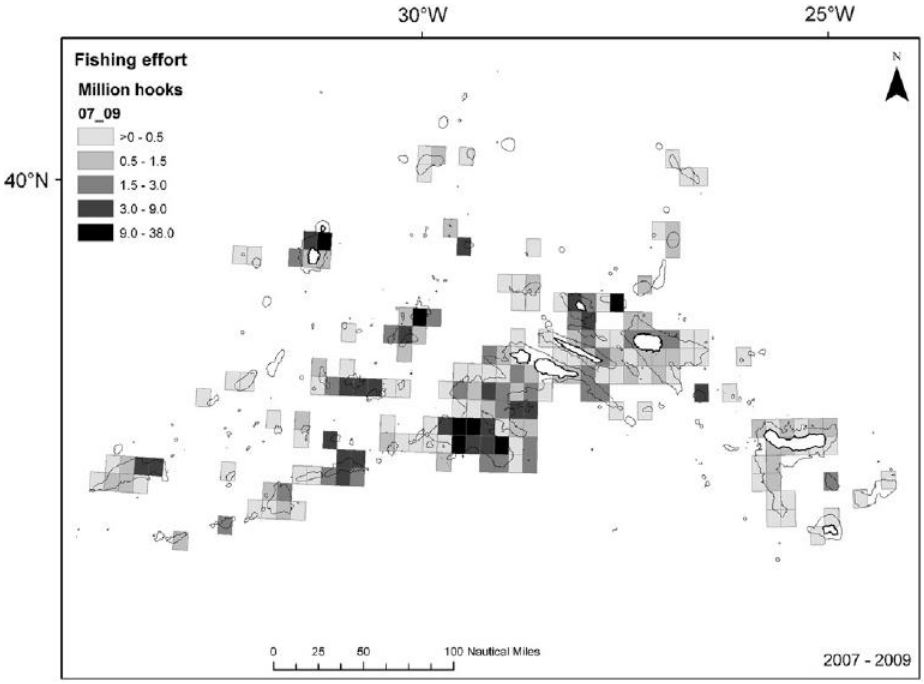


Figure 18. Spatial distribution of fishing effort (number of hooks) of bottom longline fleet (pooled) for 2007–2009 (Source: (Diogo, Pereira, Higgins, Canha, & Reis, 2015)**).**

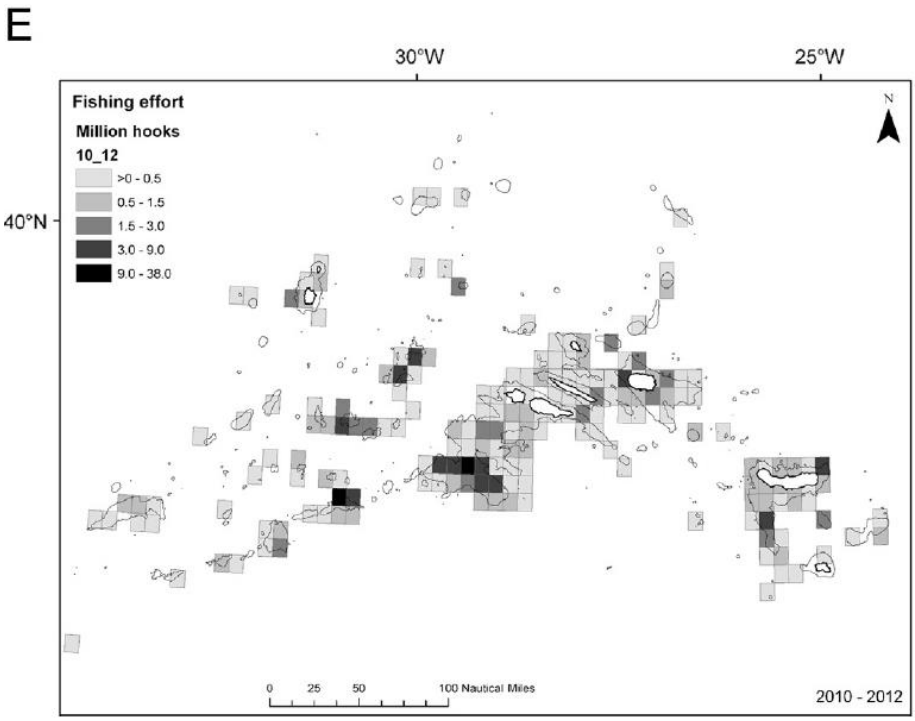


Figure 19. Spatial distribution of fishing effort (number of hooks) of bottom longline fleet (pooled) for 2010–2012 (Source: (Diogo, Pereira, Higgins, Canha, & Reis, 2015)**).**

For this sector, in the 3rd Workshop of MarSP, was presented to the participant's cartography with the current spatial distribution of fisheries sector in the Azores: i) areas most used by fishermen in their activity and; ii) the most important points (spots) where they fish. The information shown, resulted from 13 interviews performed. In the cartography the areas most used by fishermen were represented by a color scale (green, orange and red). This gradation of color indicated the degree of importance of these areas for them. The degree of importance was calculated considering the number of responses for a given area and the rating attributed by stakeholders for each of these areas (both the number of responses and the rating factor had the same weight in the analysis developed). For the areas marked as most used for fishing, it was not possible to distinguish the type of fishing within these areas.
Although this spatial information has been presented in the 3rd Workshop and discussed, it was not considered in the present briefing because: i) contrary to expectations, there was no unanimous validation of the info by the stakeholders and; ii) the sample (number of interviews) was very low and consequently without representativeness for the fisheries sector.

PART III

Sectorial Analysis

The sector diagnosis presented in this section includes a SWOT analysis and the analysis of sectoral interactions (sector-sector, land-sea interactions, sector-environment). The methodological approach for all analysis was similar and mainly based on regional stakeholders' consultation.

The first step to develop the analysis was based on sectoral representative stakeholders' consultation, through individual interviews. Stakeholders were asked to give their technical opinion on the fulfilment of each analysis for the sector they represent. For Fisheries sector, 15 representatives' regional stakeholder accepted to participate in the individual interview. The analyses resulting from this step were reviewed during the 2nd MarSP Regional Stakeholders Workshop (developed in April 2019), which had the participation of 78 stakeholders distributed in three Azores Islands: São Miguel, Terceira and Faial. In the workshop, stakeholders were grouped according to the sectors they represent and were asked to comment on and complement the analyses for those sectors. The analysis for each sector includes consensual results from both regional stakeholders' consultation (individual interviews and the workshop) and additional topics from literature review for the sector.

SWOT Analysis

A SWOT analysis was developed for each maritime sector identified for the Azores. Stakeholders were asked to identify the strengths, weaknesses, opportunities and threats they consider as the most important for the sector they represent. The final SWOT analysis for the Fisheries sector in the Azores is represented in **Table 2**. The SWOT analysis resulting from the sectoral interview presented few points, whereby Workshop participants complemented the analysis. Furthermore, it is important to note that topics highlighted in bold in the table below were considered by stakeholders as most important.

A few topics from the different domains of the SWOT analysis generated some controversy amongst stakeholders, but general consensus was achieved.

Table 2. SWOT analysis from regional stakeholders' consultation for underwater cultural heritage in the Azores.

	Positive factors	Negative factors
Internal factors	**Strengths** **- Artisanal character of fishing;** **- Sustainable activity;** - Restriction/prohibition of harmful gear (e.g. trawling and drift fishing); - The large dimension of the EEZ; - Renewed and reduced regional fleet; - Existence of marine resources with high commercial value and with great diversity, which increases domestic consumption and export flow; - Certified fishing. Ecological certifications such as Dolphin Safe and Friends of the Sea resulting from implementation of the POPA project - Observation Program for the Fisheries of the Azores; - Interconnection of the fisheries sector with other sectors (e.g. impact on the economy, synergies with scientific research); - Existence of infrastructure to support the sector on all islands, such as rehabilitated ports with fishing centers, computerized auction markets, fish reception and refrigeration stations; - Established companies specializing in canning and processing of fish, namely tuna; - Regional organization of the civil society in associations, cooperatives and a federation.	**Weaknesses** **- Transport, in particular for the disposal of the fish (e.g. sometimes the hold of the aircraft is not enough to export the entire product);** **- Quantity-driven fishing;** **- Lack of inspection[2] and control of fisheries (e.g. insufficient number of employees to allow for the enforcement of the regulations set in the normative diplomas);** **- Lack of maturity of civil society organizations;** **- Lack of education/training within the sector;** **- Need for revision of the legislation concerning the licensing of the various fishing methods;** - Need to improve the legal framework regulating recreational fisheries (e.g. increase restrictions; improve inspection and control and measures); - Low capacity for the conservation of fish stocks on board; - Poor governance/lack of organization among government entities; - Lack of local market access; - Lack of financial support; - Fragile ecosystems; - Narrow insular shelf; - Reduced number of seamount and banks available for fishing; - Seasonality and vulnerability in catches of certain species with higher commercial value; - Market based on individual companies or small family enterprises, with poor competitiveness and management strategy; - High operating costs, with limitations on access to the external market by the additional cost in air or sea disposal; - Excess of vessels and fishermen, with the aggravation of low schooling and reluctance to modernity and change; - Canning industry with limitations regarding the species, modernization aspects and lack of competitiveness; - Need to improve the legal framework regulating recreational fisheries (e.g. increase restrictions; improve inspection and control and measures); - Installed monopolies (e.g. Lotaçor).
External factors	**Opportunities**	**Threats[3]**

[2] Stakeholders in general consider the "Lack of inspection" the most important topic of the SWOT analysis, being a priority.

[3] All the threats identified by stakeholders were considered important.

	- "Fish less, earn more": It is preferable to fish less and bring fish with quality to land. With this practice it is possible to value fish more; **- Need to quantify the biomass of marine resources;** **- Increased awareness (e.g. encourage the consumption of different species of fish);** - Modernization of the fleet; - Bycatch utilization (fish caught accidentally is used and not wasted); - Certification of artisanal fisheries (sustainable fishing); - Valorization of new fishery resources; - International recognition of Azorean fish; - Good environmental quality of the marine environment; - Diversification of target species; - Innovation in the sector with new fishing gear; - Improve the management and control of fisheries by promoting maritime surveillance and better control to combat the parallel economy; - Promote new forms of valorization and certification of fishery products with new techniques of food production, packaging and preservation, new distribution and new markets; - Promote less valued marine species with a nutritional potential important for child nutrition (e.g. developing partnerships with schools); - Strengthen the positioning of the Azores as an intercontinental knowledge platform for ocean literacy, through the research centers of the Region, reinforcing studies targeting the stocks of the most valued species; - To increase traceability and quality control throughout the marketing process, through the continuous improvement of the fishing fleet, large-scale processes and oversight of intermediaries' procedures; - Training and raising awareness of good environmental practices within the fishing community - professional qualification of the working class of the fishing sector; - Display fisheries as an important part for the Region's economy and culture, valuing its professionals, reinforcing the positive image of the sector; - Increase the income of fishermen; - Promote institutional and cross-sectoral partnerships between fisheries and education, culture, tourism and transport; - Position the Azores in the area of sport fishing tourism (e.g. the archipelago is a destination of choice for big game fishing lovers); - Opportunity for marketing artisanal fishing as a tourist attraction.	**- Decrease in fishing quotas;** **- Uncertainty in abundance (change in hydrographic / oceanographic conditions, climate change);** **- The large amount of legislation and its complexity for professional fishing;** **- The standards for the modernization of the fleet required by the European Union;** **- Use of non-selective fishing gear;** **- Uncertain about national/international economic growth;** - Increased competition for maritime space, with more and more areas being required for other uses; - Emergence of new sectors influenced by fishing that offer opportunities for conversion or diversification of income; - Resources decrease as a result of increased fishing effort and overfishing for some species; - Lack of attractiveness of young people to the fisheries sector; - Aging of the fleet in some islands and the excess of boats in the sector; - Rising fuel prices; - Economic and social degradation of communities' dependent on fisheries; - Insufficient management capacity from the private sector in order to valorize the fish of the Azores (as a consequence can be closed some units of transformation and conservation of fish).

Analysis of interactions

The development of a certain activity in the maritime space is usually linked to interactions with the remaining uses and maritime sectors. Those interactions can be both positive or negative and can be both induced or suffered by a certain sector. In the context of the MarSP project, for each maritime sector, three types of interactions were analysed: sector-sectors interactions, land-sea interactions and interactions with the environment. The analysis intended to identify if interactions exist and the level of intensity of the interactions using the following scale: negative values for negative interactions, positive values for positive interactions and zero for absence of interactions. In the matrices, the column "C" represents the negative impacts induced or suffered by the sector, identified as conflicts, while the column "S" represents the induced or suffered positive interactions, deemed as synergies.

Sector-sectors interactions analyses whether there is any type of conflict and/or synergy between each of the maritime sectors identified and the other sectors. The resulting matrix reflects only the analysis of interactions occurring offshore, not including coastal areas within less than 30m bathymetry (the protection maritime zone of protection defined by the coastal zone spatial Plan - POOC).

Land-sea interactions analyse whether there is any type of conflict and/or synergy between each of the maritime sectors identified and coastal activities (up to the 30m bathymetry) developed in the various areas identified in the POOC.

Interactions with the environment analyses if there is any kind of negative and/or positive effect of each of the maritime sectors identified to the environment, specifically considering the descriptors of the good environmental status (GES), and respective criteria, as defined by the Marine Strategy Framework Directive (MSFD).

During the individual interviews, stakeholders were asked to identify the levels of conflicts and/or synergies of fisheries sector with other sectors. The final values were calculated using the tendency of answers and represent the stakeholders' perception trend. As this first analysis is based on inputs from stakeholders representing the maritime sector, to avoid or decrease possible bias in the results, during the Workshop, stakeholders were asked to comment and, when in disagreement, to propose a different value to classify the level of conflict/synergy. The final values from the workshop were calculated using the mean of all values resulting from all discussion tables. Literature review was also used to complement the characterization of the interactions, identifying if a conflict or a synergy exists in the Azores or on other contexts.

Interaction with other sectors

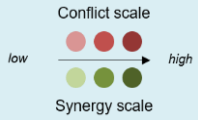
In order to analyse the interactions between fisheries and other uses and activities developed in the maritime space, an interaction matrix was created according to the aforementioned methodology.

The values featured on the matrix below represent the trend analysis of the stakeholders' sectoral consultation and the 2nd MarSP Stakeholder Engagement Workshop. Nonetheless, it is important to observe that the fisheries sector was analysed mainly based on the Stakeholders workshop sector group, considering that the participation on face to face interviews was almost null (one interview). However, the interview performed was with the regional competent authority, DRP.

Table 3. Characterization of the interactions between fisheries and other maritime sectors in the Azores resulting from stakeholders' consultation and literature review

Sector-Sectors	Fisheries		
	Sectoral interviews	2nd Workshop	Literature review

	C	S	C	S	C	S
Aquaculture	-1	0	-0.8	1.4	x	
Extraction of non-metallic mineral resources	-1	0	-1.3	0	x	
Energy	-1	0	-1	0	x	
Maritime security, defence, surveillance and civil protection	0	0	0	0.4	x	
Navigation and maritime transportation	0	0	0	0	x	
Infrastructures	0	0	-0.3	0	x	
Coastal and maritime tourism	0	0	-0.3	0.6	x	
Scientific research and marine biotechnology	0	2	0	2.2		x
Underwater cultural heritage	0	0	0	0.2	x	
Environmental conservation and MPAs	-1	1	-2	1.6	x	
Legend	**C** – Conflict; **S** – Synergy; **X** – Existent **-3** – High conflict; **-2** – Moderate conflict; **-1** – Low conflict **0** – Without conflict/synergy **1** – Low synergy; **2** – Moderate synergy; **3** – High synergy **"-"** – Does not answer					



Conflicts have been identified between fishery sector and extraction of non-metallic mineral resources sector because of the areas where aggregate extraction is permitted. Also, between fishery sector and environmental conservation and MPAs sector due to the creation of marine protected areas that reduce fishing areas already limited by natural constraints. By law in the Azores, is prohibited fishing in areas nearby aquaculture infrastructures (article 24 of the Regional legislative decree n.º 31/2012/A). Therefore, and since the aquaculture sector is growing in the Azores, fishermen are afraid of losing more fishing area to this sector.
Synergies have been identified between fishery sector and coastal and maritime tourism, since the latter appears as a concrete alternative for diversifying the sources of incomes and increasing profits (e.g. Pesca-tourism). Also, between fishery sector and scientific research because sometimes fishers host on-board researchers, frequently as observers, who take the opportunity to collect data and information for their own research about fisheries. The good management of fisheries sector depends to a large extent on the scientific studies that are carried out in the area.

Uses compatibilization and Multi-uses

Ocean multi-use (MU) is an emerging concept which responds to the increasing demand for marine resources and space. It has been defined as the intentional "joint use of resources in close geographic proximity by either a single user or multiple users. It is an umbrella term that covers a multitude of use
combinations in the marine realm and represents a radical change from the concept of exclusive resource rights to the inclusive sharing of resources and space by one or more users" (Schupp, et al., 2019)
A study has already been developed in the Azores (Vergílio, et al., 2017) to identify opportunities of MU development. The study included sectoral stakeholders' consultation to ensure representatives and practitioners of the main sectors were listen and involved. Also, combine the fisheries use with tourism and recreation, scientific research, and renewable energies. However, the most relevant MU combinations in the report and related to the fisheries sector are:

Fisheries & Tourism and Recreation – Pesca-tourism

It is difficult to define when the combination of Fisheries & Tourism and Recreation was first developed, but the concept "Pesca-tourism" was defined by the Italian Government, in 1982. Pesca-tourism is different from recreational touristic fishing, because while the first one is defined as the tourist on board a registered commercial fishing vessel for leisure (requiring a tourism fishing license), the second does not take place aboard a commercial fishing vessel and usually does not involve traditional commercial fishers (requiring a maritime tourist operator license). Pesca-tourism is an opportunity to for fishers to have an alternative source of income and to divulge and maintain their culture, as well as for public awareness about the fisheries sector (Piasecki et al., 2016).
In 2008, the Azorean Regional Government published legislation focused on Fisheries & Tourism and Recreation (Regional Legislative Decree 23/2007/A, in its current wording) as one of these activities. The MU, identified in the Azores as existent, is characterized by commercial small scale fishers welcoming tourists aboard on their commercial fishing vessels, allowing them to watch, or even participate, in the traditional fishing activity. In the Azores, the activity of pesca-tourism requires an annual licence, which has to be requested from the regional authority with competence in the area of fisheries (currently the DRP). In 2015, five permits were given. In 2018, the number increased to 13 licences (DRP, 2019). According to Azorean legislation, tourists can fish, watch the fishers working and/or consume the fish captured in the boat or in some partner restaurant. The maximum catch for each tourist is 2 kg or one specimen in case of higher weight (Regional Legislative Decree 23/2007/A, in its current wording).
This MU has several benefits, namely the increasing public awareness of the knowledge needed to be a fishermen practicing commercial fisheries. Parallel activities that might result from the implementation of this MU, such as small fish markets and supporting projects to local elementary schools, were also highlighted (Vergílio, et al., 2017). By contrast, two disadvantage are: i) the known conflict between OMTs that practice tourist fishing and Pesca-tourism, both spatial and socioeconomic and; ii) the need for part of the crew to remain on land while tourists go on-board to prevent the vessel's capacity being exceeded.

Scientific Research & Fisheries

Currently there is some sharing of efforts from fishers to host on-board researchers from different entities, frequently as observers, and take the opportunity to collect data and information for their own research. Also, currently scientific research takes more advantage from the MU than fisheries, as main shared resources are made available by fisheries and more direct involvement of fishers in research should be promoted (Vergílio, et al., 2017).

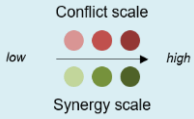
Furthermore, the European Commission (2019), consider that commercial fishing competes with other maritime activities in terms of access to resources and space. This is particularly the case with respect to coastal tourism, recreational fishing, shipping, offshore oil and gas, marine mining (aggregates) and offshore windfarms. On the other hand, the fisheries sector may benefit from positive spillover effects generated by the MPAs where fisheries resources are protected effectively.

Land-sea interaction

Similarly, the interaction between fisheries and sectors which take place on coastal areas was analysed through a comparison matrix (**Table 4**). This analysis assumes that activities are developed within less than 30 m in bathymetry (areas from the maritime zone of the coastal zone spatial plan - POOC).

Table 4. Characterization of interactions of fisheries with coastal zones in the Azores resulting from stakeholders' consultation and literature review

Land-sea		Fisheries					
		Sectoral interviews		2nd Workshop		Literature review	
		C	S	C	S	C	S
Critical areas for the sustainable coastal use	Natural, cultural and scenic special area	0	0	-1	0.3		
	Bathing zones	0	0	-1.3	0.3	x	
	Edified areas in risk zones	0	0	0	0		
Environmental protection	Marine environmental protected areas	0	0	-1.8	0.8	x	
	Land environmental protected areas	0	0	0	0.5		
Coastal protection areas	Edified areas	0	0	0	0		
	Agricultural, forestry and other uses	0	0	-0.5	0		
	Touristic potential areas	-1	1	-1	0.8		
Infrastructures	Airport	0	0	0	0.5		
	Road	0	0	0	0.3		
Navigation	Ports	0	3	0	3	x	
	Marinas, 'portinhos'	0	1	-0.3	1.5	x	
Legend	**C** – Conflict; **S** – Synergy; **X** – Existent **-3** – High conflict; **-2** – Moderate conflict; **-1** – Low conflict **0** – Without conflict/synergy **1** – Low synergy; **2** – Moderate synergy; **3** – High synergy **"-"** – Does not answer						



The conflict identified by stakeholders relatively to "Natural, cultural and scenic special areas" is because the fishermen go fishing in emblematic areas like, Vila Franca Islet localized in São Miguel Island. The conflict identified to the interaction "Agricultural, forestry and other uses"/Fisheries is related with the use of fertilizers as a source of contamination of marine waters near the coast, affecting fish stocks (e.g. In São Miguel Island).

Interaction with the environment

The impacts of fisheries on the environment (**Table 5**) were analysed taking into consideration the Good Environmental Status (GES) descriptors, as defined by the MSFD.

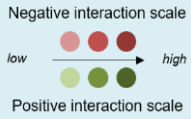
Table 5. Characterization of impacts of fisheries in the GES descriptors defined by stakeholders' consultation.

Interactions with the environment	Fisheries					
	Sectoral interviews		2nd Workshop		Literature review	
	N	P	N	P	N	P

Biodiversity	-2	0	-2.8	0.3	x	
Non-indigenous species	-1	0	-0.8	0.3		
Exploited fish and shellfish	-2	0	-3	0		
Food-webs	-2	0	-3	0	x	
Human-induced eutrophication	0	0	-0.3	0		
Sea floor integrity	-2	0	-1.8	0		
Hydrographical conditions	-2	0	-0.3	0		
Contaminants (water, sediments, biota)	-1	0	-1.5	0		
Contaminants in fish and seafood	-1	0	-1.5	0		
Litter	-1	0	-2.8	0	x	
Level of noise	-1	0	-1.5	0		

Legend

N – Negative effect; **P –** Positive effect; **X –** Existent
-3 – High negative effect; **-2 –** Moderate negative effect; **-1 –** Low negative effect
0 – Without negative/positive effect
1 – Low positive effect; **2 –** Moderate positive effect; **3 –** High positive effect
"-" – Does not answer



The positive impact identified to the descriptor "Biodiversity" is justified by stakeholders as a result from the identification of new species from the deep sea (by stakeholders in Terceira Island). The negative impact identified to the descriptor "Non-indigenous species" is associated with the example concede by stakeholders in Terceira of the lion fish, affirming that, in case the species appears in Azorean waters, directed fisheries could eliminate the species. The negative impact identified to the descriptor "Elements of food-webs" is related with the fact that everything is connected and, as a consequence, fisheries might highly affect the biodiversity and, as a consequence, cetaceans. The negative impact identified to the descriptor "Marine litter" is associated with the litter originated by the activity.

Additional documents and links

European Commission (EC): The Common Fisheries Policy (CFP), https://ec.europa.eu/fisheries/cfp/aquaculture_pt;
European Commission (EC): Maritime and Fisheries Fund (EMFF), https://ec.europa.eu/fisheries/cfp/emff_en;
European Fisheries Control Agency (EFCA): https://www.efca.europa.eu/en;
European Market Observatory for Aquaculture Fisheries Products (EUMOFA): https://www.eumofa.eu/;
Food and Agriculture Organization of the United Nations (FAO): Fisheries and Aquaculture Department, http://www.fao.org/fishery/en;
International Council for the Exploration of the Sea (ICES): http://www.ices.dk/Pages/default.aspx;
North East Atlantic Fisheries Commission (NEAFC): https://www.neafc.org/;
Professional Training Center for Fisheries and the Sea (FOR-MAR): http://www.for-mar.pt/;
Directorate-General for Maritime Affairs and Fisheries of the European Union (DG MARE): https://ec.europa.eu/info/departments/maritime-affairs-and-fisheries_en;
International Commission for the Conservation of Atlantic Tunas (ICCAT): https://www.iccat.int/en/;
DOCAPESCA Portos e lotas, S.A.: http://www.docapesca.pt/index.php;
Portuguese Institute of Sea and Atmosphere, I. P. (IPMA): http://www.ipma.pt/pt/index.html;
Directorate-General for Natural Resources, Safety and Maritime Services (DGRM):

https://www.dgrm.mm.gov.pt/en/web/guest;
National Institute of Statistics (INE):
https://www.ine.pt/xportal/xmain?xpgid=ine_main&xpid=INE&xlang=pt;
Azores Government Portal: Regional legislation,
http://www.azores.gov.pt/Portal/pt/entidades/srtop-drt/textoImagem/Legislacao.htm;
Azores Regional Statistics Service (SREA):
https://srea.azores.gov.pt/Conteudos/Inqueritos/detalhe_inquerito.aspx?idc=306&idsc=2163&lang_id=1;
Observation Program for Fisheries in the Azores (POPA): http://www.popaobserver.org/;
Azorean Auctions Service, S. A., S.A. (LOTAÇOR): https://www.lotacor.pt/.

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AQUACULTURE

Introduction

The aim of the MarSP (Macaronesian Maritime Spatial Planning) project is to develop concrete actions for the Member States (Portugal and Spain), through regional and national competent entities to build the necessary capacities and tools for the implementation of the European Union (EU) Directive on Maritime Spatial Planning (MSP) (Directive 2014/89/EU, 2014) in the Macaronesia region, including mechanisms for cross-border cooperation.
For the characterization of the existing uses in the Azores maritime space, the main blue sectors and activities need to be considered. Aquaculture sector is an important economic and strategic activity that requires space and should be considered in any MSP processes. In the Azores, the sector is at an initial stage of development and currently the few existing commercial experiments aim the production of macroalgae and fish.

Purpose

This sector briefing summarises the current status of the aquaculture in the Autonomous Region of the Azores (Portugal), under MarSP project work package 2 "Mapping the current conditions and creating a vision for the MSP in Macaronesia" and Task 2.2 "Mapping the maritime uses and activities and defining the MSP current conditions". It includes a characterization of the current situation of the aquaculture sector and MPA in the Azores and the proposed and adopted methodologies to map the activity. It also includes a sector diagnosis and the main interactions with other sectors, the environment and the land-sea interface.

PART I

Sector characterization

Aquaculture at national and European levels

Aquaculture is one of the economic activities presenting the highest global growth in the last few years. This activity has important socioeconomic dimensions, sustaining food production and food security, job creation and promoting of social equality (Moffitt et al., 2014). Moreover, with the continuous demand of fish food, aquaculture assumes an important role of supporting the fish demand and complementing the fisheries sector, helping the reduction of the pressures over fish resources (Moffitt et al., 2014).

At the European Union level, aquaculture was identified in the Blue Growth strategy[4] as one of the sectors of maritime economy with the greatest potential for growth and job creation. Currently it represents approximately 20% of the fish production and directly employing about 85 thousand people (European Union, 2019).

In Portugal, the aquaculture is still in development, expressing the need for strategies to support the implementation of the activity in a sustainable manner (Botelho et al., 2015). At national level, there were a total of 1532 licensed aquaculture sites by the end of 2017, from which 1447 were active. The majority of them were located in the marine and coastal regions, from which the production corresponded to 94% of the total production in 2016, increasing to 94,4% in 2017 (INE, 2018).

The Portuguese national aquaculture production (2016-2017) can be observed at **Figure 20**.

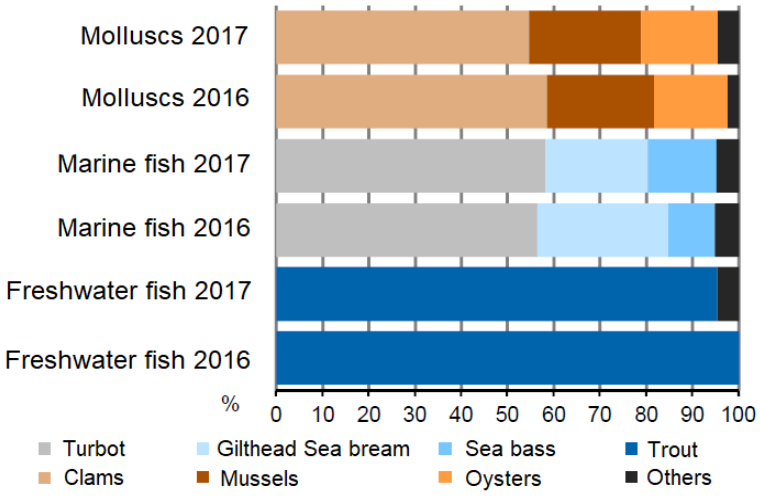


Figure 20: Structure of the production volume in aquaculture, per species (2016-2017) (Instituto Nacional de Estatística (INE), 2018)

[4] COM(2012) 494, of 13 September 2012. Blue Growth: opportunities for marine and maritime sustainable growth. Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions.

Aquaculture development in the Azores

Located in the middle of the Atlantic Ocean, the Azores' aquaculture is still underdeveloped, having no contribution to the regional fish and shelfish production and the installation of aquaculture facilities in the maritime space surrounding the archipelago still in its early stages.

Some of the main limiting factors for offshore aquaculture development in the archipelago include its geographic isolation and distance to the consuming market, rough climate and oceanographic conditions, narrow insular shelf and high average depth of the marine waters, low biological productivity, which make it difficult to safely install and manage inshore and offshore aquaculture production units, while maintaining its financial viability. Moreover, the coastline is predominantly made by high and steep cliffs, making it difficult to access those areas. Sheltered bays are rare and the shore environment is typically exposed to strong wave action (Soto, 2008). Markets are distant due to the Region's remoteness and thus transport costs for both supplies and sales become expensive (Afonso, 2008).

Furthermore, the main species that are commercially produced in Europe (such as the seabass, gilthead seabream, turbot and salmon) do not occur naturally in the Region, thus not being allowed to be farmed in Azorean waters as a preventive measure for the introduction of non-indigenous species with invasive potential. In addition, the necessary know-how on farming local species suitable for aquaculture purposes is still insufficient, adding to a lack of specialised aquaculture workforce (Afonso, 2008; White, 2008), even though there are some running experiments targeting the production of macroalgae and fish.

On the other hand, there have been some examples of land-based aquaculture in the Azores, with freshwater aquaculture being implemented in late 1930s, for the purpose of restocking inland waters; currently there are two aquaculture stations for the production of rainbow trout, one in São Miguel island and the other in Flores island.

Discutions about the requirements and assets to promote the development of offshore aquaculture in the region started in the 1980's (Abecasis et al., 2014). The perception was that environmental conditions in the archipelago demand important investments on advanced tecnhology and scientific knowledge, for an activity that involves a considerable amount of risk. Nevertheless, aquaculture development is being considered to be a strategic sector in the Azores policy for the blue economy (EU Comission, 2017) and the region created specific legislation for the activity (see below) and specific lines for investment support. Along the last decades, the University of the Azores and associated research centers and enterprises runned several aqualculture related projects to produce clams, limpets, algae and barnacles, and an experimental aquaculture laboratory was created in Horta (Abecasis et al., 2014). The subject was discussed in 2008 on an international technical worhshop where experts defined a roadmap for aquaculture in the Azores (Pham et. al, 2008).

Despite the acknowledged constraints, offshore aquaculture can benefit from the very good quality of the Azorean seawater, with low pollution levels and permanently renewed by the currents, as well as from the favourable water temperature, local species of high commercial value, the existing fisheries market, the extensive coastline and natural biosecurity - consequence of the effects of geographic isolation (Soto, 2008). Even though there is yet to be a tradition for aquaculture in the Azores, the activity has potential to help meet the growing demands for fish food in a sustainable way by complementing the fishing activity with quality products that are typical of the Azorean waters, thus enhancing and diversifying the maritime economy in the archipelago. It could also allow the use of by-products from the processing industry and contribute to providing opportunities for social development and improving employment. An increase in aquaculture production is expected to occur in the following years, both offshore and in tanks inshore, as a number of initiatives from the Regional Government have taken place in recent years to ensure the necessary conditions for aquaculture development, with the private sector showing interest in investing.

Projects and initiatives contributing to the sector

The Regional Government of the Azores has supported mainly scientific and technological research activities contributing to knowledge on coastal and offshore areas with potential for installing aquaculture units in the archipelago, considering both environmental and socioeconomic factors, legal restrictions and potential conflicts with other uses and activities, aiming to assure the sustainable exploitation of living marine resources (Botelho *et al.*, 2015). It is important to note that the proper selection of an aquaculture site is extremely important, since it not only determines installation feasibility, expenses and maintenance, but also the socioeconomic and environmental impacts of this activity (Botelho *et al.*, 2015). As a result, a specific project, LocAqua project, was developed in order to help determine the most appropriate areas for aquaculture development. The project's results include a model to determine potential aquaculture sites. The methodology developed under this project will be adopted in this report for the purpose of mapping the suitability of each area for the activity (see Part II - Methodology for mapping sector activity). However, it should be mentioned that LocAqua's results reflect the situation observed by the end of the project, in 2015 (Botelho *et al.*, 2015), and so the available information and the state-of-the-art of the criteria used in the analysis are susceptible to changes as a consequence of knowledge progress and political and legal changes (Botelho *et al.*, 2015).

Besides from mapping potential areas, in the last decade a number of experimental aquaculture units have been implemented to evaluate the feasibility of farming certain local species, such as algae, barnacles, limpets, abalone and clams (e.g. Fajã da Caldeira de Santo Cristo, in São Jorge island has a recognized potential for clam aquaculture), with varying degrees of success, even though the experimental projects have never reached its commercial phase. Due to the low productivity of the typically oligotrophic waters of the Azores, integrated multi-trophic aquaculture seems to be a feasible – more productive and more sustainable - option for offshore production, taking advantage of the existing natural conditions and the mutually beneficial relationship between species from different trophic levels, which point to algae, echinoderms and fish species as the most indicated species to draw synergies from.

Further R&D actions to advance the understanding of aquaculture thus remains a fundamental pillar underpinning the growth of the sector in the Azores, as well as qualification and training of aquaculture professionals. As such, aquaculture was identified as one of the priorities on the Research and Innovation Strategy for Smart Specialisation (RIS3), with one of its measures being the creation of an experimental aquaculture centre, which is also a declared intention of the Regional Government.

Legal framework and constrains

This section integrates information coming from MarSP Deliverable D.6.5. (MSP Governance Analysis of the Macaronesia) (Pallero, et al., 2019).

Competent institutions for sectoral management

According to the Political and Administrative Statute of the Autonomous Region of the Azores, (Law no. 2/2009 of 12 January), the Region has competence for licensing in the context of the private use of maritime public domain and legislative competece concerning the aquaculture sector. According to Regional Regulatory Decree no. 4/2015/A, of 20 February, the relevant competent authorities are the following:» Regional Directorate of Fisheries (Direção Regional das Pescas, DRP) - competent authorithy for aquaculture management and for issuing the legally applied authorizations/licences;

- Regional Inspection of Fisheries (Inspeção Regional das Pescas, IRP): competent inspecting authorithy for aquaculture;
- Regional Directorate of Maritime Affairs - Direção Regional dos Assuntos do Mar (DRAM) in Portuguese: competent authorithy for issuing TUPEM, when located on the maritime space and TURH, when located in maritime public domain.

Normative basis

The normative basis at European, national and regional levels can be found on the following table.

Table 6: Legal Framework for aquaculture

Aquaculture		
European	**Commission Implementing Regulation (EU) 2017/838 of 17 May 2017**	Regards feed for certain organic aquaculture animals.
	Regulation (EC) No. 852/2004 of the European Parliament and of the Council of 29 April 2004	Lays down general rules for food business operators on the hygiene of foodstuffs.
	Regulation (EC) No. 853/2004 of the European Parliament and of the Council of 29 April 2004	Lays down specific hygiene rules for food of animal origin.
National	**Regulatory Decree no. 16/2015, of 16 September, the seventh amendment to the Regulatory Decree no. 43/87, of 17 July and the first amendment to Regulatory Decree no. 14/2000, of 21f September**	Establishes requirements and conditions relating to the installation and exploration of marine cultures and those associated, as well as the transmission conditions and the cessation of authorizations and licenses
	Decree-Law no. 383/98, of 27 November – Changes and republishes the Decree-Law no. 278/87, of 7 July	Regulates the practice of marine fisheries and rearing of marine species. Changed by the Decree-Law no. 10/2017, of 10 January and by the Decree Law no. 40/2017, of 4 April (https://bit.ly/2C8YRAS)
	Decree Law no. 40/2017, of 4 April	Approves the legal regime for the installation and operation of aquaculture establishments in marine waters, including transitional waters, and in internal waters, in the use of the legislative authorization granted by Law no. 37/2016, of15 December. (https://bit.ly/2JdlfdZ)
	Decree-Law no. 38/2015, of 12 March, altered by Decree-Law no. 139/2015, of 30 July	Develops the marine spatial planning and management fundamental Law no. 17/2014, of 10 April, including the private use of transitional waters for aquaculture purposes.
	Decree-Law no. 46/2016, of 18 August	Establishes the transitional regime for titles of private use of water resources for aquaculture purposes in transitional waters. (https://bit.ly/2AoB3Yk)
	Decree-Law no. 152/2009, of 2 June	Transposes into national law the Council Directive 2006/88/EC, of24 October, on animal health requirements for aquaculture products.
	Law no. 54/2005, of 15 November. Amended by Law no. 78/2013, of 21 November, by Law no. 34/2014, of 19 June, amended and republished by Law no. 31/2016, of 23 August	Establishes the legal regime of water resources.

	Law no. 58/2005, of 29 December. Amended and republished by Decree-Law no. 130/2012, of 22 June, amended by Law no. 42/2016, of 28 December, and amended by Law no. 44/2017 of 19 June	Approves the Water Law, transposing Directive 2000/60/EC of the European Parliament and of the Council of 23 October into the national legal order and lays down the framework for sustainable water management.
	Decree-Law no. 77/2006, of 30 March	Complements the transposition of Directive 2000/60 / EC of the European Parliament and of the Council of 23 October establishing a framework for community action for water policy, developing the framework established by Law no. 58/2005 of 29 December.
	Decree-Law no. 226-A/2007, of 31 May, Amended by Decree-Laws nos. 391-A / 2007, of 21 December; 93/2008, of 4 June; 107/2009, of 15 May; 137/2009, of 8 June; 245/2009, of 22 September, 82/2010, of 2 July; by Rectification Statement no. 32/2008 11 of June ; by Law no. 44/2012, of 29 August, by Law no. 12/2018, of 2 March and by Decree-Law no. 97/2018, of 27 November	Establishes the legal regime for the use of water resources.
	Decree-Law no. 353/2007, of 26 October	Establishes the procedure for delimiting the public water domain.
	Decree-Law no. 113/2006, of 12 June	Establishes the rules for the implementation, in national law, of Regulations (EC) nos. 852/2004 and 853/2004 of the European Parliament and of the Council of 29 April 2004, regarding the hygiene of foodstuffs and the hygiene of foodstuffs of animal origin.
Regional	**Legislative Regional Decree 22/2011/A, of 4 July**	Regulates the exercise of aquaculture in the Region, aiming to ensure its development in a sustainable way and considering the specificities of the Azorean fauna and flora (https://data.dre.pt/eli/declegreg/22/2011/07/04/a/dre/pt/html)
	Ordinance 87/2016, of 12 August	Regulates the support regime for productive investments in aquaculture, under the Union Priority established on n. 2 of article 6. From EU Regulation 74508/2014, of 15 May
	Ordinance no. 74/2016, of 8 July. Altered by Ordinance no. 81/2017, of 30 October	Regulates the support regime for innovation in aquaculture.
	Ordinance no. 19/2017, of 10 February. Altered by Ordinance no. 56/017, of 5 July	Regulates the support regime for investments in processing fishery and aquaculture products.
	Ordinance no. 18/2017, of 10 February	Regulates the support regime for the commercialization of fisheries and aquaculture products.

	Government Council Resolution no. 126/2016, of 25 July, altered by the Government Council Resolution 2/2018, of 24 January	Approves the establishment of the aquaculture production areas located on Faial, Terceira and São Miguel islands, as well as authorized species, production limits and exploitation regime. Aquaculture sites installed on a depth less than 500m are allowed to produce less than 100 tonnes per year. Aquacultures sites installed on a depth superior than 500m are allowed to produce less than 250 tonnes per year.
	Ordinance no. 67/2007, of 15 October	Establishes the rules for the application of the regime for the water resources use in the Autonomous Region of the Azores.
	Regional Legislative Decree no. 18/2010/A, of 21 May	Adapts to the Autonomous Region of the Azores the regime for the procedure of delimitation of the public water domain, approved by Decree-Law no. 353/2007, of 26 October.
	Regional Legislative Decree no. 30/2010 / A of November 15	Establishes the legal regime for environmental impact assessment and licensing.

From a legal standpoint, the Azores have already made progress with the publication of Regional Legislative Decree no. 22/2011/A, of 4 July, a comprehensive and flexible regulatory framework, which regulates the implementation of aquaculture in the Region, setting the procedures for the installing and operating aquaculture establishments – including those of licencing - in scientific or experimental regimes, both on land and in the maritime territory of the Azores, with a view to creating conditions leading to a sustainable development of the sector, considering the specificities of the Azorean fauna and flora, involving saltwater, brackish water and freshwater species (Botelho et al., 2015). Another important step was the publication of Resolution of the Council of Government no. 126/2016, of 25 July, altered by the Government Council Resolution 2/2018, of 24 January, which identifies aquaculture production areas (APAs) on São Miguel, Terceira and Faial islands, according to results from mapping of coastal and offshore areas with potential for aquaculture, and also defines production limits and identifies the seventeen species allowed for aquaculture production, namely crustaceans, molluscs, echinoderms and bonefish (including live bait). According to Resolution of the Council of Government nº 126/2016, of 25 July, the identified aquaculture production areas are not subject to environmental impact assessment, as per the Regional Legislative Decree no. 30/2010/A, of 15 November. It follows that aquaculture projects in structures of any nature installed in the maritime space, which are less than 500 m from the coast, are not obliged to be subject to environmental impact assessment, since their annual production does not exceed 100 tonnes per year, as well as those installed at a distance of more than 500 m from the coast, inasmuch as annual production does not exceed 250 tonnes per year.

In what concerns incentives for private investment, the Regional Government has implemented tax benefits for the contractual regime concerning aquaculture productive units (Regional Legislative Decree no. 1/2019/A, of 7 January), and has approved a support regime for productive investments in aquaculture (Ordinance 87/2016, of 12 August) and a support regime for innovation in aquaculture, in the framework of Operational Programme "Mar 2020". On the other hand, the Operational Programme "Azores" identified, as one of its main objectives, the need to reinforce the competitiveness of small and medium-sized enterprises (SMEs) in aquaculture, focusing on supporting innovation, including through business incubators, developing new business models for SMEs and underpinning their capacity to grow in regional, national and international markets.

For the intends and purposes of maritime spatial planning, pursuant to Law no. 17/2014 of 10 April, and Decree-law no. 38/2015, of 12 March, aquaculture falls under what is considered private use of the national maritime space, materialized by the allocation of an area or volume in that space, with the purpose of making better use of the available marine resources in that space (when compared to the advantages obtained by common use), thus resulting in added value for public interest. Such private used is subject to the issuance of a Title of Private Use of the National Maritime Space

(TUPEM). As such, installing aquaculture infrastructures in the maritime space requires prior obtaining of a TUPEM, except if it occurs in areas under the jurisdiction of port entities, excluded from the scope of the Decree-Law no. 38/2015, of October 12. Nonetheless, the granting of a TUPEM does not entitle its holder to use or exploit the resources located in that space; hence, in addition, aquaculture must comply with the authorizations and/or licensing requirements established by Regional Legislative Decree no. 22/2011/A, of 4 July, via issuance of the respective authorization/license, when applicable.

Pursuant to Law no. 54/2005 of 15 November, the jurisdiction of the maritime public domain with respect to the licensing, installation and operation of aquaculture and related establishments falls under the regional competent authority for aquaculture, except when it concerns the shore for coastal and inland waters subject to tidal influence. In the latter, such cases fall under the competence of the Regional Government department responsible for water resources in the maritime public domain, namely the Regional Directorate for Sea Affairs (DRAM), and are subject to a Title of Use of Water Resources (TURH), according to Regional Legislative Decree no. 22/2011/A, of 4 July. DRAM is also the competent authority regarding the maritime spatial planning process, being responsible for managing TUPEM requests and issuing them.

The Regional Government department responsible for aquaculture is Regional Directorate of Fisheries (Direção Regional das Pescas, DRP), according to Regional Regulatory Decree no. 4/2015/A, of 20 February. In cases where aquaculture is intended exclusively for purposes of scientific or technological development or in cases of experimental aquaculture development, the installation of the aquaculture is only dependent on authorization from DRP issued via a permit (maximum of 5-year for experimental aquaculture), which is subject to formal assent from the competent authority for the environment, in case it is located on protected areas and the port authorities, if it falls on areas under the port jurisdiction. The installation of de facto aquaculture establishments must be authorized via permit by DRP, which supersedes the need for the issuance of a TURH (except when it concerns the shore for coastal and inland waters subject to tidal influence). The actual exploitation of aquaculture establishments, however, must be preceded of a licencing process, managed by DRP. The license must be issued within a three-month period after the installation of the infrastructure is concluded, once the installation is inspected and approved.

Aquaculture sites must take into consideration the existing administrative constraints and restrictions applied to the maritime space. Public utility restrictions are distinct from administrative easements as they derive directly from the law and do not dependent on any administrative act, and they concern any limitations over the private use and occupation of the maritime space, thus preventing full enjoyment of private use rights.

Table 7: Administrative constraints and restrictions to aquaculture in the Azores

Administrative constraints and restrictions	Observations
Natural heritage	
Regional Legislative Decree no. 15/2012/A, of 2 April	Legal regime for nature conservation and protection of biodiversity of the Autonomous Region of the Azores
Regional Legislative Decree no. 10/2019/A, of 22 May	Approves the regime of protection and classification of the volcanic cavities of the Autonomous Region of the Azores
Regional Legislative Decree no. 47/2008/A, of 7 November, modified and republished by the Regional Legislative Decree no. 39/2012/A, of 19 September	Creates the Island Natural Park of Santa Maria
Regional Legislative Decree no. 11/2018/A, of 28 August	Creates the Paleopark of Santa Maria

Regional Legislative Decree no. 19/2008/A, of 8 July	Creates the Island Natural Park of São Miguel
Regional Legislative Decree no. 11/2011/A, of 20 de April	Creates the Island Natural Park of Terceira
Regional Legislative Decree no. 45/2008/A, of 5 November	Creates the Island Natural Park of Graciosa
Regional Legislative Decree no. 10/2011/A, of 28 March	Creates the Island Natural Park of São Jorge
Regional Legislative Decree no. 20/2008/A, of 9 July	Creates the Island Natural Park of Pico
Regional Legislative Decree no. 46/2008/A, of 7 November, modified and republished by the Regional Legislative Decree no. 7/2019/A, of 27 March	Creates the Island Natural Park of Faial
Regional Legislative Decree no. 8/2011/A, of 23 March	Creates the Island Natural Park of Flores
Regional Legislative Decree no. 44/2008/A, of 5 November	Creates the Island Natural Park of Corvo
Regional Legislative Decree no. 15/2012/A, of 2 April	Natura Network 2000 (Special Areas of Conservation and Special Protection Areas)
Regional Legislative Decree no. 18/2002/A, of 16 May	Adapts the Decree-Law no. 140/99 to the Autonomous Region of the Azores, following the revision of the transposition into domestic law of the Birds and Habitats Directive
Regional Legislative Decree no 20/2006/A, of 6 June	Approves the Sectoral Plan for the Autonomous Region of the Azores of Natural 2000. Amended by Statement of Rectification no. 48-A/2006 by the Regional Legislative Decree no. 7/2007/A and by the Regional Legislative Decree no. 44/2008/A.
Resolution of the Council Government no. 56/2010, of 10 May	Approves the Sites for Community Importance of the Autonomous Region of the Azores under Natura 2000
Ordinance no. 57/2018, of 30 May, modified by the Ordinance no. 69/2018, of 22 de June	Legal regime for harvesting marine species in the Azores sea
Underwater cultural heritage	
Regional Legislative Decree no. 27/2004/A, of 24 August, modified by the Regional Legislative Decree no. 8/2006/A, of 10 March and the Regional Legislative Decree no. 6/2018/A, of 16 May	Establishes the normative framework for the management of archaeological heritage, concerning the prevention, rescue and investigation of movable and immovable archaeological heritage in the Autonomous Region of the Azores
Regional Regulatory Decree no. 24/2015/A, of 29 October	Creates the Underwater Archaeological Park of the Canarias, in front of Praia Formosa (Santa Maria)
Regional Regulatory Decree 12/2012/A, of 8 May	Creates the Underwater Archaeological Park of Dori (São Miguel)
Regional Regulatory Decree no. 20/2005/A, of 12 October, modified and republished by the Regional Regulatory Decree no. 19/2015/A, of 27 October	Creates the Underwater Archaeological Park of Baía de Angra (Terceira)
Regional Regulatory Decree no. 15/2014/A, of 19 August	Creates the Underwater Archaeological Park of Caroline (Pico)
Regional Regulatory Decree no. 17/2015/A, of 29 September	Creates the Underwater Archaeological Park of Slavonia, in Lajedo coast, Lajedo parish (Flores)
Basic infrastructures, national defence and public security	

Law no. 2078, of 11 July 1955	Establishes the regime of the areas subject to military constraints
Decree-Law no. 45987, of 22 October 1964	Establishes the general regime military and aeronautic constraints
Decree-Law no. 116/2006, of 16 June	Defines aeronautic constraints for the neighbouring land of João Paulo II airport (Ponta Delgada, São Miguel)
Decree no. 1/2019, of 18 January	Establishes the protection general zone around Lajes air-base (Terceira)
Regional Regulatory Decree no. 27/84/A, of 24 July	Establishes the protection general zone around Graciosa island aerodrome
Regional Regulatory Decree no. 36/84/A, of 11 October, modified by the Regional Regulatory Decree no. 21/2012/A, of 9 November	Establishes the protection general zone around São Jorge (Velas) island aerodrome
Regional Regulatory Decree no. 28/84/A, of 7 August	Establishes the protection general zone around Pico island aerodrome
Regional Legislative Decree no. 24/2011/A, of 22 August	Approves the ports system in the Azores
Decree-Law no. 594/73, of 7 November	Establishes the legal regime for the constitution of marine aids to navigation easements
Regional Regulatory Decree no. 24/2002/A, of 30 August	Defines the pilotage areas covered by the ports under the jurisdiction of the autonomous joints of the ports of the Autonomous Region of the Azores
Resolution of the Council Government no. 161/2016, of 23 December	Approves the distribution of the Azorean ports by classes A, B, C and D
Ordinance no. 17/2014, of 29 March	Approves the regulation for the management of fishing ports and fishing centres in the Autonomous Region of the Azores
Decree-Law no. 150/2015, of 5 August	Establishes the regime for the prevention of major accidents involving dangerous substances and the limitation of their consequences for man and the environment
Law no. 34/2006, of 28 July	Determines the extent of maritime zone under national sovereignty or jurisdiction and the powers exercised by the Portuguese State, as well as the responsibilities over the high seas
Law no. 27/2006, of 3 July	Establishes the Civil Protection Basic Law. Amended by the Organic Law no. 1/2011 of November 30, amended and republished by Law no. 80/2015 of August 3
Decree-Law no. 265/72, of 31 July	Approves the general regulation of the Captaincy. Public Note no. 340/2018, corresponding to the Captaincy of Horta Port. Public Note no. 554/2018, corresponding to the Captaincy of Port of Santa Cruz of Flores. Public Note no. 419/2018, corresponding to the Captaincy of Port of Angra do Heroísmo. Public Note no. 327/2018, corresponding to the Captaincy of Port of Praia da Vitória. Public Note no. 813/2017, corresponding to the Captaincy of Port of Ponta Delgada. Public Note no. 420/2018, corresponding to the Captaincy of Port of Vila do Porto.
Other	
Decree-Law no. 166/2008, of 22 August, modified and republished by the Decree-Law 239/2012, of 2 November	Establishes the legal regime of the National Ecological Reserve

Decree order no. 419/2012, of 20 December	Defines the conditions and requirements for the uses and actions concerning the National Ecological Reserve
Regional Regulatory Decree no. 15/2008/A, of 25 June	Coastal Zone Spatial Plan (POOC) of Santa Maria
Regional Regulatory Decree no. 6/2005/A, of 17 February	Coastal Zone Spatial Plan (POOC) of North Coast of São Miguel
Regional Regulatory Decree no. 29/2007/A, of 5 December	Coastal Zone Spatial Plan (POOC) of South Coast of São Miguel
Regional Regulatory Decree no. 3/2019/A, of 2 April (partial suspension) **Regional Regulatory Decree no. 1/2005/A, of 15 February**	Coastal Zone Spatial Plan (POOC) of Terceira
Regional Regulatory Decree no. 13/2008/A, of 25 June	Coastal Zone Spatial Plan (POOC) of Graciosa
Regional Regulatory Decree no. 24/2005/A, of 26 October	Coastal Zone Spatial Plan (POOC) of São Jorge
Regional Regulatory Decree no. 24/2011/A, of 23 November	Coastal Zone Spatial Plan (POOC) of Pico
Regional Regulatory Decree no. 4/2017, of 17 March (annex of Declaration no. 5/2016) **Declaration no. 5/2016, of 14 September (first amendment to the synthesis plant)** **Regional Regulatory Decree no. 19/2012/A, of 3 September**	Coastal Zone Spatial Plan (POOC) of Faial
Regional Regulatory Decree no. 24/2008/A, of 26 November	Coastal Zone Spatial Plan (POOC) of Flores
Regional Regulatory Decree no. 14/2008/A, of 25 June	Coastal Zone Spatial Plan (POOC) of Corvo
Decree of the President of the Republic no. 67-A/97, of 14 October	Ratifies the United Nations Convention on the Law of the Sea of 10 December 1982 (addressing, among other subjects, submarine cables)
Decree-Law 507/72, of 12 December	Updates the legal dispositions for the protection of submarine cables
Regional Regulatory Decree 420/2018, of 26 April, 554/2018, of 4 June, 340/2018, 26 March, 419/2018, of 24 April, and 244/2016, of 15 March	Establishes the dispositions and area of protections for the submarine cables in the Islands of Santa Maria, Flores, Faial, and Terceira
Government Council Resolution no. 103/2019, of 26 September	Establishes of the aquaculture production area "Baía do Filipe", located in Graciosa island
Government Council Resolution no. 126/2016, of 25 July, altered by the Government Council Resolution 2/2018, of 24 January	Approves the establishment of the aquaculture production areas located on Faial, Terceira and São Miguel islands, as well as authorized species, production limits and exploitation regime
Regulatory Ordinance 70/2016, of 1 July	Establishes the fishing zone around Graciosa Island
Regulatory Ordinance 54/2016, of 21 June	Establishes the fishing zone at Ribeira Quente, in São Miguel Island
Regulatory Ordinance 53/2016, of 21 June	Establishes the fishing zone in Pico and Faial Island
Regulatory Ordinance 87/2014, of 29 December	Establishes the fishing zone in Santa Maria Island
Regulatory Ordinance 97/2018, of 6 August	Establishes the fishing zone in Quatro Ribeiras, Terceira Island
Regulatory Ordinance 94/2017, of 28 December	Regulates fishing and permanency of boats at Condor Bank

Resolution of the Council Government no. 105/2013, of 6 November	Defines the areas authorized for sand extraction by licensed companies and their maximum annual extraction volumes. Amended by Government Council Resolution no. 3/2014 of 15 January 2014, which approves the areas where commercial extraction of sea sands is authorized
Regional Regulatory Decree no. 16/2011/A, of 30 May	Establishes the legal framework for the management of bathing areas, the quality of bathing water and the provision of assistance in places intended for bathers and transposes Directive 2006/7/EC into the regional legal order
Ordinance no. 30/2018, of 28 March	Lists the coastal bathing waters identified in the Azores for the year 2018
Regional Regulatory Decree no. 35/2004/A	Establishes the boundaries of recreational boating areas in the Autonomous Region of the Azores

Instruments

Currently there is no Sectoral Plan regulating the sector in the Azores.

At national level, the existing instruments are the following:

- National Ocean Strategy 2013-2020, approved by the Resolution of the Council of Ministers no. 12/2014, of 12 February.
- Strategic Plan for the Portuguese Aquaculture 2014-2020, adopted pursuant to Article 34 of Regulation (UE) no. 1380/2013 from the European Parliament and Council, of 11 December 2013.

According to article 97.º of Decree-Law no. 38/2015, of 12 March, the private use of water resources in transitional waters for aquaculture purposes is subject to a Plan for Aquaculture in Transitional Waters. Depending on its location, the implementation of aquaculture installations is also subject to the legal provisions applicable to the planning and management of water resources and to terrestrial planning, and its associated instruments, namely the Management Plans for the Hydrographic Region (*Planos de Gestão de Região Hidrográfica*), the Coastal Zone Management Plans (*Planos de Ordenamento da Orla Costeira*) and the Municipal Director Plans (*Planos Diretores Municipais*).

Stakeholder's perception on the legal framework

The stakeholders' consultation developed in the context of the MarSP project aims to gather information on stakeholder's perceptions about the Azorean legislative context of maritime sectors, among other topics. Selected stakeholders include representatives of the regional and/or local administration and aquaculture operators. The consultation process was performed through individual interviews. Stakeholders were asked if they agreed with the legislative context for aquaculture and what type of changes would they recommend.

In the interviews it was mentioned that the regulatory framework of the sector needs to be well assessed in order to avoid environmental damages, in special if a maximum number of licenses is to be established.

PART II

Methodology for mapping the sector

Current spatial distribution

Considering that aquaculture is a very recent activity in the Azores, its spatial distribution reflects the fact that still few production sites have been implemented. Currently, there are three defined areas for the development of the sector, established by the Government Council Resolution no. 126/2016, of 25 July, altered by Government Council Resolution 2/2018, of 24 January:

- Aquaculture Production Area (APA) "Feteira" (Horta, Faial island) is located between the parish of Feteira and Castelo Branco, within the zone limited by a boundary of 500 meters from the coast, situated between 20 and 50 meters of depth, where a maximum production of 100 tonnes per year is allowed.

Figure 21: Aquaculture production site "Feteira" in Faial (Source: DRAM, DRP)

- Aquaculture Production Area (APA) "Porto Martins" (Praia da Vitória, Terceira island) is situated on enclosed bay within the south end of the Mine islet and the north end of the São Fernando Port, located between 20 and 50 meters of depth. The area is located both within the 500-meter line from the coast, where the production is limited to 100 tonnes per

year, and beyond that line, where the yearly production can rise to a maximum of 250 tonnes.

Figure 22: Aquaculture production site "Porto Martins" in Terceira (Source: DRAM, DRP)

- Aquaculture Production Area (APA) ”Ribeira Quente” (Povoação, São Miguel island), is positioned on the south coast of the island, west of the Port of Povoação, between 20 and 50 meters of depth. Part of the area is located within the boundary defined by the 500-

meter line from the coast, where the production per year can go up to 100 tonnes; the part which goes beyond that line is limited to a maximum production of 250 tonnes each year.

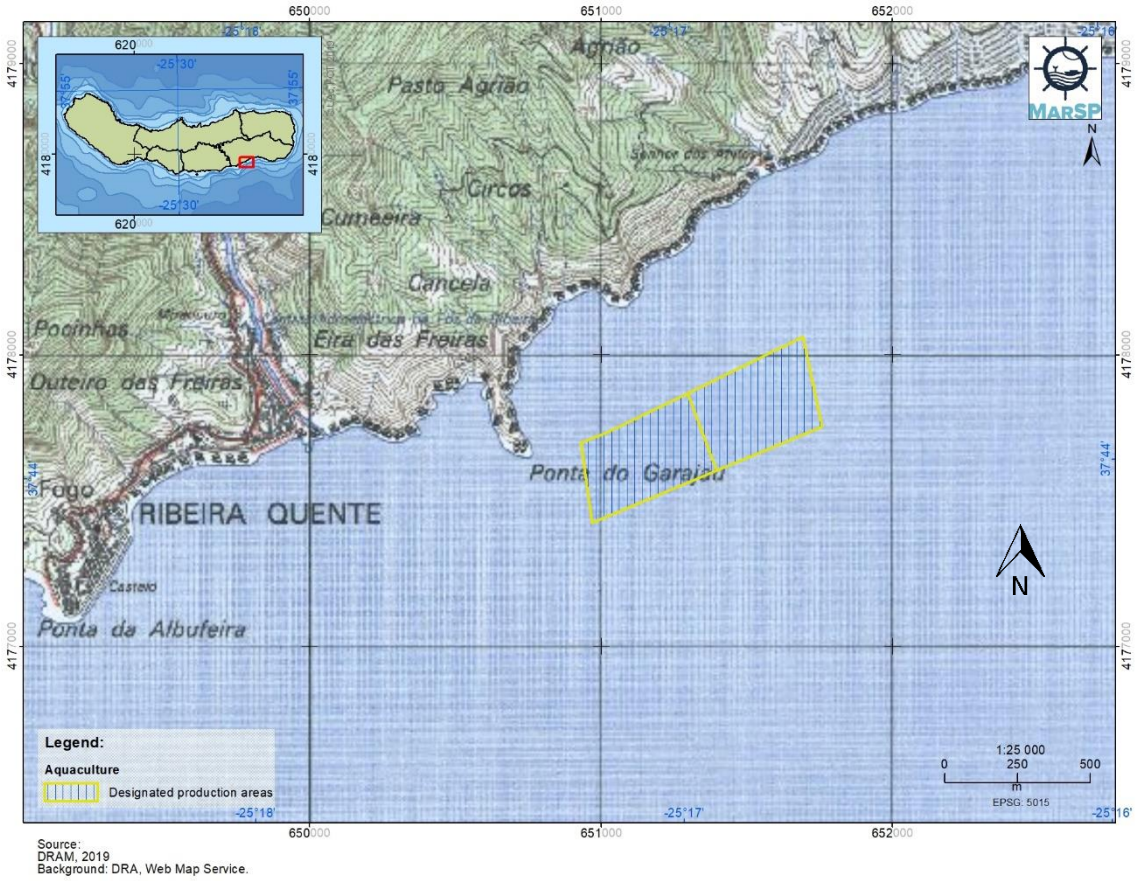


Figure 23. Aquaculture production site "Ribeira Quente" in São Miguel (Source: DRAM, DRP).

- Aquaculture Production Area (APA) "Baía do Filipe" (Graciosa Island), recently approved by the Regional Government of the Azores, but still not yet published at the Official Journal until the present date.

Figure 24: Aquaculture production site "Baía do Filipe" in Graciosa Island (Source: DRAM, DRP)

Aquaculture implementation status for APA

As a result of the two support systems for aquaculture, the innovation programme and the productive investments programme, a number of aquaculture projects are curretly being implemented.

In 2016, it was initiated the installation of an onshore aquaculture in Graciosa inland for brackish water production of spirulina using low-depth tanks, which, since 2018, has begun its production and commercialization phase.

Regarding offshore aquaculture, the only actively functioning aquaculture, albeit still experimentally, is the one located in APA – Ribeira Quente (São Miguel island), which has its infrastructure installed since 2018 for the production of algae and fish (fish cages), namely greater amberjack (Seriola spp.) and is currently in its exploration phase, expected to progress to the growth phase in one to two years. It is intended that the production mode will later on evolve to function as an integrated multi-trophic aquaculture. The project located in APA Feteira (Faial island) has recently completed its installation phase and is predicted to farm algae and echinoderms (sea urchin and sea cucumber) in integrated multi-trophic aquaculture mode. The project situated in APA Porto Martins (Terceira island) has also concluded its installation phase and will be designed to test different types of infrastructures for algae production. All projects all involve partnerships with the University of the Azores and local fisheries associations. No chemical products or pharmaceutical substances are expected in the cultures.

PART III

Sectorial Analysis

The sector diagnosis presented in this section includes a SWOT analysis and the analysis of sectoral interactions (sector-sector, land-sea interactions, sector-environment). The methodological approach for all analysis was similar and mainly based on regional stakeholders' consultation.
The first step to develop the analysis was based on sectoral representative stakeholders' consultation, through individual interviews. Stakeholders were asked to give their technical opinion on the fulfillment of each analysis for the sector they represent. For aquaculture sector, one representative regional stakeholder accepted to participate in the individual interview. The analyses resulting from this step were reviewed during the 2nd MarSP Regional Stakeholders Workshop (developed in April 2019), which had the participation of 78 stakeholders distributed in three Azores Islands: São Miguel, Terceira and Faial. In the workshop, stakeholders were grouped according to the sectors they represent and were asked to comment on and complement the analyses for those sectors. The analysis for each sector includes consensual results from both regional stakeholders' consultation (individual interviews and the workshop) and additional topics from literature review for the sector.

SWOT Analysis

A SWOT analysis was developed for each maritime sector identified for the Azores. Stakeholders were asked to identify the strengths, weaknesses, opportunities and threats they consider as the most important for the sector they represent. The final SWOT analysis for the aquaculture sector in the Azores is represented in **Table 8**. The SWOT analysis resulting from the sectoral interview presented few points, whereby Workshop participants complemented the analysis; as a result, due to time constraints, no topics were highlighted for Opportunities and Threats. Furthermore, it is important to note that topics highlighted in bold in the table below were considered by stakeholders as most important.

Table 8: SWOT analysis from regional stakeholders' consultation for aquaculture in the Azores

	Positive	Negative
Internal	***Strengths*** **- Azores image associated to modernism;** **- Produced knowledge;** **- "Pristine" waters with high environmental quality for the available areas (e.g., absence of industrial contaminants);** - Available maritime space; - Fish image as "Azores Brand"; - Favourable orography for pollution dispersion; - Possibility for employment raise; - Inshore aquaculture near the coast: control of critical factors for production (water quality, temperature, pH, nutrients); - Offshore aquaculture: constant water renewal; - Cultivation of species of high market value; - Synchronization of production cycles with the peaks of target markets; - Contribution to food production.	***Weaknesses*** **-Implementation and operation difficulties resulting from the coastal orography, hydrographical and oceanographic conditions;** **- Geographical discontinuity of the archipelago;** **- Limitations to the product flow;** - Azores maritime environmental status; - Research, development and innovation, studies to be done (lack of *know-how*); - Purchasing power; - Conflicts in the use of space; - Need to develop and test production protocols for the target species to determine optimal production conditions; - Oligotrophic waters, therefore, less productive; - Difficulty in keeping the production density to values that prevent the emergence of stress, pathologies and cannibalism; - Pollution resulting from aquaculture, with possible impacts to coastal macrobenthos (e.g. excretion and organic matter deposition, feed, chemical products, drug and antibiotic use); - Accidental introduction of non-indigenous species (used primarily in the early stages of production, in hatcheries and nurseries, to feed the target species); - High production and transport costs, mainly air transportion; - Genetic selection.
External	***Opportunities*** - Alternative (or complementarity) to the fisheries sector; - Activity available to employ people from the fisheries sector and from research; - Available community funds; - Decrease in fishing pressure on resources; - New markets; - New professional qualification; - Bait production/storage; - Repopulation of species; - Possibility of using existing research infrastructures; - Development of new qualified technology-based jobs; - Integrated multi-trophic aquaculture: diversification of production using different trophic levels in the same aquaculture production site.	***Threats*** - Increase in the number of storms over time; - Prejudiced mindset against the product; - No proper public structures to manage the sector; - If too high, the number of granted licenses can pose an environmental threat; - Production limitation to small scale, due to the geographical characteristics that allow few suitable areas; - Environmental impact; - Need for careful selection of species for cultivation, based on market dynamics, in order to facilitate their sale and export.

Analysis of interactions

The development of a certain activity in the maritime space is usually linked to interactions with the remaining uses and maritime sectors. Those interactions can be both positive or negative and can be both induced or suffered by a certain sector. In the context of the MarSP project, for each maritime sector, three types of interactions were analysed: sector-sectors interactions, land-sea interactions and interactions with the environment. The analysis intended to identify if interactions exist and the level of intensity of the interactions using the following scale: negative values for negative interactions, positive values for positive interactions and zero for absence of interactions. In the matrices, the column "C" represents the negative impacts induced or suffered by the sector, identified as conflicts, while the column "S" represents the induced or suffered positive interactions, deemed as synergies.

Sector-sectors interactions analyses whether there is any type of conflict and/or synergy between each of the maritime sectors identified and the other sectors. The resulting matrix reflects only the analysis of interactions occurring offshore, not including coastal areas within less than 30m bathymetry (the protection maritime zone of protection defined by the coastal zone spatial Plan - POOC).

Land-sea interactions analyse whether there is any type of conflict and/or synergy between each of the maritime sectors identified and coastal activities (up to the 30m bathymetry) developed in the various areas identified in the POOC.

Interactions with the environment analyses if there is any kind of negative and/or positive effect of each of the maritime sectors identified to the environment, specifically considering the descriptors of the good environmental status (GES), and respective criteria, as defined by the Marine Strategy Framework Directive (MSFD).

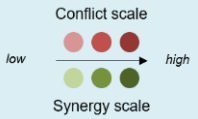
During the individual interviews, stakeholders were asked to identify the levels of conflicts and/or synergies of ports and marinas with other sectors. The final values were calculated using the tendency of answers and represent the stakeholders' perception trend. As this first analysis is based on inputs from stakeholders representing the maritime sector, to avoid or decrease possible bias in the results, during the Workshop, stakeholders were asked to comment and, when in disagreement, to propose a different value to classify the level of conflict/synergy. The final values from the workshop were calculated using the mean of all values resulting from all discussion tables. Literature review was also used to complement the characterization of the interactions, identifying if a conflict or a synergy exists in the Azores or on other contexts.

Interactions with other sectors

In order to analyse the interactions between aquaculture and other uses and activities developed in the maritime space, an interaction matrix was created according to the aforementioned methodology.

The values featured on the matrix below represent the trend analysis of the stakeholders' sectoral consultation and the 2nd MarSP Stakeholder Engagement Workshop. Nonetheless, it is important to observe that the aquaculture sector was analysed mainly based on the Stakeholders workshop sector group, considering that the participation on face to face interviews was almost nule.

Table 9: Characterization of the interactions between aquaculture and other maritime sectors in the Azores

Sector-Sectors	Aquaculture					
	Sectoral interviews		2nd Workshop		Literature review	
	C	S	C	S	C	S
Fisheries	-3	0	-1	1.8	X	X
Extraction of non-metallic mineral resources	0	0	-0.8	0	X	
Energy	0	2	-0.3	0.8	X	X
Maritime security, defence, surveillance and civil protection	0	0	0	0	X	X
Navigation and maritime transportation	0	0	-0.5	0.3	X	X
Infrastructures	0	0	-0.3	0	X	
Coastal and maritime tourism	-1	3	-1	1.5	X	X
Scientific research and marine biotechnology	0	3	0	3	X	X
Underwater cultural heritage	0	0	-0.3	0		
Environmental Conservation and MPAs	0	3	-0.8	1.8	X	X
Legend	**C** – Conflict; **S** – Synergy; **X** – Existent **-3** – High conflict; **-2** – Moderate conflict; **-1** – Low conflict **0** – Without conflict/synergy **1** – Low synergy; **2** – Moderate synergy; **3** – High synergy **"-"** – Does not answer					

The reasons behind the grades given by the sectoral interviews and 2nd MarSP Stakeholder Engagement Workshop for each of the identified interactions with aquaculture are the following:

- Fisheries: interviewed stakeholders believe the future scenario is probably one with high conflict. On the other hand, in the workshop the interaction between the fisheries and aquaculture was considered neutral by the stakeholders, due to the stakeholders' understanding that it does not compete with aquaculture;
- Extraction of non-metallic mineral resources: stakeholders at the workshop affirmed that the sector can affect water quality;
- Energy: stakeholders at the workshop considered that synergies can exist if the energy is wind based;
- Navigation and maritime transport: stakeholders at the workshop considered that conflicts could appear due the presence of cages, which may alter navigation routes. On the other hand, other stakehodlers believe that synergies can appear when installing the cages in sheltered areas, mainly near shore and ports;
- Coastal and maritime tourism: stakeholders at the workshop affirmed that negative visual effects on seascape would cause conflict; on the other hand they also believe synergies can result from tours to the aquaculture installations. In the interview, the stakeholders believe that the sector can benefit from aquaculture infrastructures. Nonethless, due to the coastal

landscape nearby aquaculture sites, it is also believed that a spatial conflict between sports fishing and aquaculture might happen;

- Scientific research and marine biotechnology: stakeholders at the sectoral interviews affirmed that aquaculture would provide opportunities for research;
- Conservation: stakeholders at the workshop observed that, depending on the aquaculture system adopted, natural life below the cages would struggle to exist. Synergies can occur as aquaculture infrastructures can play as artificial reefs for other species.

Uses compatibilization and Multi-uses

Ocean multi-use (MU) is an emerging concept which responds to the increasing demand for marine resources and space. It has been defined as the intentional "joint use of resources in close geographic proximity by either a single user or multiple users". It is an umbrella term that covers a multitude of use combinations in the marine realm and represents a radical change from the concept of exclusive resource rights to the inclusive sharing of resources and space by one or more users" (*in* Schupp, et al., 2019).
The Ocean Multi-Use Action Plan (Schultz-Zehden et al. 2018) combines aquaculture with tourism and renewable energies. In this report, it is appointed that the former combination involves the diversification of tourism in order to include possible synergies with the aquaculture sector, e.g. visits to aquaculture sites, diving/snorkelling in the proximities or in the installation if possible, and sport fishing/angling next to the installation. The latter combination is applied for both offshore wind farms and wave energy. The combination with offshore wind farms can entail direct attachment of installations or the co-location of aquaculture installations within the security zone. Similarly, the combination with wave energy infrastructures can be done physically or co-located side-by-side, enabling the use of wave energy directly for aquaculture operations or to connect it to onshore enterprises or national grids.

Land-Sea interaction

Similarly to the previous matrixes, the land-sea interaction for the aquaculture sector was analyzed taking into account the interaction between aquaculture and activities on coastal areas. The result is shown as a comparison matrix (**Table 10**).

Table 10: Characterization of interactions of aquaculture with coastal zones in the Azores

Land-sea		Aquaculture					
		Sectoral interviews		2nd Workshop		Literature review	
		C	S	C	S	C	S
Critical areas for the sustainable coastal use	Natural, cultural and scenic special area	-1	0	-1	0	X	X
	Bathing zones	0	0	-0.5	0	X	
	Build-up areas in risk zones	0	0	0	0		
Environmental protection	Marine environmental protected areas	0	2	-1.3	1.5	X	X
	Land environmental protected areas	0	0	0	0		
Coastal protection areas	Build-up areas	0	0	0	0	X	
	Agricultural, forestry and other uses	0	0	0	0	X	
	Touristic potential areas	0	0	-0.5	0	X	X
Infrastructures	Airport	-1	1	-0.8	1		X
	Road	-1	1	-0.8	1		X
Navigation	Ports	-2	2	-1.5	2	X	X
	Marinas, 'portinhos'	-1	1	-0.8	1	X	X

The explanation given on the sectoral interviews are the following:

- Natural, cultural and scenic special area: the aquaculture sector demands space and has a visual impact on landscape and seascape;
- Marine environmental protected areas: do not allow the free passage, nonetheless aquaculture might benefit the environment, such as in cases where filter-feeding shellfish, such as oysters, are cultured in-situ, and when pressure is reditred from wild fish stocks;
- Airport/road: environmental impact caused as consenque of greenhouse gases, methane, among other pollutants, emited by both air and road modals. However, these infrastructures contribute to the distribution of aquaculture products;
- Ports: conflicts might arise when small ports are not considered in the implementation of aquaculture structures, such as the one observed at Porto Martins that is preventing activities in the space designated to aquaculture prior to its instalation such as "chicharro" fisheries, as well as conflicts related to the aquaculture structure's maintenance and vessels' flows. Synergies are related to the transportation of the product;
- Marinas and small ports: a potential for synergy was identified as cages could be installed in sheltered areas in the surroundings of marina and small ports, as long as they do not interfere with navigation routes.

There are no notes for the explanation of the values of the 2nd MarSP Stakeholder Engagement Workshop interactions between land-sea zones and aquaculture.

Interactions with the environment

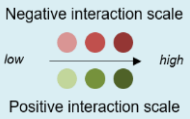
The impacts of aquaculture on the environment (Table 11) were analysed taking into consideration the Good Environmental Status (GES) descriptors, as defined by the MSFD.

Table 11: Characterization of impacts of aquaculture considering MSFD's GES descriptors

Interactions with the environment	Aquaculture					
	Sectoral interviews		2nd Workshop		Literature review	
	N	P	N	P	N	P
Biodiversity	0	2	-0.8	1.8	X	X
Non-indigenous species	0	0	-1	0	X	
Exploited fish and shellfish	0	1	-0.5	1.5	X	X
Elements of food-webs	0	1	-0.5	0.8	X	
Human-induced eutrophication	0	1	-1	0	X	X
Sea floor integrity	0	0	-0.5	0	X	X
Hydrographical conditions	0	0	0	0.3	X	
Contaminants (water, sediments, biota)	-1	0	-1.8	0.3	X	X
Contaminants in fish and seafood	-1	0	-1.5	0	X	
Marine Litter	0	0	-0.5	0	X	
Level of noise	0	0	0	0.5	X	

Legend

N – Negative effect; **P –** Positive effect; **X –** Existent
-3 – High negative effect; **-2 –** Moderate negative effect; **-1 –** Low negative effect
0 – Without negative/positive effect
1 – Low positive effect; **2 –** Moderate positive effect; **3 –** High positive effect
"-" – Does not answer



The explanations of the values for the 2nd MarSP Stakeholder Engagement Workshop are the following:

- Eutrophication: stakeholders affirmed that aquaculture can cause increased eutrophication in sheltered bays;
- Sea floor integrity: moorings were identified as a possible conflict by the stakeholders;
- Elements of food webs: stakeholders considered that aquaculture can cause ecological imbalances to the marine environment;
- Biodiversity: aquaculture was linked by the stakeholders to an increase in marine resources (food security); on the other hand, aquaculture can cause pollution and negatively influence local biodiversity.

Additional documents and links

Tools and Aquaculture for Aquaculture Sustainability (TAPAS): it comprehends a set of improved tools and methodologies as well as guidance for the European aquaculture sector (https://www.scitecheuropa.eu/tools-and-aquaculture-for-aquaculture-sustainability-tapas/98665/)

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NON-METALLIC MINERAL RESOURCES

Introduction

The aim of the MarSP (Macaronesian Maritime Spatial Planning) project is to develop concrete actions for the Member States (Portugal and Spain), through regional and national competent entities to build the necessary capacities and tools for the implementation of the European Union (EU) Directive on Maritime Spatial Planning (MSP) (Directive 2014/89/EU, 2014) in the Macaronesia region, including mechanisms for cross-border cooperation.

For the characterization of the existing uses in the Azores maritime space, the main blue sectors and activities need to be considered. In the context of the MarSP project, the exploration of non-metallic mineral resources is an important activity to consider in processes of MSP, especially to satisfy the needs in outermost regions. This sector includes the exploration and exploitation of sand, gravel, and pebble.

Purpose

This sector briefing summarises the current status of the non-mineral metallic resources sector in the Autonomous Region of the Azores (Portugal), under MarSP project work package 2 "Mapping the current conditions and creating a vision for the MSP in Macaronesia" and Task 2.2 "Mapping the maritime uses and activities and defining the MSP current conditions". It includes the characterization of the current situation of the non-mineral metallic resources sector and MPA in the Azores and the proposed and adopted methodologies to map the activity, both current and potential situations. It also includes a sector diagnosis, the identification of the main drivers of change for the development of the sector and the main interactions with other sectors, the environment and the land-sea interface.

PART I

Sector characterization

Mineral resources

Marine mining comprises the extraction and processing of non-living resources in the ocean, including marine aggregates (e.g. sand and gravel), other minerals and metals in/on the seabed (e.g. manganese, tin, copper, zinc, cobalt) and chemical elements dissolved in seawater (e.g. salt and potassium) (European Commission, 2019). In the EU, the traditional sector of mineral resources extraction is mostly in decline due to decreasing production and rising costs (European Commission, 2019). Nonetheless, novel potential applications for mineral resources are currently being discussed at international level, with deep-sea mining being studied as a potential alternative for the extraction of metallic mineral resources from the seabed. Non-metallic mineral resources include minerals which potential interest as raw material arises from their metallic content, even though they contain metals in their composition. Depending on their economic potential, the constituent metallic mineral content may be regarded as a by-product of the exploitation of this resource.

In the Azores, marine mining comprises exclusively the extraction of non-metallic mineral resources, namely the exploration and exploitation of sand, gravel and pebble, and the Region is self-sufficient with respect to these mineral resources. The development of the activity in the Region is based on the existing knowledge on non-metallic marine resources located at coastal areas and on the seabed, at the level of the insular shelf of the islands. With the collaboration of the Regional Government of the Azores, there have been a number of detailed studies of the insular shelves in the Azores archipelago aiming to identify areas with potential for aggregate extraction, in the context of GEMAS project and PLATMAR project. These initiatives have gathered data on the majority of the shelves surrounding Faial, Pico, São Miguel, Flores and Santa Maria island, namely bathymetric data, high-resolution seismic reflection data, and sediment sampling mapping information, with the purpose of characterizing the composition and texture of superficial deposits and providing volume estimates. Knowledge on the seabed substrate type surrounding other islands of the Azores archipelago is, however, still limited.

In the archipelago, sand deposits inland are few and the known and available submerged deposits of sand are scarce due to a set of adverse geomorphological, geological and hydrodynamic factors. The seafloor surrounding the islands is characterized by very narrow shelves and steep slopes with an important rocky component and a very irregular topography (Amorim et al., 2017). Due to the volcanic nature of the archipelago and the steep bathymetric gradient around the islands, the slopes of these structures are characterized by a predominance of exposed rocky surfaces, in contrast to the sediment coverage in abyssal plain areas in deep-sea zones. These are generally made up of alkaline basalts, including submarine lava flows and pyroclastic falls and flows (Borges et al., 2009). Fine sediments or black volcanoclastic sand are other constituents of the seabed, especially in areas with lower slopes and zones more sheltered from the effects of currents and waves. Estimates point to sedimentary particles being the main components of the Azores subarea of the Portuguese EEZ, occupying a large part of the abyssal plain. Biogenic substrates, such as those derived from the settlement of stony corals and foraminifera, also represent a relevant fraction of the islands' submerged slopes (Amorim et al., 2012).

Pressures and impacts of aggregate extraction

Dredging activities modify the local dynamics on the areas of incidence of the operations; the magnitude of impacts will depend on the dredged volumes, operation angle, the direction and speed of the main and local currents, as well as the bathymetry of the surrounding area. It may cause changes in the profile, bathymetry and bottom sedimentation regime of sandy seafloors, thus altering processes of coastal erosion, sediment transport and beach nourishment. Dredging operations can also cause resuspension of a large amount of solid materials (including potentially dangerous contaminants) in the water column, increasing turbidity levels and altering sediment deposition. Loss of substrate, sediment plumes and the modification of the bottom topography are factors that can alter water quality locally in areas adjacent to the exploration zones, as well as substrate quality, affecting the natural fauna and flora present in those areas. Furthermore, it worth mentioning that aggregate extraction and the subsequent sediment deposition can severely impact maerl sites, even though, considering that, in the Azores, extraction occurs at depths of about 20 m, it is not expected that those communities are being significantly affected, as most circalitoral maerl is distributed vertically at depths between 40-80 m (Governo dos Açores, 2014).

In this context, evaluating and preventing impacts on the marine environment, safeguarding its physical and biological components and ensuring coastal protection are fundamental aspects to consider for the spatial planning and sustainable management of the activity. This is especially relevant for sand extraction operations, considering little is known about the medium- and long-term effects of bathymetry changes on the shoreline. As such, the activity requires permanent monitoring and further studies may be needed to evaluate new potential areas to make up for the potential depletion of the deposits currently being exploited. In the framework of PLASMAR project, it is currently being conducted a study to monitor and evaluate the impacts of dredging on the seabed, in areas where licenced sand extraction operations in the Azores are taking place.

Regional legal framework for aggregate extraction

The Regional Government of the Azores has been defining the public policy for the sector taking into account the environmental components concerning nature conservation and the preservation of biodiversity and landscape values, as well as the need to stimulate scientific research for the valorisation of geological resources, training and capacity building (Regional Government of the Azores, 2016).

Aggregate extraction in the Azores is currently regulated according to Regional Legislative Decree no. 9/2010/A of 8 March (altered and republished by Regional Legislative Decree no. 31/2012/A of 6 July). In the diploma it is established that aggregate extraction can occur for the following purposes, targeting sand/sandy materials (grain size between 64 μm and 2 mm) and rolled pebble (rounded masses with size superior to 5cm): sand extraction for commercial purposes, rolled pebble for the provision of fishing gear and rolled pebble for ornamental purposes. It sets a clear distinction between the zones where the several types of extraction can take place, while also setting the previsions regarding on the zones where the activity is forbidden. No aggregate extraction can take place in the following areas:

a) Less than 1 nautical mile from port infrastructures for classes A, B and C, in accordance with Regional Legislative Decree no. 24/2011/A, of 22 August;

b) Less than 0.5 nautical miles from ports infrastructures for class D and E, in accordance with Regional Legislative Decree no. 24/2011/A, of 22 August;

c) Less than 0.5 nautical miles from the bathing areas indicated in the Coastal Zone Spatial Plans (POOC) in force;

d) Within a 0.5 nautical mile range on each side of the port entrance channel for port classes A and B;

e) Within protected areas of any nature and in areas where, in accordance with the applicable Coastal Zone Spatial Plans, the extraction is prohibited;

f) Less than 0,5 nautical miles of licensed facilities for aquaculture of any nature, namely Aquaculture Production Areas established by the Government Council Resolution no. 126/2016, of 25 July (altered by Government Council Resolution 2/2018, of 24 January);

g) Within a radius of 0.5 nautical miles from sites marked as containing archaeological finds;

h) Less than 250 m from islets and shallow waters of any nature where the reduced probe is less than 5 m.

Aggregate extraction is always subject to prior licensing. The exceptions to this are the cases when the activity is applied to the extraction of rolling pebble for ornamental purposes; or for civil protection reasons; or for dredging and excavation operations in areas under port jurisdiction to ensure navigation conditions, for keeping stream and lagoon channels clear. On the maritime space, beyond 250 m from the coastline, extraction of non-mineral resources from the seabed can be authorized for commercial purpose.

Rolled pebble may be extracted from coastal areas to be used as a constituent of longline fishing gear (mostly bottom longlines). When destined exclusively to this purpose, the activity does not require previous licensing, as long as the extracted volume does not exceed the daily limit of 10 m^3.

On the other hand, rolled pebble can also be extracted from the coastal area for ornamental purposes, subject to previous licensing, as long as the yearly limit of 100m^3, per 1000 m of coastline, is not exceeded and provided that it causes no significant negative impacts on the coastline and the stability of the adjacent cliffs. There is a need to adapt the existing regulation concerning rolled pebble extraction, in order to balance resource demand and its availability and avoid contributing to further costal erosion, as there is little knowledge on the volumes extracted and the sites where the extraction takes place and no real way to efficiently monitor and inspect the activity. This is especially relevant considering that there is some demand for these geological materials in the Azores, which are mostly found in the fragile and very dynamic coastal zone.

With the publication of Government Council Resolution no. 105/2013, of 6 November (altered by Government Council Resolution no. 3/2014 of 15 January), aggregate extraction for commercial exploitation of sand by licensed companies became restricted to certain areas, where extraction is authorized. These areas and the legal regulations applied to the activity were mainly based on results from the GEMAS project, whenever available in the island, which identified a number of sand deposits as preferred sites for aggregate extraction, based on their location, depth and estimated volume. The areas were selected in order to ensure that the economic development of this activity was compatible with the conservation of environmental values and coastal protection, avoiding areas important for the stability and structural integrity of coastal zones and those involved in beach dynamics, and taking into consideration the historical use of some zones. The authorised areas are located near the coast of all islands, except São Jorge.

Previous to the publication of Government Council Resolution no. 105/2013, of 6 November, aggregate extraction was limited to island quotas, based solely on the unloaded material, setting maximum volumes per island (until 2006, unloading quotas for São Jorge, Pico and Faial island were treated as a unit). Since then, the activity is subject to annual exploitation quotas, stipulated per authorised area, and the licencing process depends on the companies' expressed intents.

In the context of maritime spatial planning, pursuant to Law no. 17/2014 of 10 April, and Decree-law no. 38/2015, of 12 March, aggregate extraction activities fall under what is considered private use

of the national maritime space, materialized by the allocation of an area or volume in that space. That implies making better use of the available marine resources in that space (when compared to the advantages obtained by common use), thus resulting in added benefit for public interest. Such private used is subject to the issuance of a Title of Private Use of the National Maritime Space (TUPEM). As such, the extraction of non-metallic mineral resources from the maritime space requires prior obtaining of a TUPEM, except if it occurs in areas under the jurisdiction of port entities, excluded from the scope of the Decree-Law no. 38/2015, of October 12. Nonetheless, the granting of a TUPEM does not entitle its holder to use or exploit the resources located in that space. Hence, aggregate extraction activities must also comply with the licensing requirements established by the sectoral legal framework, namely Regional Legislative Decree no. 9/2010/A of 8 March (altered and republished by Regional Legislative Decree no. 31/2012/A of 6 July).

According to the Political and Administrative Statute of the Autonomous Region of the Azores, the Region has competence for licensing in the context of the private use of maritime public domain and aggregate extraction (Art. 8 of Law no. 2/2009 of 12 January). The process of granting licences for commercial exploitation of sand and for occasional operations of aggregate extraction, on both the coastal area and the territorial sea, is currently managed by the Regional Directorate for Sea Affairs (DRAM), according to Regional Regulatory Decree no. 4/2015/A of 20 February. DRAM is also the competent authority regarding the maritime spatial planning process, being responsible for managing TUPEM requests and issuing them. Since 2013, extraction activities are monitored in real time by DRAM, in partnership with Portos dos Açores, S.A. This is done via an online platform linked to an Automatic Identification System (AIS), which registers the position of the operating extraction vessels, adding to the registry of all the information from the licenced operator and the ports where the extracted resource is unloaded.

Aggregate extraction activity in the Azores

In the Azores, aggregate extraction is conducted predominantly for the purposes of commercial exploitation of sand, which is as an essential raw material for the construction industry in the Region and lacks natural deposits on land. Importing this resource is likely to be more expensive. Pebble extraction takes place mainly for the provision of fishing gear, and occasionally for ornamental purposes. In addition to its economic and social relevance, dredging of non-metallic mineral resources also has implications for coastal protection (e.g. artificial beach nourishment), while also playing a part in ensuring the safety of port operations and navigation conditions.

Sediment dredging in the Azores has been mostly limited to sand extraction. Even though sand extraction can occur at depths between 20 m and 80 m (maximum dredging depth of standard extraction equipment), in the Azores, the available equipment usually operates at a depth of approximately 20 m, and thus the activity is limited to the very narrow insular shelves, taking place near the coast. The extracted sand has a particle size between 0.6 and 2mm, depending on the extraction sites, and is mainly is constituted by basalt or trachyte.

The evolution of the aggregate extraction sector in the Azores is mainly determined by the demands of the construction industry, which has been reducing in the last decade, especially after the 2011 economic crisis. Even though this is a declining industry in the Azores, due to both insularity and territorial fragmentation, as well as the legal enforcement of more restrictive measures, the sector continues to be a significant maritime activity in the Region. For most of the islands, there is no alternative source for this raw material to supply the construction market.

Until 1992, sand extraction was carried out on beaches, having had significant negative impacts, with excessive near-shore dredging accelerating the erosion of natural beaches, as was verified in Ribeira Grande (São Miguel Island) and São Mateus Beach (Graciosa Island). Since then, it was implemented a licencing system for sand extraction from the seabed on some islands and such

activities took place systematically from 1992 to 1994 on the islands of Santa Maria, São Miguel and Terceira respectively, and were occasionally carried out on the islands of Pico and Graciosa between 1995 and 1997 and Corvo during 1997. From 2001 onwards, the volume of dredged submarine sediment unloaded at ports started being monitored. Until 2012, all information on the activity was provided by the port administration authority and concerned only volumes unloaded at ports, with little information available on actual extracted volumes and sites. Subsequently, with the entry into force of Regional Legislative Decree No. 9/2010/A of 8 March (altered and republished by Regional Legislative Decree no. 31/2012/A, of 6 July), it was established an annual licensing procedure (replacing the previous system automatically renewed licences). It also became mandatory to provide the competent authority with detailed information on the extraction sites and volumes extracted (provided by the operator), and the volumes unloaded at ports (provided by Portos dos Açores , SA). Before the publication of Government Council Resolution no. 105/2013, of 6 November, sand extraction took place near the coast of all the islands of the archipelago, except São Jorge, and since then extraction operations became mostly limited to the authorised areas.

Currently there are only two operating dredger vessels registered in the Region, "Coral da Horta" and "Dragocidental". In the last decade, the number of licences attributed to companies for the purposes of commercial exploitation of sand from the seabed has been steadily decreasing, ranging from 8 companies in 2013, to only 2 in 2018.

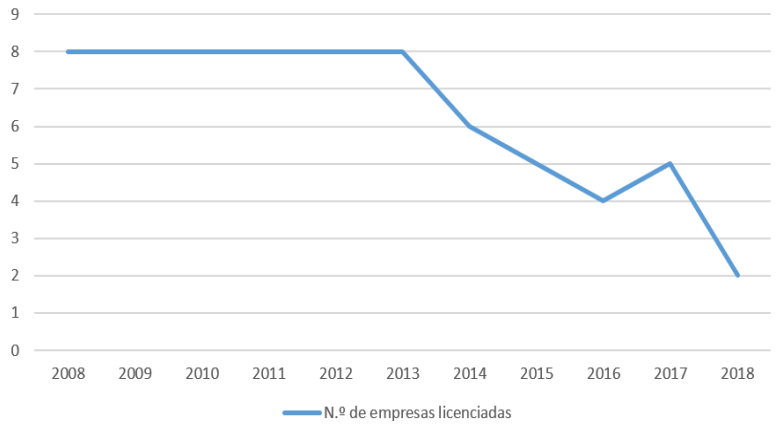


Figure 25. Number of licenses issued for commercial exploitation of sand in the last decade (Source: DRAM)

The total volume of sand extracted for commercialization, based on the unloaded volumes in all islands, has been decreasing since 2001, with 2018 registering the lowest value, bellow 50,000 m^3. The licensed volumes have also accompanied the decreasing tendency of the sector, and have not been surpassed by total unloaded volumes.

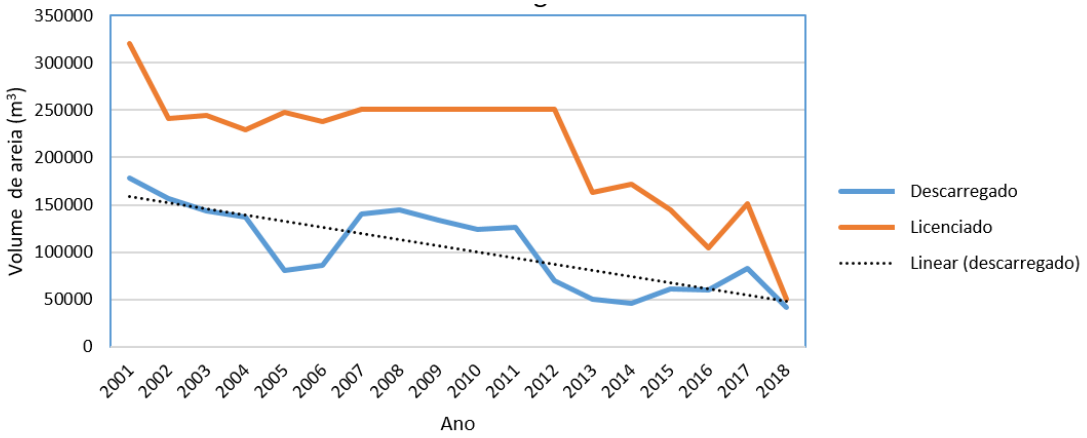


Figure 26. Comparison between the total volume of sand unloaded at ports and licenced volumes, between 2001 and 2018 (Source: DRAM)

In the period 2001-2018, the island with the largest total unloaded volume was Terceira, accounting for 43.39 % of the total volume, followed by São Miguel island, with 22.77 % and São Jorge, Pico and Faial islands, which collectively represented 22.16 %.

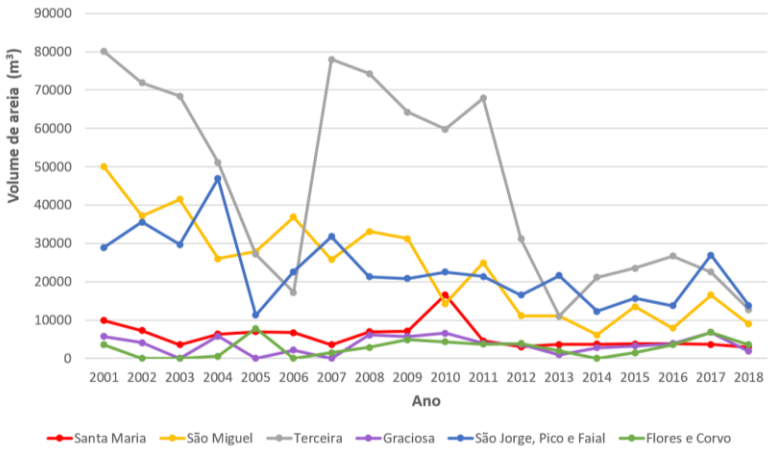


Figure 27. Comparison of the volume of extracted sand unloaded at ports, per island, between 2001 and 2018 (Source: DRAM)

This tendency is also prevailing in the last decade, as represented in, showing the total yearly unloaded volumes for each island. In 2018, Terceira was the island registering the highest demand, with 29.08% of the total unloaded volumes in the Region during that year taking place in the ports of this island, followed by São Miguel (20.49%), Pico (16.73%) and Faial (11.56%).

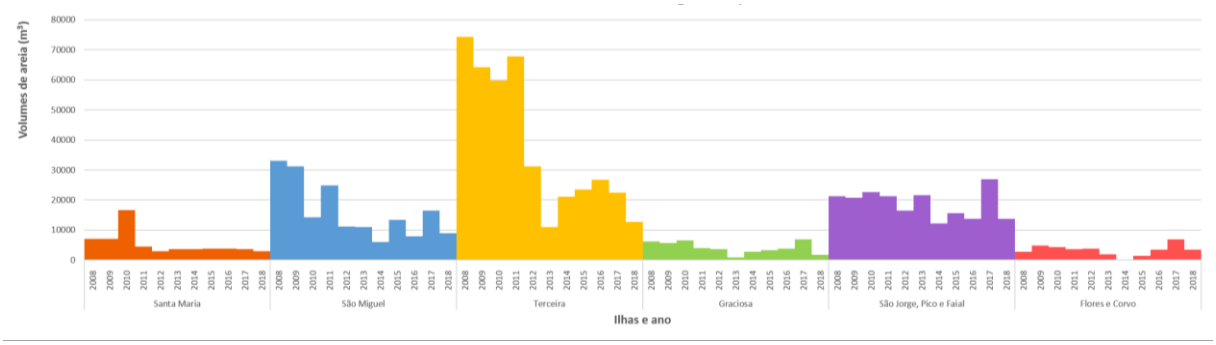


Figure 28. Annual volume of extracted sand unloaded at ports, per island, in the last decade (Source: DRAM)

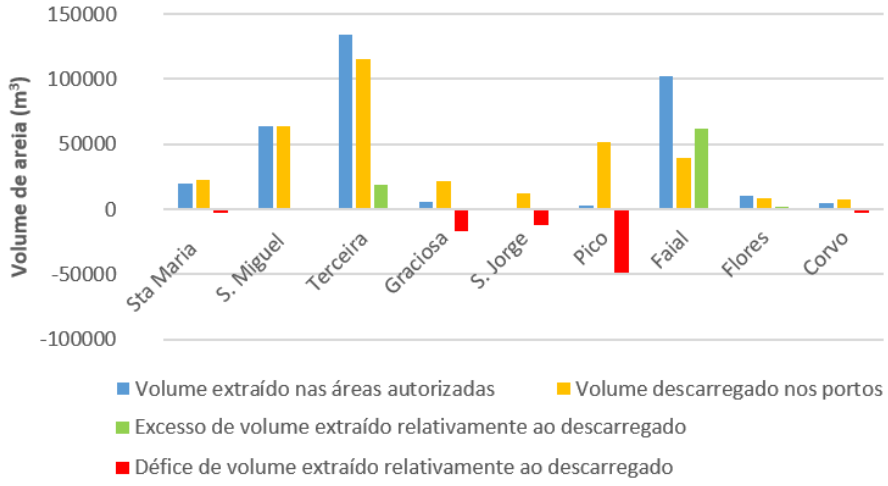


Figure 29. Comparison of the total volume in the period 2013-2018 for sand extracted from authorized areas and the total volume unloaded at ports, per island (Source: DRAM)

According to data gathered since 2013, when comparing the volumes of sand unloaded at the ports and the extracted volumes at each of the authorised, it is shown that the islands which did not depend on resources coming from areas located near the coast of other islands were Terceira, Faial, Flores and São Miguel. The largest deficit is presented in Pico and Graciosa, considering the proximity from areas in Faial and Terceira, respectively. In the vicinity of São Jorge there are no authorised areas; as such, it is expected that the resource needs are to be met by extracted volumes coming from operations happening mainly in Faial and Pico.

The operations for sand discharge take place in ports of class A or B. According to information on the unloaded volumes at each port since 2015, most discharges happen in Porto da Praia da Vitória and Porto de Ponta Delgada.

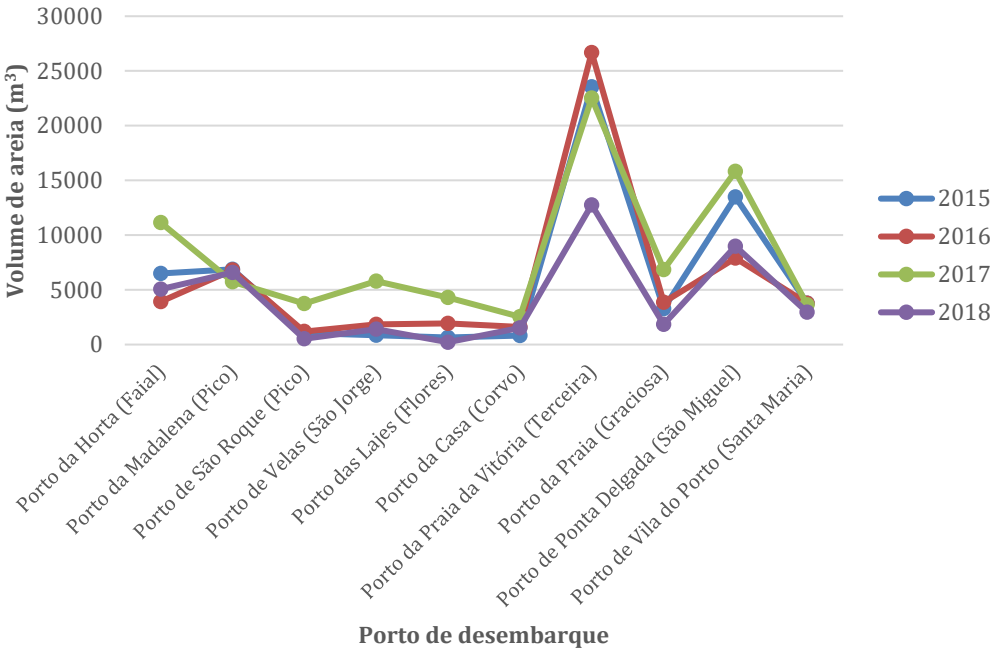


Figure 30. Total volume in the period 2015-2018 for extracted sand unloaded at each main port in the islands (Source: DRAM)

Until 2013, the sale price for m³ of extracted sand was fixed at € 15; since then, it varies between € 13 and € 21, depending on the operator, the area and the year, with a medium value of around € 17. An estimate of the annual value of the extracted sand, sold at first-sale rates in the archipelago, can be obtained by matching the volume of unloaded sand to the medium price per m³, per year. In accordance with the decreasing tendency of the sector since 2001, the global turnover obtained from the commercialization of sand has been diminishing, while losing relative economic weight in terms of contribution for Gross Value Added (GVA) and employment.

Figure 31. Estimate of the annual value of the extracted sand, between 2001 and 2018 (Source: DRAM)

Legal framework and constrains

This section integrates information coming from MarSP Deliverable D.6.5. (MSP Governance Analysis of the Macaronesia) (Pallero, et al., 2019).

Competent authorities for sectorial management

National institution:

- General Directorate for Natural Resources, Safety and Maritime Services (Direção Geral de Recursos Naturais, Segurança e Serviços Marítimos, DRGM) – competent authority for coordinating the national MSP process.
- General Directorate of Energy and Geology (Direção-Geral de Energia e Geologia, DGEG) – competent authority for geological resources management at national level.

Regional institution:

- Regional Directorate of Maritime Affairs-/Regional Secretariat of Sea, Science and Technology (Direção Regional dos Assuntos do Mar,DRAM)/ Secretaria Regional do mar, Ciência e Tecnologia, SRMCT) – competent authority for managing the licencing process and for issuing the TUPEM.
- National Maritime Authority/ Maritime Police (Autoridade Marítima Nacional/ Polícia Marítima) and the Regional Inspection of Environment (Inspeção Regional do Ambiente, IRA) - entities with authority for inspecting aggregate extraction activities.

Normative basis

The normative basis at the national and regional levels is listed at the following table.

Table 12. Legal Framework for the sector of mineral extraction

	Mineral Extraction	
National	Basic Law of the legal regime for the disclosure and exploitation of geological resources existing in the national territory, including those located in the national maritime space (Republic Diary, 1st series, no. 119, June 22, 2015)	
	Law 54/2015, from 22 of June	Establishes the legal basis for the disclosure and exploitation of the geological resources existing in the national territory, including those located in the national maritime space
	Decree-Law 109/94 from 26 of April	Establishes the legal regime of petroleum prospecting, research and production activities. Amended by Law no. 82/2017 of 18 August
Regional	Regional Regimental Decree 21/2012/A, from 9 of May	Establishes the legal regime for the disclosure and exploitation of natural assets in the earth's crust, generally referred to as geological resources, whether or not part of the public domain, of the terrestrial and marine territory of the Autonomous Region of the Azores
	Regional Regimental Decree 9/2010/A, from 8 of March	Determines the legal regime of the extraction of aggregates in the coastal strip and in the territorial sea, altered and republished through Regional Legislative Decree no. 31/2012 / A

		The extraction is forbidden in sites: a) Less than 1 nautical mile from port of classes A to C or less than 0.5 nautical miles from ports of class D and small ports in accordance with Regional Legislative Decree No 17/94 / A of 18 May, as amended by Regional Legislative Decree No 19/98 / A of 28 November, and Regional Legislative Decree no. 13/2000 / A of 20 May b) Less than 0.5 nautical miles from the bathing areas indicated in the coastal plans c) Within a 0.5 nautical mile range on each side of the port access flaps of classes A and B; d) Within protected areas of any nature and in areas where, in accordance with the coastal planning plan applicable, the extraction is prohibited; (e) less than 0,5 nautical miles of licensed facilities for aquaculture of any nature; (f) within a radius of 0.5 nautical miles from sites marked as containing archaeological finds; (g) less than 250 m from islets and shallows of any nature where the reduced probe is less than 5 m.
	Government Council Resolution 3/2014 from 15 of January	Approves the areas where commercial extraction of sea sands is authorized
	Order 332/2013, from 20 of February	Determines the extraction and discharge rates to be charged for each cubic meter of extracted sand
	Decree Order 51/2013, from 10 of July	Establishes rules concerning the licensing for the extraction of rolled stone which is intended to be used exclusively in the preparation of professional fishing gear
	Government Council Resolution 105/2013, from 6 of November	Defines the areas authorized for extraction of sand by licensed companies and their maximum annual extraction volumes. Amended by Government Council Resolution No. 3/2014 of, January 15, approving areas where commercial extraction of sea sands is authorized

Mineral resources exploration must accomplish with administrative constraints and restrictions in force (Table 13**Erro! A origem da referência não foi encontrada.**). Administrative servitudes result from legal impositions, or administrative acts, which have the public utility as purpose, and which may result in prohibitions or limitations, or compel the practice of actions. Administrative restrictions are limitations to the use, occupation and transformation of the soil (territory), prohibiting the owners to fully benefit from their property rights (DGOTDU, 2011).

Table 13. Administrative constraints and restrictions to aggregates extraction in the Azores

Administrative constraints and restrictions **Natural heritage**	Observations
Regional Legislative Decree 15/2012/A, of 2 April	Legal regime for nature conservation and protection of biodiversity of the Autonomous Region of the Azores
Regional Legislative Decree 10/2019/A, of 22 May	Approves the regime of protection and classification of the volcanic cavities of the Autonomous Region of the Azores
Regional Legislative Decree 47/2008/A, of 7 November, modified and republished by the Regional Legislative Decree 39/2012/A, of 19 September	Creates the Island Natural Park of Santa Maria

Regional Legislative Decree 11/2018/A, of 28 August	Creates the Paleopark of Santa Maria
Regional Legislative Decree 19/2008/A, of 8 July	Creates the Island Natural Park of São Miguel
Regional Legislative Decree 11/2011/A, of 20 de April	Creates the Island Natural Park of Terceira
Regional Legislative Decree 45/2008/A, of 5 November	Creates the Island Natural Park of Graciosa
Regional Legislative Decree 10/2011/A, of 28 March	Creates the Island Natural Park of São Jorge
Regional Legislative Decree 20/2008/A, of 9 July	Creates the Island Natural Park of Pico
Regional Legislative Decree 46/2008/A, of 7 November, modified and republished by the Regional Legislative Decree 7/2019/A, of 27 March	Creates the Island Natural Park of Faial
Regional Legislative Decree 8/2011/A, of 23 March	Creates the Island Natural Park of Flores
Regional Legislative Decree 44/2008/A, of 5 November	Creates the Island Natural Park of Corvo
Regional Legislative Decree 15/2012/A, of 2 April	Natura Network 2000 (Special Areas of Conservation and Special Protection Areas)
Decree order 57/2018, of 30 May, modified by the Decree order 69/2018, of 22 de June	Legal regime for catching marine species in the Azores sea
Built heritage	
Regional Legislative Decree 27/2004/A, of 24 August, modified by the Regional Legislative Decree 8/2006/A, of 10 March	Creates the Underwater Archaeological Park of the Canarias, in front of Praia Formosa (Santa Maria)
Regional Regulatory Decree 24/2015/A, of 29 October	Creates the Underwater Archaeological Park of Dori (São Miguel)
Regional Regulatory Decree 20/2005/A, of 12 October, modified and republished by the Regional Regulatory Decree 19/2015/A, of 27 October	Creates the Underwater Archaeological Park of Baía de Angra (Terceira)
Regional Regulatory Decree 15/2014/A, of 19 August	Creates the Underwater Archaeological Park of Caroline (Pico)
Regional Regulatory Decree 17/2015/A, of 29 September	Creates the Underwater Archaeological Park of Slavonia, in Lajedo coast, Lajedo parish (Flores)
Basic infrastructures, national defence and public security	
Law 2078, of 11 July (1955)	Establishes the regime of the areas subject to military constraints
Decree-Law 45987, of 22 October (1964)	Establishes the general regime military and aeronautic constraints
Decree-Law 116/2006, of 16 June	Defines aeronautic constraints for the neighbouring land of João Paulo II airport (Ponta Delgada, São Miguel)
Decree 1/2019, of 18 January	Establishes the protection general zone around Lajes air-base (Terceira)
Regional Regulatory Decree 27/84/A, of 24 July	Establishes the protection general zone around Graciosa island aerodrome
Regional Regulatory Decree 36/84/A, of 11 October, modified by the Regional Regulatory Decree 21/2012/A, of 9 November	Establishes the protection general zone around São Jorge (Velas) island aerodrome
Regional Regulatory Decree 28/84/A, of 7 August	Establishes the protection general zone around Pico island aerodrome
Regional Legislative Decree 24/2011/A, of 22 August	Approves the ports system in the Azores
Decree-Law 594/73, of 7 November	Establishes the legal regime of constitution of constraints of maritime signage
Decree-Law 198/2006, of 19 October, modified by the Decree-Law 293/2009, of 28 September	Establishes the legal regime for traffic separation schemes (EST), to be applied in maritime areas under national jurisdiction, following approval by the competent authority of the International Maritime Organization (IMO)
Other	
Decree-Law 166/2008, of 22 August, modified and republished by the Decree-Law 239/2012, of 2 November	Establishes the legal regime of the National Ecological Reserve
Decree order 419/2012, of 20 December	Defines the conditions and requirements to which uses and actions are subject in National Ecological Reserve
Regional Regulatory Decree 15/2008/A, of 25 June	Coastal Zone Spatial Plan (POOC) of Santa Maria
Regional Regulatory Decree 6/2005/A, of 17 February	Coastal Zone Spatial Plan (POOC) of North Coast of São Miguel

Regional Regulatory Decree 29/2007/A, of 5 December	Coastal Zone Spatial Plan (POOC) of South Coast of São Miguel
Regional Regulatory Decree 3/2019/A, of 2 April (partial suspension) Regional Regulatory Decree 1/2005/A, of 15 February	Coastal Zone Spatial Plan (POOC) of Terceira
Regional Regulatory Decree 13/2008/A, of 25 June	Coastal Zone Spatial Plan (POOC) of Graciosa
Regional Regulatory Decree 24/2005/A, of 26 October	Coastal Zone Spatial Plan (POOC) of São Jorge
Regional Regulatory Decree 24/2011/A, of 23 November	Coastal Zone Spatial Plan (POOC) of Pico
Regional Regulatory Decree 4/2017, of 17 March (annex of Declaration 5/2016) Declaration 5/2016, of 14 September (first amendment to the synthesis plant) Regional Regulatory Decree 19/2012/A, of 3 September	Coastal Zone Spatial Plan (POOC) of Faial
Regional Regulatory Decree 24/2008/A, of 26 November	Coastal Zone Spatial Plan (POOC) of Flores
Regional Regulatory Decree 14/2008/A, of 25 June	Coastal Zone Spatial Plan (POOC) of Corvo
Decree of the President of the Republic 67-A/97, of 14 October	Submarine cables (ratifies the United Nations Convention on the Law of the Sea of 10 December 1982)

Instruments

The instruments are the following:

- National Strategy for the Sea 2013-2020 (approved by Resolution of the Council of Ministers no. 12/2014 of February 12)

Stakeholder's perception

The stakeholders' consultation developed in the context of the MarSP project aims to gather information on stakeholder's perceptions about the Azorean legislative context of maritime sectors. Selected stakeholders include representatives of the regional and/or local administration and aggregate extraction operators. The consultation process was performed through individual interviews. Stakeholders were asked if they agreed with the legislative context for aggregate extraction and what type of changes would they recommend.

In the interviews, the stakeholders affirmed that the current regulation is adequate, while also mentioning the possibility for a reduction on the applied taxes for the sector. Moreover, it was mentioned the need to carefully distribute new licenses for the commercial exploitation of sand.

PART II

Methodology for mapping sector activity

Current spatial distribution

In the Azores, the exploitation of non-metallic mineral resources is performed in predetermined areas according to licences issued by the Regional Government, specifically DRAM. The Government Council Resolution no. 105/2013, of 6 November (altered by Government Council Resolution no. 3/2014 of 15 January) establishes those authorized areas, which are presented below.

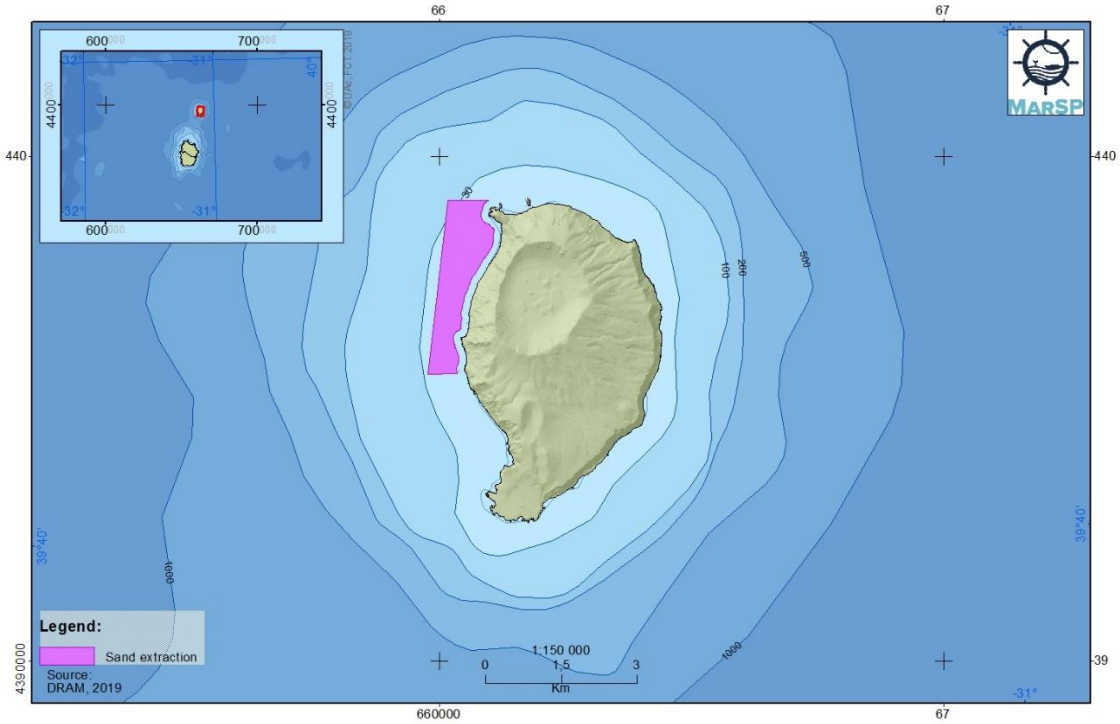


Figure 32. Non-metallic mineral extraction areas in Corvo Island

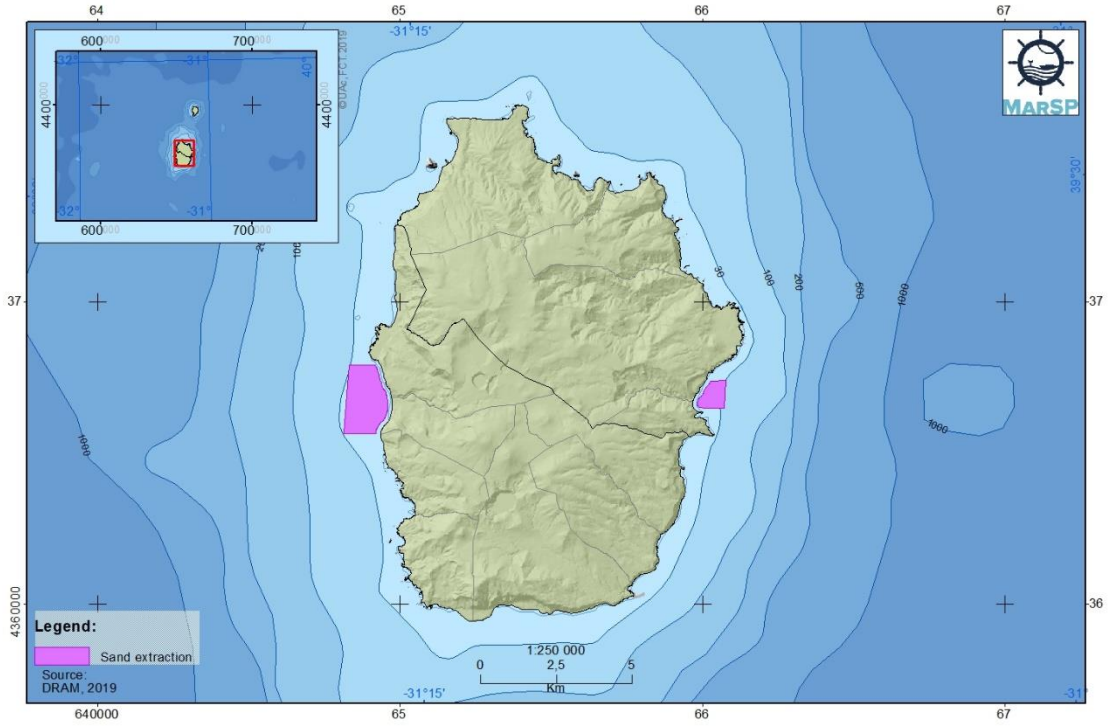


Figure 33. Non-metallic mineral extraction areas in Flores Island

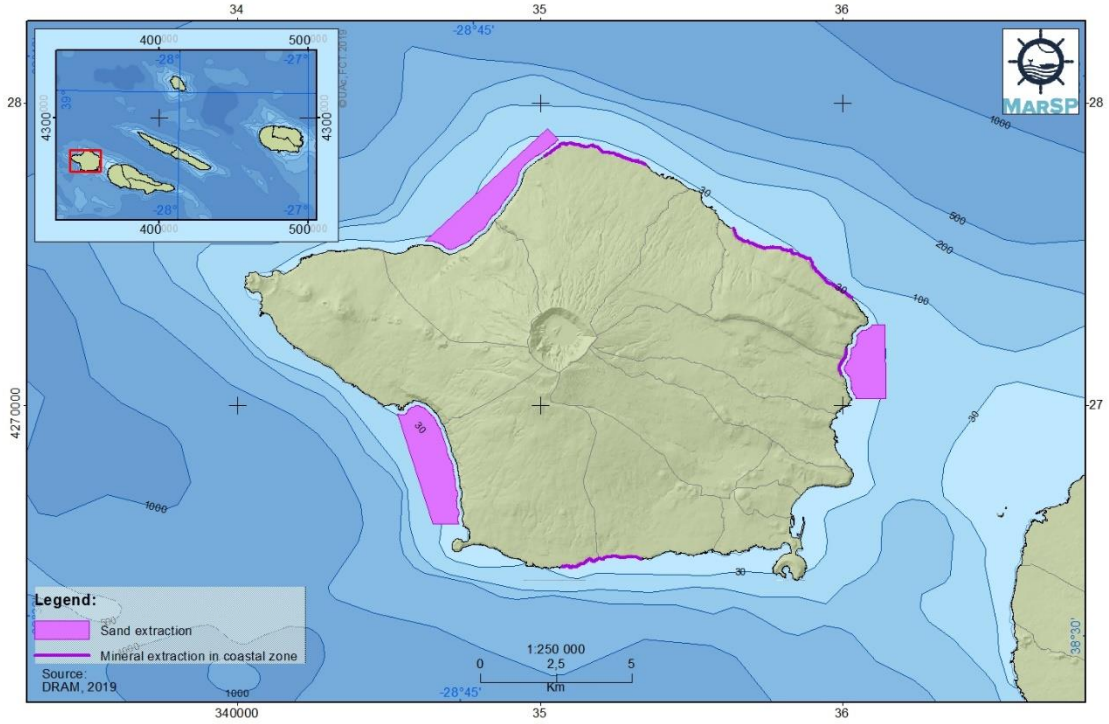


Figure 34. Non-metallic mineral extraction areas in Faial Island

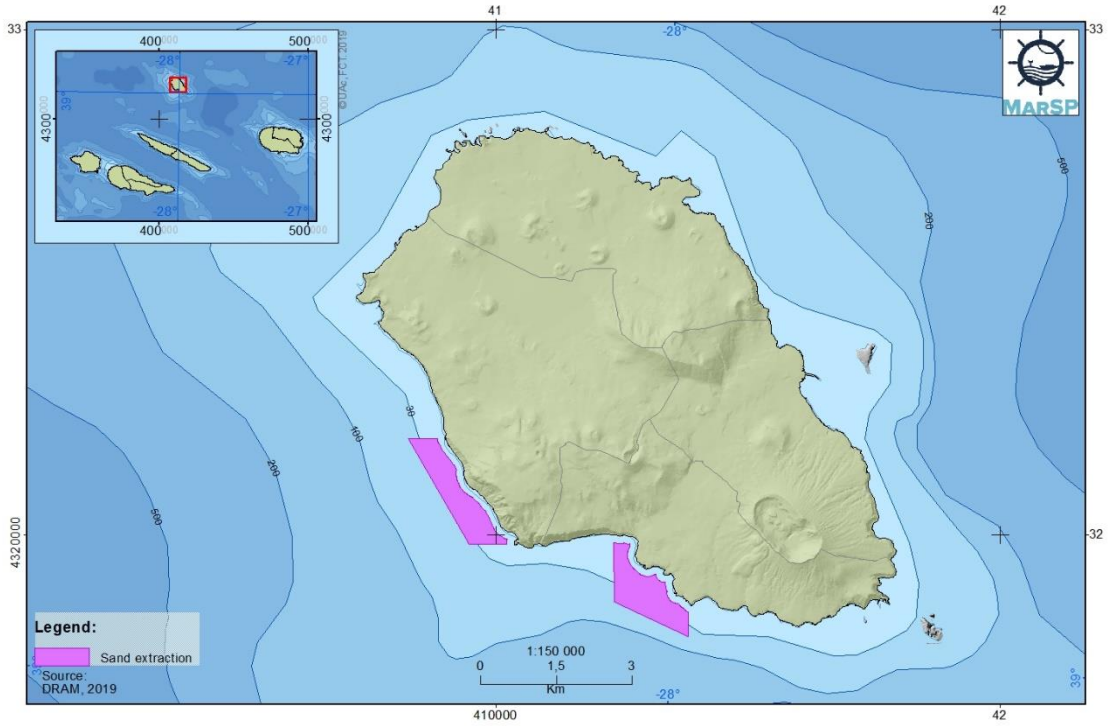


Figure 35. Non-metallic mineral extraction areas in Graciosa Island

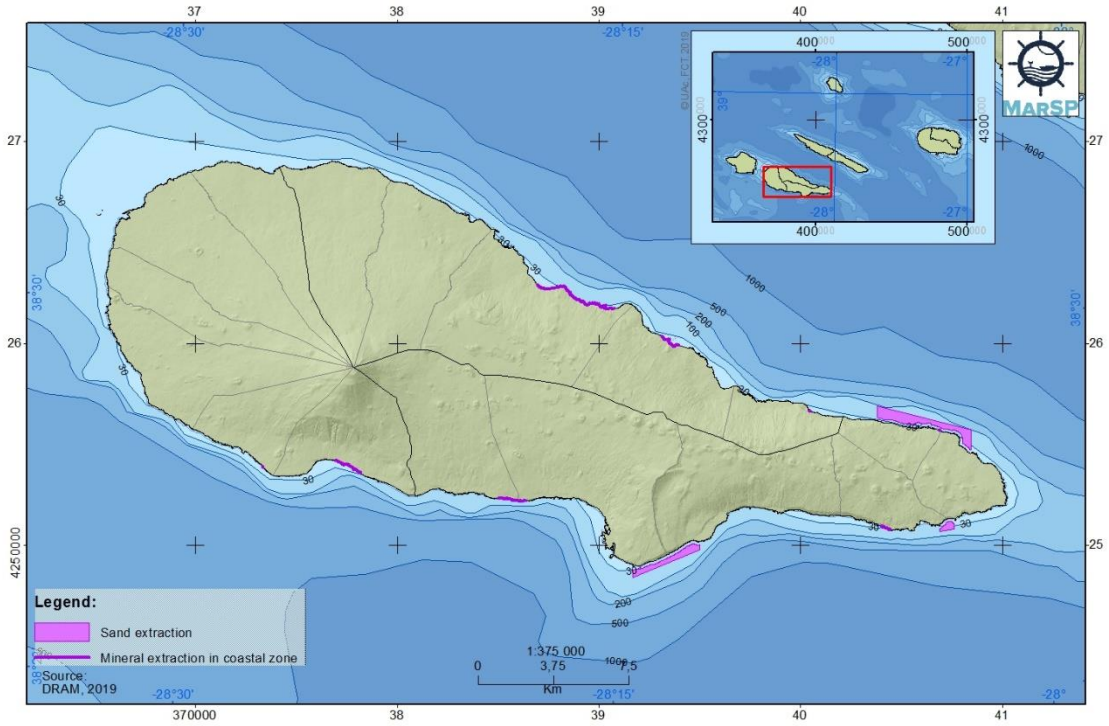


Figure 36. Non-metallic mineral extraction areas in Pico Island

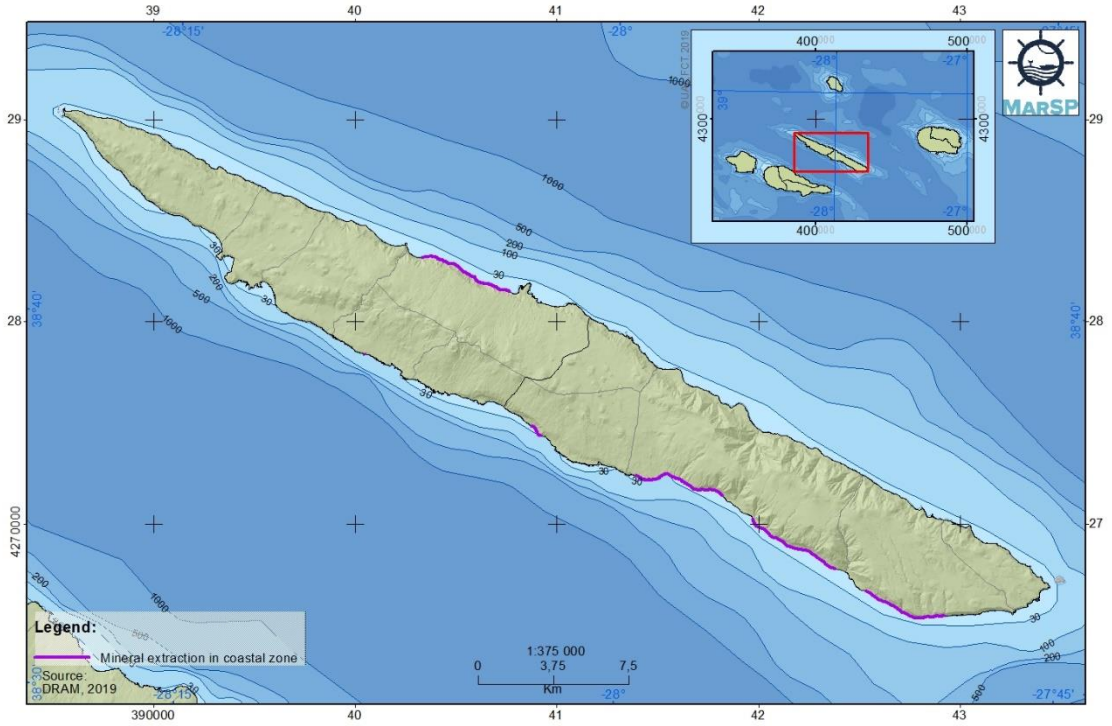


Figure 37. Non-metallic mineral extraction areas in São Jorge Island

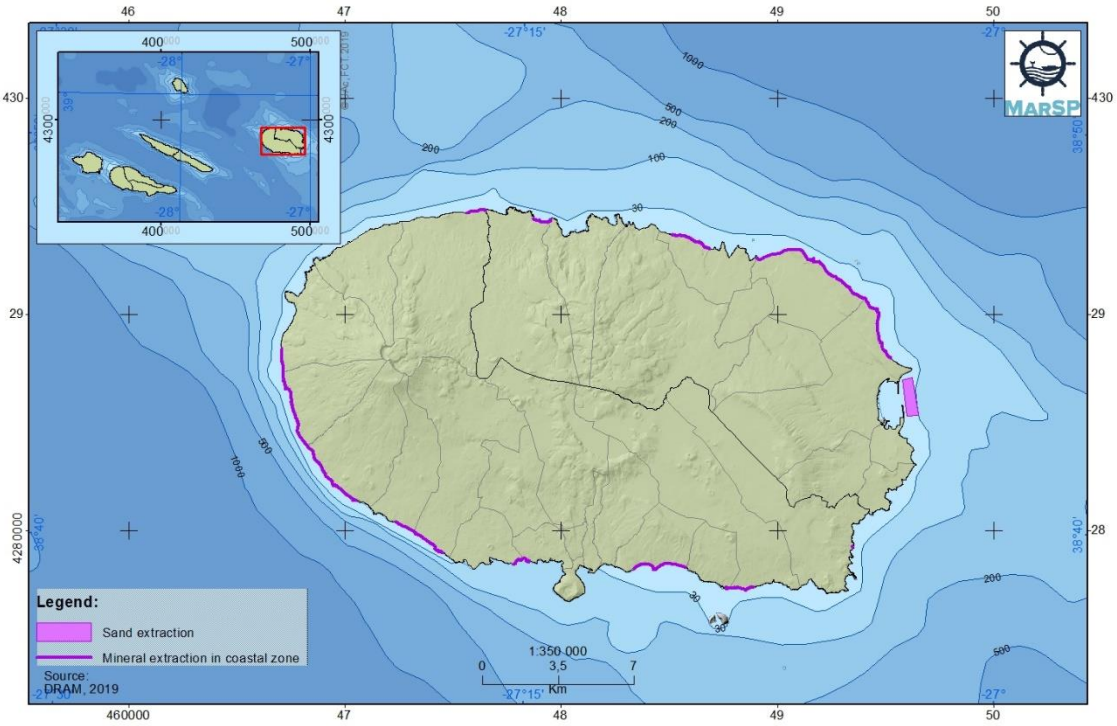


Figure 38. Non-metallic mineral extraction areas in Terceira Island

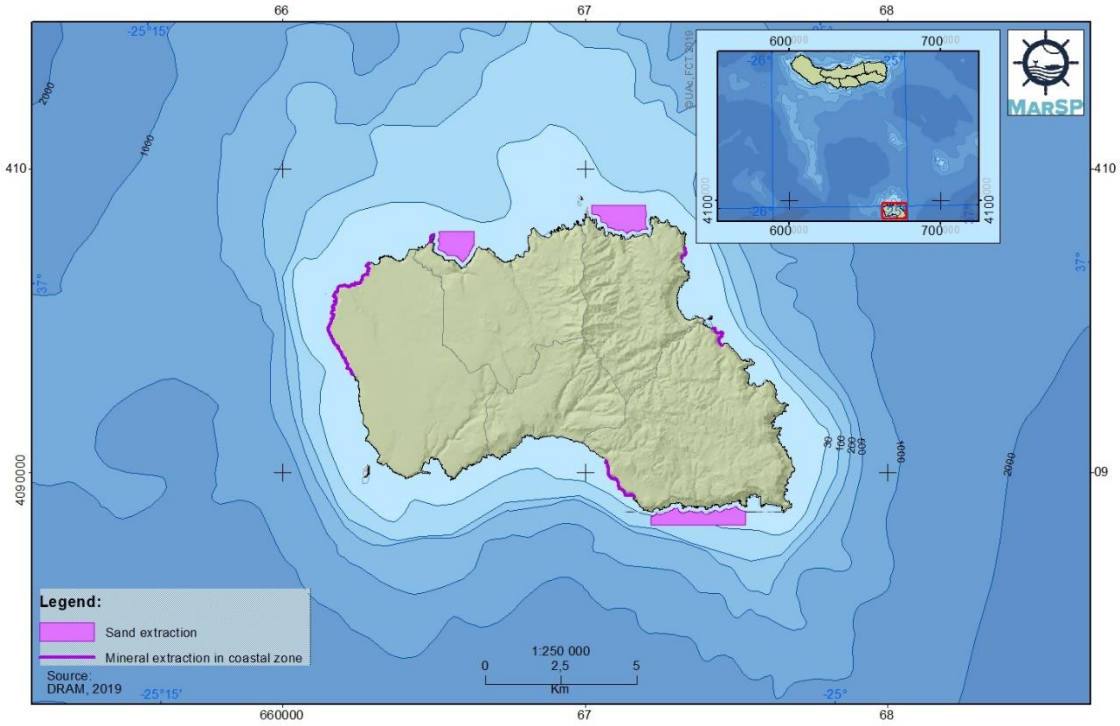


Figure 39. Non-metallic mineral extraction areas in Santa Maria Island

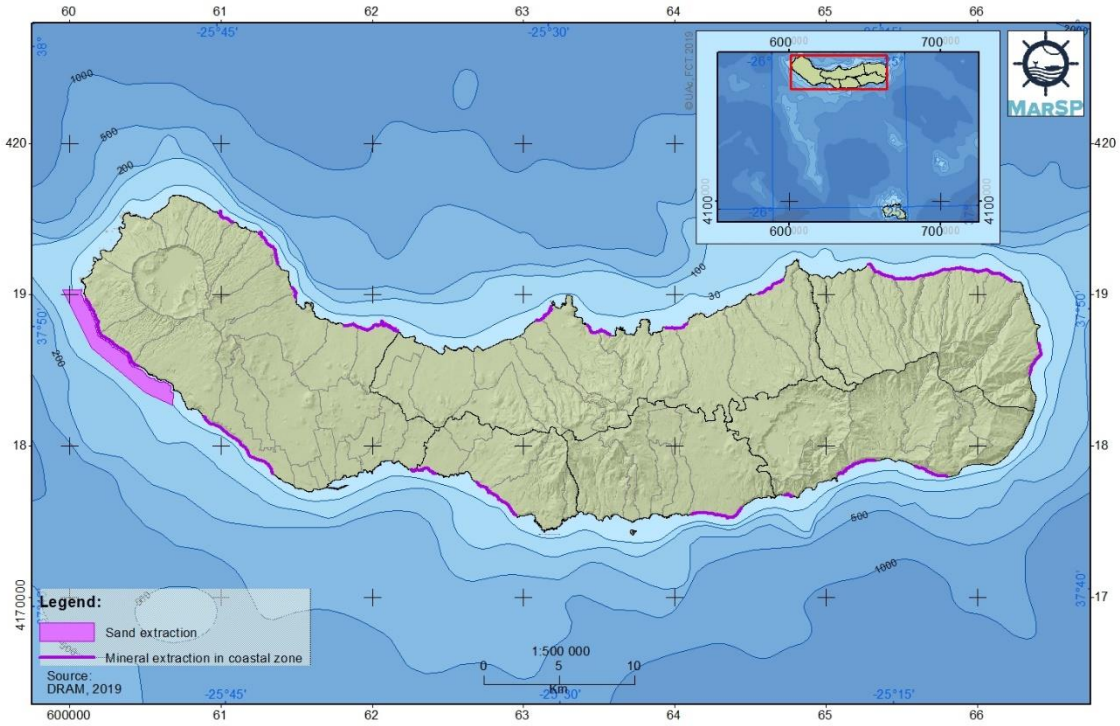


Figure 40. Non-metallic mineral extraction areas in São Miguel Island

PART III

SWOT Analysis

A SWOT analysis was developed for each maritime sector identified for the Azores. The first approach to develop the SWOT analysis was based on sectorial representative stakeholders' consultation, through individual interviews. Stakeholders were asked to identify the strengths, weakness, opportunities and threats they consider as the most important for the sector they represent. The resulting SWOT analysis was reviewed and validated during the 2nd MarSP Regional Stakeholders Workshop (developed in April 2019). In the workshop, stakeholders were grouped according to the sectors they represent and were asked to comment and complement on the SWOT analysis. It is important to highlight that during the workshops a few stakeholders have misunderstood the scope of non-metallic mineral resources and included in their analysis also metallic mineral resources.

The final SWOT analysis for aggregate extraction sector in the Azores (IV) includes both consensual results from regional stakeholders' consultation and additional topics from literature review (e.g. (SRRN, 2014).

Table 14. SWOT analysis from regional stakeholders' consultation for aggregate extraction in the Azores

	Positive factors	Negative factors
Internal factors	***Strengths*** - Resource still to be explored; - Wide wealth of mineral resources on the seabed (e.g. hydrothermal vents); - Exploration of iron, silver, gold and rare metals, in addition to natural gas and hydrocarbons; - Increase in the region's economy; - Factor of population fixation with the appearance of new opportunities (exploration/extraction).	***Weakness*** - Lack of local expertise; - Few legislations; - Urgent need for studies addressing the environmental impact; - Europeans standards to access mineral resources; - Bad image for mining; - High operating costs; - Lack of planning and inspection of extractive activities; - Given the fragility of marine ecosystems, economic activity in the exploration of mineral resources could irreversibly affect ecosystems.
Ext	***Opportunities***	***Threats***

	- Development of infrastructure related to tourism; - Development of infrastructure related to urbanization; - Technological advances will allow the exploration of the deep sea and possibly seabed mining; - Technological development may make the ocean exploration more profitable; - New activities/trade related to the extraction and use of new mineral resources; - Employment raise.	- Increase in the number of licenses need to be assessed to not exceed the sector capacity; - Production limitation to small-scale due the Azorean geographical characteristics; - Environmental effect; - Increased coastal erosion and hydrographical impact in the case of sand exploitation near the coast; - A possible lack of commitment from the government can lead to the privatization in the mineral extraction; - Depletion of the natural heritage of the Azores.

Analysis of interactions

The development of a certain activity in the maritime space is usually linked to interactions with the remaining uses and maritime sectors. Those interactions can be both positive or negative and can be both induced or suffered by a certain sector. In the context of the MarSP project, for each maritime sector, three types of interactions were analysed: sector-sectors interactions, land-sea interactions and interactions with the environment. The analysis intended to identify if interactions exist and the level of intensity of the interactions using the following scale: negative values for negative interactions, positive values for positive interactions and zero for absence of interactions. In the matrices, the column "C" represents the negative impacts induced or suffered by the sector, identified as conflicts, while the column "S" represents the induced or suffered positive interactions, deemed as synergies.

Sector-sectors interactions analyses whether there is any type of conflict and/or synergy between each of the maritime sectors identified and the other sectors. The resulting matrix reflects only the analysis of interactions occurring offshore, not including coastal areas within less than 30m bathymetry (the protection maritime zone of protection defined by the coastal zone spatial Plan - POOC).

Land-sea interactions analyse whether there is any type of conflict and/or synergy between each of the maritime sectors identified and coastal activities (up to the 30m bathymetry) developed in the various areas identified in the POOC.

Interactions with the environment analyses if there is any kind of negative and/or positive effect of each of the maritime sectors identified to the environment, specifically considering the descriptors of the good environmental status (GES), and respective criteria, as defined by the Marine Strategy Framework Directive (MSFD).

During the individual interviews, stakeholders were asked to identify the levels of conflicts and/or synergies of ports and marinas with other sectors. The final values were calculated using the tendency of answers and represent the stakeholders' perception trend. As this first analysis is based on inputs from stakeholders representing the maritime sector, to avoid or decrease possible bias in the results, during the Workshop, stakeholders were asked to comment and, when in disagreement, to propose a different value to classify the level of conflict/synergy. The final values from the workshop were calculated using the mean of all values resulting from all discussion tables.

Literature review was also used to complement the characterization of the interactions, identifying if a conflict or a synergy is existing in the Azores or on other contexts.

Interaction with other sectors

In order to analyse the interaction of the maritime sectors and mineral extraction, the matrixes based on the aforementioned different logics are presented.

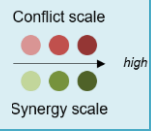
The values featured on the matrix below represent the trend analysis of the stakeholders' sectorial consultation and the 2nd MarSP Stakeholder Engagement Workshop. Nonetheless, it is important to observe that the mineral extraction sector was analysed mainly based on the Stakeholders workshop sector group, considering that the participation on face-to-face interviews was almost null.

Table 15. Characterization of interactions of extraction of non-metallic mineral resources and the maritime sectors in the Azores

Sector-Sectors	Mineral Resources			
	Sectorial interviews		2nd Workshop	
	C	S	C	S
Fisheries	0	0	-0.5	0
Aquaculture	-1	0	-1.3	0
Energy	0	0	-0.3	0
Maritime security, defence, surveillance and civil protection	0	0	0	0
Navigation and maritime transportation	0	0	0	0.3
Infrastructures	0	0	-0.3	0
Coastal and maritime tourism	0	0	-0.8	0
Scientific research and marine biotechnology	0	1	-0.3	0.5
Underwater cultural heritage	0	0	-0.8	0.3
Environmental Conservation and MPAs	0	0	-0.5	0

Legend

C – Conflict; **S** – Synergy; **X** – Existent
-3 – High conflict; **-2** – Moderate conflict; **-1** – Low conflict
0 – Without conflict/synergy
1 – Low synergy; **2** – Moderate synergy; **3** – High synergy
"-" – Does not answer



The explanation for each no-neutral interaction is the following:

- Aquaculture: Interviewed stakeholder affirms that there is an area-based conflict.
- Scientific research and marine biotechnology: Interviewed stakeholder affirms that there is low synergy observed.
- Coastal and marine tourism: Stakeholders at the workshop considered that the water quality and hydrodynamics can be damaged by the activity.
- Underwater cultural heritage: Stakeholders at the workshop identified a conflict, in case any heritage finding occur, the extraction would need to be interrupted.

- Environmental conservation and MPAs: Stakeholders at the workshop indicated conflict due the same reasons as the ones given for coastal and marine tourism.

Uses compatibilization and multi-uses

Ocean multi-use (MU) is an emerging concept which responds to the increasing demand for marine resources and space. It has been defined as the intentional "joint use of resources in close geographic proximity by either a single user or multiple users. It is an umbrella term that covers a multitude of use combinations in the marine realm and represents a radical change from the concept of exclusive resource rights to the inclusive sharing of resources and space by one or more users" (*in* (Schupp, et al., 2019).

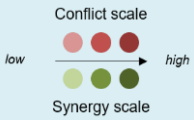
Non-metallic mineral extraction is not an activity that has been explored in this context. The Ocean Multi-Use Action Plan (Schultz-Zehden et al. 2018) does not include combinations with non-metallic mineral extraction.

Land-Sea interaction

Similarly to the maritime sectorial interaction analysis, the interaction of the coastal sectors and mineral extraction was analysed through a comparison matrix (VI).

Table 16. Characterization of interactions of shipping and maritime transport and coastal zones in the Azores

Land-sea		Aquaculture			
		Sectorial interviews		2nd Workshop	
		C	S	C	S
Critical areas for the sustainable coastal use	Natural, cultural and scenic special area	0	0	-2.2	0
	Bathing zones	0	1	-2.4	0.2
	Build-up areas in risk zones	0	0	-1.2	0
Environmental protection	Marine environmental protected areas	0	0	-2.2	0
	Land environmental protected areas	0	0	-1.4	0
Coastal protection areas	Build-up areas	0	0	-0.8	0
	Agricultural, forestry and other uses	0	0	-0.6	0
	Touristic potential areas	0	0	-1.4	0.2
Infrastructures	Airport	0	0	-0.4	0.8
	Road	0	0	-0.6	1
Navigation	Ports	0	3	-0.4	2.6
	Marinas, 'portinhos'	0	3	-0.6	2.6
Legend	**C –** Conflict; **S –** Synergy; **X –** Existent **-3 –** High conflict; **-2 –** Moderate conflict; **-1 –** Low conflict **0 –** Without conflict/synergy **1 –** Low synergy; **2 –** Moderate synergy; **3 –** High synergy **"-" –** Does not answer				



The explanation for each no-neutral interaction for the matrix is the following:

- Bathing zones: Interviewed stakeholders affirm that it is an opportunity to foster beach nourishment endeavours.
- Ports and Marinas: Interviewed stakeholders affirm that there is the possibility to dredge the port area, which results in a high synergy, despite this being often a mandatory activity to ensure the access to the port.

There are no notes for the explanation of the values of the 2nd MarSP Stakeholder Engagement Workshop interactions between land-sea zones and mineral extraction.

Interactions with the Environment

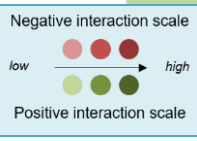
Correspondingly to the previous matrixes analysis, the interaction of the Good Environmental Status descriptors and mineral extraction was analysed at **Table 17**.

Table 17. Characterization of impacts of mineral extraction in the GES descriptors defined by stakeholders' consultation

Interactions with the environment	Aquaculture			
	Sectorial interviews		2nd Workshop	
	N	P	N	P
Biodiversity	0	0	-1.8	0
Non-indigenous species	0	0	-0.3	0
Exploited fish and shellfish	0	0	-0.8	0
Elements of food-webs	0	0	-0.8	0
Human-induced eutrophication	0	3	-0.3	0
Sea floor integrity	0	0	-2.5	0
Hydrographical conditions	0	0		0.3
Contaminants (water, sediments, biota)	0	0	-0.5	0
Contaminants in fish and seafood	0	0	-0.3	0
Marine Litter	0	0	-0.5	0
Level of noise	0	0		0

Legend

N – Negative effect; **P –** Positive effect; **X –** Existent
-3 – High negative effect; **-2 –** Moderate negative effect;
-1 – Low negative effect **0 –** Without negative/positive effect
1 – Low positive effect; **2 –** Moderate positive effect;
3 – High positive effect **"-" –** Does not answer



The explanation for each no-neutral interaction are the following:

- Human induced eutrophication: the accumulation of sand leads to eutrophication and the bathymetry is reduced.
- Biodiversity: stakeholders at the workshop affirmed that the impact of the activity on this descriptor will affect mainly species that live on the subsoil.
- Seafloor integrity: Stakeholders at the workshop observed that it will affect the area in which the extraction is made on.

- Hydrographical conditions: Stakeholders at the workshop affirmed that it will affect the area in which the extraction is made.

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SCIENTIFIC RESEARCH AND MARINE BIOTECHNOLOGY

Introduction

The aim of the MarSP (Macaronesian Maritime Spatial Planning) project is to develop concrete actions for the Member States (Portugal and Spain), through regional and national competente entities to build the necessary capacities and tools for the implementation of the European Union (EU) Directive on Maritime Spatial Planning (MSP) (Directive 2014/89/EU, 2014) in the Macaronesia region, including mechanisms for cross-border cooperation.
For the characterization of the existing uses in the Azores maritime space, the main blue sectors and activities need to be considered. In this report, two sectoral activities are jointly analysed, scientific research and marine biotechnology sectors, since biotechnology in the Azores is yet incipient and shares several aspects of scientific research, including development of prospection studies and activities using the scientific method. For the context of the MarSP project, scientific research sector is defined as the set of activities developed by researchers for the advancement of knowledge and conducted for the purpose of contributing to science by the rigorous and systematic (following protocols and long established structures) collection, interpretation and evaluation of data and results, in a planned manner. For the purposes of the MarSP project, marine biotechnology is defined as the use and exploitation of marine bioresources (e.g. fish, algae, and other macro- and micro-organisms) as the target or source of biotechnological applications. Some examples are the creation of products and processes, such as smart food, feed, biofuels, biomaterials, cosmetics, pharmaceuticals, nutraceuticals, industrial enzymes and solutions for bioremediation (ECORYS, Study in support of Impact Assessment work on Blue Biotechnology - Revised Final Report FWC MARE/2012/06 – SC C1/2013/03, 2014).
Portugal has spent 1.33% of its national GDP in research and development (R&D) (DGEEC, Investigação e desenvolvimento: principais indicadores por região, 2019). The national maritime space, due to its size and natural resources and biodiversity, is a unique natural laboratory. The Azores subarea corresponds to approximately 56% of the total Portuguese Economic Exclusive Zone (EEZ) (Marinha Portuguesa, 2017), which increases the potential for the development of marine scientific research. In Portugal, biotechnology areas with the greatest impact in Portugal are pharmaceutical and industrial. A few decades after its appearance, biotechnology continues to significantly expand and is considered an increasingly crucial sector for the economic and social progress of most industrialized countries, along with that of various developing regions (P-BIO, s.d.). In Portuguese waters, bioprospection and the research for genetic resources is an emergent activity, compared to other maritime activities. However, due to their potential for valorization and the diversity of existing biotopes, they represent a promising source of technological development and added value in various areas of science and industry (PSOEM, 2018).

Purpose

This sector briefing summarises the current status of the aquaculture sector in the Autonomous Region of the Azores (ARA) (Portugal), under MarSP project Work Package 2. "Mapping the current conditions and creating a vision for the MSP in Macaronesia" and Task 2.2. "Mapping the maritime uses and activities and defining the MSP current conditions". It includes a characterization of the current situation of scientific research and marine biotechnology in the Azores and the proposed and adopted methodologies to map the activity. It also includes a sector diagnosisr and the main interactions with other sectors, the environment and the land-sea interface.

PART I

Sector characterization

The Azores has active scientific activities developing research on themes related to sea, with recognized research centres at the University of the Azores and in cooperation with European and international research projects (Paramio, Borges, Tiago, & Cabral Vieira, 2013; SPI-Açores, 2014). It is also an objective of the Azorean Government to strengthen the positioning of the Region as an intercontinental platform for monitoring the Atlantic, in areas such as biodiversity, ecology of marine ecosystems, ecotoxicology, fisheries and the sustainable use of the oceans and marine technology for exploration of the deep ocean, which have been the focus of research developed in the Azores (SPI Açores, 2014).

Scientific research

The Azores Regional Government recognizes the need to internationalize the scientific research developed in the Azores and the need to create knowledge and to transfer it to the business sector. It aims to reinforce the establishment of partnerships for knowledge and the link between the entities of the Scientific and Technological System of the Azores (SCTA) and the socio-economic and business network, and between the scientific research, innovation and entrepreneurship, reinforcing the cooperation between research centers and enterprises (DRCT, Direção Regional da Ciência e Tecnologia, 2018a). The Azorean Regional Government has been contributing to fund scientific research by supporting research centers based in the Azores, as well as through the funding of projects with regional interest (IC, 2018).

Scientific and Technological System of the Azores

The SCTA consists of all human, institutional, material and financial resources for the production and promotion of scientific knowledge and innovation, through research and technological development, knowledge transfer, advanced training and qualification and dissemination of scientific and technological culture. This system is established in and ruled by the Regional Legislative Decree 10/2012/A. The system is organized in different groups depending on the nature of each institution (IC, 2018):

- Scientific research institutions;
- Technological institutions;
- Infrastructures for scientific and technological dissemination;
- Institutions of higher education based in the ARA, with respect for the principle of university autonomy and the provisions in the legislation in force on the higher education system;
- Public and private organizations for coordination, management, reception and valorization of Science and Technology;
- Research and Development partnerships.

The Government of the Azores provides the list of the 39 entities currently integrating the SCTA (DRCT, Lista de entidades do SCTA, 2018b). The institutions more related with the sea affairs and marine resources are briefly presented below.

Institutions of higher education based in the ARA

The **University of the Azores** (UAc) is the only institution of higher education in the Azores, divided in three campuses: Ponta Delgada, Horta and Angra do Heroísmo (São Miguel, Faial and Terceira Islands, respectively). The UAc provides several courses, directly related to the sea, conferring different degrees, such as Biology (including Marine Biology), Marine Sciences and Integrated Ocean Studies (UAc, UAc Universidade dos Açores - Ensino, 2018). The Department of Oceanography and Fisheries (DOP/UAc) of the UAc is member of the Institute of Marine Research (IMAR), one of the international reference centres in Deep Sea research. The Department of Biology of the UAc also develops significant research activities in the field of marine biology, which includes topics such as marine resources, biological oceanography, modelling and mapping of coastal biotope (EASME, 2017).
The UAc has also collaborated in the development of the 'Sea School', signing a Cooperation Protocol together with the Azores Government, the municipality of Horta (Faial) and the Nautical School Infante D. Henrique. This project intends to develop a vocational school aiming at meeting the training needs in the areas of commercial shipping, fisheries, maritime tourism activities and activities linked to environmental monitoring. This school is expected be an organic unity of the education system of the Azores (EASME, 2017).
In addition to teaching, the University of the Azores hosts several research centers with scientific activities focused on the sea.

Public and private scientific research institutions

There are 16 public and six private institutions registered in the SCTA and dedicated to research (IC, 2018), some of them particularly focused on the sea affairs or biotechnology. The **Biotechnology Centre of Azores** (CBA-Açores), public institution, aims to be a strategic R&D unit of the UAc in the area of biotechnology, and its interaction with agricultural and biological sciences. The CBA-Açores mission is to foster fundamental and applied scientific research to develop new knowledge and technological innovation, creating opportunities and impacting economic growth by promoting innovation, entrepreneurship and competitiveness in the agrarian, environmental and bioindustrial sectors (CBA, 2018).
The **Okeanos Center** is a public institution of research and development of the UAc focused on the study of marine living resources in the Azores, with collaborations for supporting theses of UAc courses (2^{nd} cycle and 3^{rd} cycle) and other European universities and with a growing number of projects and services provisions related to the oceans (Okeanos, 2018).
The **Research Centre in Biodiversity and Genetic Resources** (CIBIO-Açores), public institution, is a R&D unit of the UAc, which mission is to develop world-class research in the areas of biodiversity and evolutionary biology. The group from the University of Azores, together with the University of Madeira, aims to develop high-level research in biodiversity, using island systems as models. Areas of activity vary from coastal biotopes to natural and exotic forests, also including freshwater and marine ecology, neo- and palaeo-biogeography, palaeoecology and palaeontology. The group was largely focused on Macaronesian studies, but research questions have progressively widened in scope and risen in integration level, such as the development of community and species distribution models, the research dedicated to invasive alien species, global models devoted to island formation and biogeographic patterns in the marine realm, and global studies devoted to marine biogeography. Research in areas linking biodiversity with relevant socio-economic activities in connection with the Research and Innovation Strategies for Intelligent Specialization (RIS3) has also been developed (CIBIO-InBIO, 2018).
The **Azorean Biodiversity Group** (GBA) is a regional public R&D unit of the UAc, integrating the Centre for Ecology, Evolution and Environmental Change (cE3c). The main objective of GBA is to perform research that addresses societal challenges in ecology, evolution and the environment.

The Azorean Biodiversity Group investigates ecological and evolutionary processes on oceanic islands, contributing to the Centre's vision and mission of understanding the response of biodiversity to global changes at multiple temporal and spatial scales. In addition, its interdisciplinary expertise also enables research in environmental risk assessment and pest control, and provides support for decision-making and outreach, and effective conservation planning strategies in island ecosystems (cE3c, 2018).
The **IMAR** is a private and non-profit organization, recognized as being of public utility. IMAR-UAc (the IMAR unit of the University of Azores) includes several researchers from the University of Azores (mostly belonging to the DOP) and researchers employed by IMAR. IMAR-UAc promotes R&D in marine sciences and technology, multidisciplinary marine research, education, and links with governmental and private organizations and with the society as a whole (Association of European Marine Biological Laboratories Expanded, 2019).
Other public institutions registered in the SCTA with focus on sea activities are the Center of Applied Economics Studies of the Atlantic (CEEAplA) and the History Center "d'Aquém e d'Além Mar" (Centre for Overseas History (CHAM) (DRCT, Lista de entidades do SCTA, 2018b).
The CEEAplA is hosted by two Universities, the UAc and the University of Madeira. Its main objective is to promote theoretical and applied scientific research using its highly skilled human resources engaged in research projects in the areas of business and economics, namely: Labor Economics; Tourism Economics and Development, Regional Economics; Public Sector Economics; Economic History; Management; and Finance (CEEAplA-A, 2011). In the Azores, the Center has developed activities related to the sea, namely for the Blue Economy.
The CHAM is hosted by the Faculty of Social and Human Sciences, of the New University of Lisbon and by the Azores University. Its main focus is research related to the History of the Discoveries and the Portuguese Expansion, as well as the Portuguese presence around the world, with an interdisciplinary perspective and incorporating comparative history, particularly the history of the regions with which Portugal maintained contacts (CHAM, 2013). In the Azores, History Center "d'Aquém e d'Além Mar" has also developed studies on underwater archeology.

Technological infrastructures

Technological infrastructures are here understood as entities that include hosting, management and valuing of activities and transfer of Science and Technology (S&T) (DRCT, Lista de entidades do SCTA, 2018b).

Infrastructures for science and technology dissemination

The network of science centers in the Azores includes several centers dedicated to different themes (DRCT, Lista de entidades do SCTA, 2018b). The main objectives of the **Observatory of the Azorean Sea** are the dissemination of the S&T culture, the promotion of environmental education and interpretation activities related to Marine Sciences and the promotion of sustainable practices to preserve resources, biodiversity and the functioning of marine ecosystems. Additionally, this observatory aims to preserve and study the Azorean whaling heritage (OMA, 2015).

Indicators of scientific activities developed in the Azores

The Portuguese Directorate General of Education and Science Statistics (DGES) published statistical results for different indicators for education and science, including the Azores Region for the year of 2017 (DGEEC, Investigação e Desenvolvimento (IPCTN), 2019).
According to DGEEC (2019), the total expense of the Azores Region with R&D is residual in the national context: 12 million euros (M€), in the total national amount of 2.585 M€, distributed by four execution sectors (companies, State, higher education and non-profit private institutions). The

expense is mainly from the institutional sector and allocated to exact and natural sciences, followed by agricultural and veterinary sciences.
Similarly, human resources in R&D in the Azores is residual (353 ETI[5]), compared to the national context (54.995 ETI). Most human resources are associated to the institutional sector and most of them are researchers.

Table 18. Expense in R&D in the Azores, in 2017 (adapted from (DGEEC, Investigação e Desenvolvimento (IPCTN), 2019)**.**

	Total national		Companies sector		Institutional sector	
	Million €	% of regional GDP	Million €	% of regional GDP	Million €	% of regional GDP
Portugal	2 585 099.5	1.33	1 303 484.0	0.67	1 281 615.6	0.66
Autonomous Region of the Azores	12 469.1	0.30	1 645.7	0.04	10 823.4	0.26

Table 19. Personnel in R&D in the Azores, in 2017 (adapted from (DGEEC, Investigação e Desenvolvimento (IPCTN), 2019)**.**

	Total national				Companies sector				Institutional sector			
	Total personnel in R&D		Researchers		Total personnel in R&D		Researchers		Total personnel in R&D		Researchers	
	ETI*	‰**	ETI	‰**	ETI	‰**	ETI	‰**	ETI	‰**	ETI	‰**
Portugal	54 994.8	10.5	44 937.5	8.6	22 022.3	4.2	15 407.2	3.0	32 972.5	6.3	29 530.4	5.7
Autonomous Region of the Azores	352.7	2.9	256.5	2.1	57.5	0.5	45.5	0.4	295.2	2.4	211.0	1.7

* **Equivalente a Tempo Integral ('Full Time Equivalent')**
** **‰ of active population**

European research projects in the Azores

A preliminary list of European projects developed between 2007 and 2018, provided by DRCT, is presented in Supplement I. In the Azores, other projects focusing on the sea and maritime space have been started, such as MARCET, PLASMAR, Mistic Seas, SMARTBLUE, EMSODEV, LuMinAves, BEST III and INDICIT.
Amongst the 57 European funded projects, presented in Supplement I, that included at least one institution from the Azores, 41 are related to the coastal or maritime space and/or maritime sectors and ecosystems. These numbers, even though preliminary, reflect the importance of sea affairs both for the European and the Azores research context and priorities, such as maritime spatial planning, observation systems, fisheries, deep-sea, specific taxonomic groups, blue economy, amongst others. Within that list, Portugal is the coordinating country of 11 of the projects and, from these, five are coordinated by Azorean institutions.

[5] Equivalente a Tempo Integral ('Full Time Equivalent'), i.e., the total actual time spent by individuals on R&D activities, in completely or in part, with reference to the percentage of dedication to these activities during the year.

Table 20. Examples of European funded projects, developed between 2007 and 2018, with Portuguese institutions coordinating, based on information provided by DRCT (* – Azorean institutions coordinating).

Acronym	Title	Year	Coordinator
CONCHA	The construction of early modern global Cities and oceanic networks in the Atlantic: An approach via OceaN's Cultural HeritAge	2018	Universidade Nova de Lisboa
pp2EMBRC	European Marine Biology Resource Centre preparatory phase 2	2015	Centro de Ciências do Mar do Algarve
iFADO	Innovation in the framework of the Atlantic deep ocean	2017	Instituto Superior Técnico
CORALCHANGE*	Factors controlling carbonate production and destruction of cold-water coral reefs of the NE Atlantic	2009	IMAR - Institute of Marine Research
NETBIOME-CSA*	Strengthening European research cooperation for smart and sustainable management of tropical and subtropical biodiversity in outermost regions and overseas countries and territories	2013	FRCT
SINGULAR	Smart and Sustainable Insular Electricity Grids Under Large-Scale Renewable Integration	2012	University of Beira Interior
SPECIAL	Sponge Enzymes and Cells for Innovative AppLications	2010	UM - University of Minho
EASYCO	Collaborative European Atlantic Water Quality Forecasting System	2009	Instituto Superior Técnico
MacSIMAR*	Incorporation of an Integrated Meteorological and Oceanographic Monitoring System for Macaronesia in the European marine/maritime research strategy	2009	Administração dos Portos das Ilhas de São Miguel e Santa Maria, S.A.
MARPROF*	Basis for the Management and Gastronomic Valorisation of the Deep-water Fishery Resources from the Macaronesia	2009	Secretaria Regional do Ambiente e Recursos Naturais / DRP / Direção de Serviços de Investigação das Pescas
LIFE CWR*	Ecological Restoration and Conservation of Praia da Vitória Coastal Wet Green Infrastructure	2013	Município da Praia da Vitória
SAFE ISLANDS FOR SEABIRDS	Safe islands for seabirds/ Initiating the restoration of seabird-driven ecosystems in the Azores	2009	Sociedade Portuguesa para o Estudo das Aves

Requests to access natural resources for scientific purposes in the Azores (Regional Legislative Decree 9/2012/A)

Regional Legislative Decree 9/2012/A, of 20 March, establishes, for the Azores, the legal regime to the access to natural resources for scientific purposes in the Azores (see legal framework and constraints section for more details).

Between 2013 and 2018, the Azores Government emitted 229 authorizations for access to natural resources, 92 (40%) were to access sea-related resources (such as, sea water, marine flora and fauna). Only in 2014 and 2017 approximately half of the requests were related to access to coastal and/or marine resources, however, values may be higher, since the listing not always is clear whether the samples are accessed in the marine environment or not.

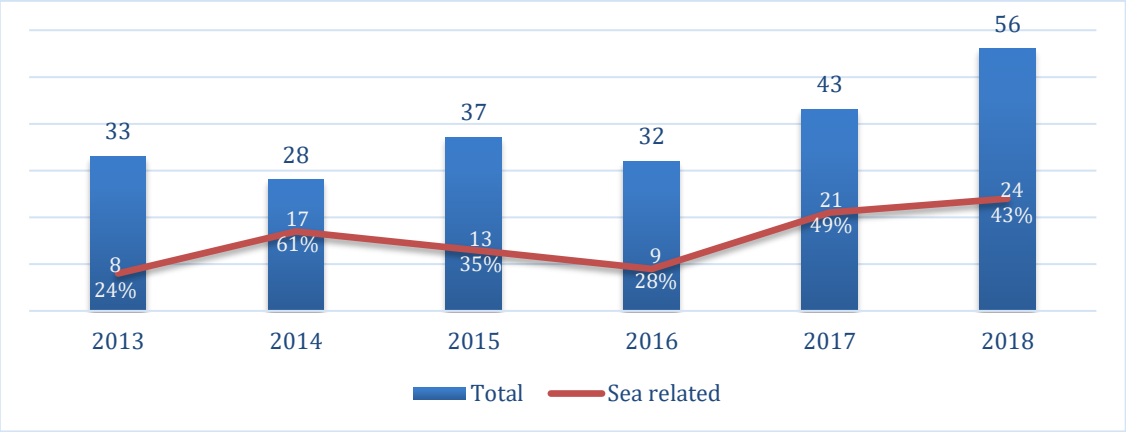


Figure 41. Number of requests to access to natural resources for scientific purposes in the Azores and number of requests related to the coastal and maritime resources (source: DRCT).

Marine biotechnology

Marine biotechnology is considered in the EU as an emerging sector within its strategy of blue growth, and with great potential to help the regional economy in the creation of new jobs, while contributing to sustainable growth, public health and environmental protection.

Bioprospection and the research of genetic resources in Portuguese waters is a relatively recent activity when compared to other areas of activity with relevance in the marine space. Due to their potential for resources valorization and the diversity of existing biotopes, from the coast to abyssal depths, they represent a promising source of technological development and added value in various areas of science and industry (PSOEM, 2018).

The Azores maritime space also presents valuable resources to be explored in the context of marine biotechnology. The biogeographical and geomorphic characteristics of the maritime space surrounding the Azores archipelago encompass a vast and unique marine biodiversity and, as such, represent a potential source for developing new biotechnology processes and products which could result in innovative and valuable tradable goods which has already been demonstrated in fields such as human and animal nutrition, pharmacology, cosmetics and medicine. Some of the most complex ecosystems can be found in the maritime space of the Azores, such as chemosynthetic ecosystems at shallow- water and deep sea hydrothermal vent fields, which include noteworthy animal adaptations with recognized bioprospecting potential. The typical high diversity of bacteria that can also be found at the seafloor represents another important genetic resource, including new enzymes and proteins with enormous potential in the context of blue biotechnology. Adding to that, the exploitation of algae is an activity of growing potential in the Region. Besides its value for human nutrition, it has recognized potential in the field of biotechnology, due to the production of numerous secondary compounds with important functional activities and diverse applications, which have been studied for the implementation of novel therapies and development of new drugs. Natural products extracted from bacteria and other microorganisms, micro- and macro-algae and marine invertebrates, but also from non-indigenous species and industrial by-products, have multiple applications namely in the pharmaceutical, cosmetics and food industries, in the production of biofuels and bioplastics, and in aquaculture.

As such, the acknowledged potential of some of the organisms that inhabit the extreme environments of the Azores, but also of certain species that are common to coastal areas underlies the importance of stimulating scientific research on blue biotechnology, while establishing links with industry and entrepreneurship (Autonomous Region of the Azores, 2013). RIS3 has identified as one of the main target areas the exploration of the potential of blue biotechnology.

A close relationship between the UAc and private companies creates oportunities for partnerships and might provide highly skilled jobs. The regional scientific community has been developing research in this area, which has already underpinned some business initiatives, however still lacking in economical demonstration and scale. Costs associated to marine bioprospection hinder the development of these activities. Most activities are dependent on funded scientific projects. Funding for business initiatives is currently available in the Azores through tax benefits, aiming to hold up projects in this emerging blue economy sector. The tax incentives granted by the Regional Government support the establishment of small and medium-sized enterprises, complemented by EU funding schemes for the installation of new infrastructures and laboratories, and access to specialized laboratories and technological incubators, considered as key requirements to enhance the blue growth. This situation is reflected in the still reduced number of institutions and licensed companies with activity in the Azores.
The Azores are partners in the REBECA project, a platform for territorial development and cooperation created to promote blue biotechnology within the geographical scope of the Macaronesian region and North-West Africa. One of the objectives is to create a regional microalgae bank, to search for local strains in each of the archipelagos with added value, aiming to create products for food, cosmetic and medical purposes. This initiative is an opportunity to contribute to develop the sector in the Azores (REBECA, 2019). The Azores are also involved in other biotechnology projects, namely: Sponge Enzymes and Cells for Innovative AppLications (SPECIAL project); Mining the microbiomes from marine wood-digesting bivalves for novel lignocellulose depolymerizing enzymes (META-MINE project); Exchange of biotechnology research oriented to the business profitability and mobilization of the business flow (BIOTRANSFER 2 project); Macaronesian Blue Biotechnology (MACBIOBLUE project) and; New biological control products for sustainable farming and forestry (BIOCOMES project).

Legal framework and constraints

Competent institutions for sectoral management

The University of the Azores and its associated research centres have autonomy to manage science in its scientific and technological aspects. On the administrative level, namely when regional funds are provided to scientific research, the Regional Government has a significant role managing sea affairs and S&T, namely through the Regional Secretariat for the Sea, Science and Technology (SRMCT). Amongst other competences, the SRMCT coordinates policies for S&T in the Azores and the relationship with the UAc and other entities representing the information society. Under the authority of SRMCT, the Regional Directorate for Science and Technology (DRCT) and the Regional Fund for Science and Technology (FRCT) are responsible for implementing the political measures for S&T in the Region (SRMCT, 2018).
The main action lines of DRCT are (i) the support to programmes and projects of scientific research, experimental development and of technological innovation and modernization, (ii) the promotion of infrastructures supporting scientific research activities, (iii) the technological development and the dissemination of S&T, and (iv) the incentive for the qualification of human resources and specialized training and dissemination of S&T (DRCT, Direção Regional da Ciência e Tecnologia, 2018a). The FRCT, was created with the objective to coordinate and manage the financial resources available for scientific research and technological development from Regional, European and International programmes (FRCT, Fundo Regional para a Ciência e Tecnologia, 2018). Its main competences are (FRCT, Fundo Regional para a Ciência e Tecnologia, 2018): (i) to promote and participate in the implementation, monitoring, supervision and/or evaluation and the management of studies, programs, projects, training and information and dissemination measures of scientific scope, improvement or technological innovation, as well as the information and knowledge

society; (ii) to foster and promote the support for the scientific development units and/or the regional innovation and technological upgrading and the information and knowledge society and/or in the cooperation with national and foreign counterparts; (iii) to conclude agreements, protocols and contracts with persons, whether natural or legal, of a public or private nature of Portuguese or foreign nationality, to carry out tasks or services that fit the nature and objectives of the FRCT; (iv) to promote and hold seminars, conferences, colloquiums and other similar activities in the field of science and technology and the information and knowledge society; (v) to promote and carry out the editing of works, journals, monographs, studies and other scientific and technological works and; (vi) to provide subsidies specifically provided for in the activities plan or which, to meet urgent needs, are appropriate, in line with the FRCT's objectives.

The access to genetic resources is the base for the development of biotechnology. Recognizing the need to regulate this access, Portugal approved the Nagoya Protocol, within the Convention on Biological Diversity, through the Decree 7/2017, of 13 March (PSOEM, 2018), and Decree-Law 122/2017, of 21 September, which ensures compliance with the Nagoya Protocol on access to genetic resources by ensuring the implementation of Regulation (EU) No 511/2014 of 16 April on access to genetic resources and fair and equitable sharing of benefits arising from their use in the European Union. The Azorean Government has also adapted to its legal framework the access to genetic resources, as well as remaining natural resources for scientific purposes through the Regional Legislative Decree 9/2012/A, of 20 March. The Government authority with competences to issue authorizations for the access to natural resources for scientific purposes in the ARA is currently DRCT. The Government authority with competences to issue licences for study and handling of wild animals for educational or conservation purposes is currently Regional Directorate for the Environment (DRA). Licenses for the study and handling of marine wildlife are the responsibility of the Regional Directorate for Sea Affairs (DRAM), under the Regional Legislative Decree 15/2012/A, of 2 April.

Normative basis

A few legal documents were created to rule and coordinate scientific research and marine biotechnology in the Azores. The presented documents have a regional scope.

In the Azores, scientific research is allowed in the whole maritime space under two conditions. One is the prior obtaining of a certificate of informed previous consent (CCPI) and of a license in case the natural resource: i) is located in classified areas; ii) is part of the list of protected species or habitats; or iii) depending on its nature or location, is under specific legislation) or authorization (if none of the previous cases is applied). The other is the accomplishment to the Nagoya Protocol principles, adapted to the ARA by the Regional Legislative Decree 9/2012/A. According to the regulations applied to the classified protected areas of the Island Natural Park, research activities and access to natural resources within some areas are also subject to prior favourable decision from the administrative department acting as environmental authority, which in case of the marine environment, is DRAM. Regarding the regulations applied to the Marine Park of the Azores, scientific research activities and bioprospecting must comply with the OSPAR Code of Conduct for Responsible Marine Research in the Deep Seas and High Seas of the OSPAR Maritime Area (OSPAR 08/24/1, annex no. 6). Within some of the classified areas of the Park, research activities, environmental monitoring and access to natural resources require prior favourable decision from the administrative department with competences in sea affairs, namely DRAM.

Moreover, according to Decree-Law 38/2015, of 12 March, a Title of Private Use of the National Maritime Space (TUPEM) in the form of a permit must be required for the private use of the maritime space in the scope of scientific research projects and pilot-projects related to new uses or technologies or pilot projects of non-commercial activities.

Table 21. Main legal documents ruling scientific research and marine biotechnology in the Azores.

National Legislation	Observations
Decree-Law 38/2015, of 12 March, amended by Decree-Law 139/2015, of 30 July	Develops the marine spatial planning and management fundamental Law no. 17/2014, of 10 April, including the private use of transitional waters for aquaculture purposes
Regional Legislation	Observations
Regional Legislative Decree 10/2012/A, of 26 March	Establishes the legal framework for the Scientific and Technological System of the Azores and creates its granting financial incentives framework (PRO-SCIENTIA)
Regional Legislative Decree 9/2012/A, of 20 March	Establishes, for the Azores, the legal regime to (a) the access to natural resources for scientific purposes, which include biological and genetic resources, their derivatives and by-products, air, water, minerals and soil; (b) the transfer of the natural resources collected and/or accessed, for scientific purposes and; (c) the fair and equitable sharing of benefits resulting from of the use of natural resources collected and/or accessed, for scientific purposes
Regional Regulatory Decree 20/2012/A, of 5 November	Develops and regulates the legal regime for access and use of natural resources of the Azores for scientific purposes
Regional Regulatory Decree 17/2012/A, of 4 July	System of allocation of financial incentives, called PRO-SCIENTIA
Decree order 94/2017, of 28 December	Approves the regulation of specific access to fishing and access and permanence of vessels at Banco Condor, in order to ensure the full execution of the scientific projects in that Bank.
Resolution of the Council of Government 108/2015, of 15 July, amended by the Resolution of the Council of Government 109/2017, of 16 October, and the Resolution of the Council of Government 36/2018, of 13 April	Approves the governance model for the implementation, operationalization and embodiment of the Research and Innovation Strategy for Intelligent Specialization in the Azores
Resolution of the Council of Government 46/2018, of 14 May	Approves the Action Plan for Scientific and Technological Culture (PACCTO Açores)
Resolution of the Council of Government 49/2018, 14 May	Approves the Internationalization Plan for Science and Technology of the Azores
Regional Regulatory Decree 9/2014/A, of 27 June, amended by the Regional Regulatory Decree 12/2015/A, of 23 June	Regime of contractual, conditional and temporary tax benefits that may be granted under the terms of article 9 of Regional Legislative Decree 2/99/A, of 20 January. This is a special system of contractual tax benefits for companies investing in the Azores, in projects with recognized regional strategic relevance, including marine biotechnology and aquaculture

Instruments

In the framework of the Europe 2020 strategy, the European Commission prepared in 2010 the proposal for the flagship initiative "Innovation Union". This initiative promoted innovation as a way of addressing the challenges Europe would face in the following years. In that context, the concept of Research and Innovation Strategies for Intelligent Specialization, simplified by Strategies of Intelligent Specialization, or RIS3, was launched. This strategy focused on investing in research and innovation in a selection of assets and strategic areas, considering its differentiation at international level, with the potential to leverage competitive advantages of the Region and its positioning in international value chains, combining the various financing instruments in order to create synergies and improve efficiency. In 2014, the Azorean Government published the RIS3 for

the Azores (SPI-Açores, 2014), defining the Vision and the thematic priorities for research in the Azores.

Administrative easements and restrictions of public utility

Scientific research and marine biotechnology are allowed in the whole maritime space of the Azores, however, in some cases, these activities must accomplish with administrative constraints or easements and restrictions of public utility in force, for example rules from the MPA. Administrative constraints or easements result from legal impositions, or administrative acts, which have public utility as purpose, and which may result in prohibitions or limitations, or compel the practice of actions. Public utility restrictions are distinct from administrative easements as they derive directly from the law and do not dependent on any administrative act, and they concern any limitations over the private use and occupation of the maritime space, thus preventing full enjoyment of private use rights.
For example, military exercise areas for national defence purposes might hinder or prevent scientific research or biotechnology activities in certain areas or time periods.

Table 22. Administrative constraints and restrictions to scientific research and marine biotechnology in the Azores.

Administrative constraints and restrictions	Observations
Natural heritage	
Regional Legislative Decree 15/2012/A, of 2 April	Legal regime for nature conservation and protection of biodiversity of the Autonomous Region of the Azores
Regional Legislative Decree 20/2006/A, of 6 June, amended by the Regional Legislative Decree 7/2007/A, of 10 April	Approves the Sectoral Plan of the Natura 2000 Network
Regional Legislative Decree 28/2011/A, of 11 November, amended and republished by the Regional Legislative Decree 13/2016/A, of 19 July	Creates the Marine Park of the Azores
Regional Legislative Decree 10/2019/A, of 22 May	Approves the regime of protection and classification of the volcanic cavities of the Autonomous Region of the Azores
Regional Legislative Decree 47/2008/A, of 7 November, modified and republished by the Regional Legislative Decree 39/2012/A, of 19 September	Creates the Island Natural Park of Santa Maria
Regional Legislative Decree 11/2018/A, of 28 August	Creates the Paleo park of Santa Maria
Regional Legislative Decree 19/2008/A, of 8 July	Creates the Island Natural Park of São Miguel
Regional Legislative Decree 11/2011/A, of 20 de April	Creates the Island Natural Park of Terceira
Regional Legislative Decree 45/2008/A, of 5 November	Creates the Island Natural Park of Graciosa
Regional Legislative Decree 10/2011/A, of 28 March	Creates the Island Natural Park of São Jorge
Regional Legislative Decree 20/2008/A, of 9 July	Creates the Island Natural Park of Pico
Regional Legislative Decree 46/2008/A, of 7 November, modified and republished by the Regional Legislative Decree 7/2019/A, of 27 March	Creates the Island Natural Park of Faial
Regional Legislative Decree 8/2011/A, of 23 March	Creates the Island Natural Park of Flores

Administrative constraints and restrictions	Observations
Regional Legislative Decree 44/2008/A, of 5 November	Creates the Island Natural Park of Corvo
Regional Legislative Decree 18/2002/A, of 16 May **Resolution of the Council of Government 56/2010, of 10 May**	Natura Network 2000 (Special Areas of Conservation and Special Protection Areas) Adapts to the Region the Decree-Law 140/99, of 24 April, which transposes into national law the Directives on the conservation of wild birds (Birds Directive) and the conservation of natural habitats and wildlife (Habitats Directive) Approves Sites of Community Importance in the Autonomous Region of the Azores under the Natura 2000 Network
Regional Legislative Decree 31/2012/A, of 9 July	Provides rules for catching of species for scientific purposes under the legal framework for fisheries (Article 21st)
Decree-Law 150/2015, of 5 August	Establishes the scheme for the prevention of major accidents involving dangerous substances and the limitation of their consequences for man and the environment
Underwater cultural heritage	
Law 107/2001, of 8 September	Establishes the foundations for the policy and regime for the protection and enhancement of cultural heritage
Decree-Law 164/97, of 27 June	Establishes rules for underwater cultural heritage
Regional Legislative Decree 27/2004/A, of 24 August, amended by the Regional Legislative Decree 8/2006/A, of 10 March and the Regional Legislative Decree no. 6/2018/A, of 16 May	Establishes the normative framework for the management of archaeological heritage, concerning the prevention, rescue and investigation of movable and immovable archaeological heritage in the Autonomous Region of the Azores
Regional Regulatory Decree 24/2015/A, of 29 October	Creates the Underwater Archaeological Park of the Canarias, in front of Praia Formosa (Santa Maria)
Regional Regulatory Decree 12/2012/A, of 8 May	Creates the Underwater Archaeological Park of Dori (São Miguel)
Regional Regulatory Decree 20/2005/A, of 12 October, modified and republished by the Regional Regulatory Decree 19/2015/A, of 27 October	Creates the Underwater Archaeological Park of Baía de Angra (Terceira)
Regional Regulatory Decree 15/2014/A, of 19 August	Creates the Underwater Archaeological Park of Caroline (Pico)
Regional Regulatory Decree 17/2015/A, of 29 September	Creates the Underwater Archaeological Park of Slavonia, in Lajedo coast, Lajedo parish (Flores)
Basic infrastructures, national defence and public security	
Law 34/2006, of 28 July	Determines the extent of maritime areas under national sovereignty or jurisdiction and the powers exercised by the Portuguese State as well as the powers exercised on the high seas
Law 27/2006, of 3 July, amended by the Organic Law 1/2011, of 30 November and amended and republished by the Law 80/2015, of 3 August	Establishes the Basic Law of Civil Protection
Decree-Law 106/2004, of 8 May, amended by the Law 18/2012, of 7 May	Regulates the application of the 1974 International Convention for the Safety of Life at Sea (SOLAS 74) and its Protocol

Administrative constraints and restrictions	Observations
Decree-Law 15/94, of 22 January, amended by the Decree-Law 399/99, of 14 October	Creates the National System for Maritime Search and Rescue
Decree-Law 203/98, of 10 July	Defines the legal regime for maritime rescue
Decree-Law 134/2006, of 25 July, amended by the Decree-Law 114/2011, of 30 November and amended and republished by the Decree-Law 72/2013, of 31 May	Establishes the integrated protection and relief operations system
Law 2078, of 11 July 1955	Establishes the regime of the areas subject to military constraints
Decree-Law 45987, of 22 October 1964	Establishes the general regime military and aeronautic constraints
Decree-Law 116/2006, of 16 June	Defines aeronautic constraints for the neighbouring land of João Paulo II airport (Ponta Delgada, São Miguel)
Decree 1/2019, of 18 January	Establishes the protection general zone around Lajes air-base (Terceira)
Regional Regulatory Decree 27/84/A, of 24 July	Establishes the protection general zone around Graciosa island aerodrome
Regional Regulatory Decree 36/84/A, of 11 October, modified by the Regional Regulatory Decree 21/2012/A, of 9 November	Establishes the protection general zone around São Jorge (Velas) island aerodrome
Regional Regulatory Decree 28/84/A, of 7 August	Establishes the protection general zone around Pico island aerodrome
Regulation 1093/2016, of 14 December	Defines the operating conditions applicable to the use of airspace by remotely piloted civil aircraft systems ('drones')
Regional Legislative Decree 24/2011/A, of 22 August, rectified by the Statement of Rectification 31/2011, of 11 October (terrestrial jurisdiction of Vila do Porto, Santa Maria)	Approves the ports system in the Azores
Resolution of the Council of Government 161/2016, of 23 December	Approves the distribution of the ports of the Azores by class D and fishing centres
Decree-Law 594/73, of 7 November	Establishes the legal regime for the constitution of marine aids to navigation easements
Regional Regulatory Decree 24/2002/A, of 30 August	Defines the pilotage areas in ports under the jurisdiction of the Ports Authorities of the Autonomous Region of the Azores
Decree order 17/2014, of 28 March	Approves the regulation for the management of fishing ports and fishing centres in the Azores
Decree-Law 265/72, of 31 July	Approves the General Regulations of the Captaincies
Edict 340/2018, of March 26	Edict of the Captaincy of Porto da Horta
Edict 554/2018, of June 4	Edict of the Captaincy of the Port of Santa Cruz das Flores
Edict 419/2018, of April 24	Edict of the Captaincy of the Port of Angra do Heroísmo
Edict 327/2018, of March 23	Edict of the Captaincy of the Port of Praia da Vitória
Edict 813/2017, of October 17	Edict of the Captaincy of the Port of Ponta Delgada
Edict 420/2018, of April 26	Edict of the Captaincy of the Port of Vila do Porto
Other	

Administrative constraints and restrictions	Observations
Decree-Law 166/2008, of 22 August, modified and republished by the Decree-Law 239/2012, of 2 November and Decree-Law 124/2019, of 8 August	Establishes the legal regime of the National Ecological Reserve
Decree order 419/2012, of 20 December	Defines the conditions and requirements for the uses and actions concerning the National Ecological Reserve
Regional Regulatory Decree 15/2008/A, of 25 June	Coastal Zone Spatial Plan (POOC) of Santa Maria
Regional Regulatory Decree 6/2005/A, of 17 February	Coastal Zone Spatial Plan (POOC) of North Coast of São Miguel
Regional Regulatory Decree 29/2007/A, of 5 December	Coastal Zone Spatial Plan (POOC) of South Coast of São Miguel
Regional Regulatory Decree 3/2019/A, of 2 April (partial suspension) **Regional Regulatory Decree 1/2005/A, of 15 February**	Coastal Zone Spatial Plan (POOC) of Terceira
Regional Regulatory Decree 13/2008/A, of 25 June	Coastal Zone Spatial Plan (POOC) of Graciosa
Regional Regulatory Decree 24/2005/A, of 26 October	Coastal Zone Spatial Plan (POOC) of São Jorge
Regional Regulatory Decree 24/2011/A, of 23 November	Coastal Zone Spatial Plan (POOC) of Pico
Regional Regulatory Decree 4/2017, of 17 March (annex of Declaration 5/2016) **Declaration 5/2016, of 14 September (first amendment to the synthesis plant)** **Regional Regulatory Decree 19/2012/A, of 3 September**	Coastal Zone Spatial Plan (POOC) of Faial
Regional Regulatory Decree 24/2008/A, of 26 November	Coastal Zone Spatial Plan (POOC) of Flores
Regional Regulatory Decree 14/2008/A, of 25 June	Coastal Zone Spatial Plan (POOC) of Corvo
Resolution of the Council of Government 105/2013, of 6 November, amended by the Resolution of the Council of Government 3/2014, of 15 January	Defines the areas authorized for sand extraction by licensed companies and their maximum annual extraction volumes
Regional Legislative Decree no. 9/2010/A, of 8 March (altered and republished by Regional Legislative Decree no. 31/2012/A, of 6 July);	Approves the legal framework for aggregate extraction at the coastal area and at the territorial sea in the Autonomous Region of the Azores
Regional Legislative Decree 16/2011/A, of 30 May	Establishes the legal framework for the management of bathing areas, the quality of bathing water and the provision of assistance at bathing places and transposes the EU Directive 2006/7/EC into the regional legal system
Decree order 30/2018, of 28 March	Lists the coastal bathing waters identified in the Azores for the year 2018
Regional Legislative Decree 35/2004/A, of 27 August	Establishes the boundaries of recreational boating areas in the Autonomous Region of the Azores
Decree of the President of the Republic 67-A/97, of 14 October	Submarine cables (ratifies the United Nations Convention on the Law of the Sea of 10 December 1982)
Resolution of the Council of Government 126/2016, of 25 July, amended by the Government Council Resolution 2/2018, of 24 January	Establishes the aquaculture production areas located on Faial, Terceira and São Miguel islands, as well as the authorized species, production limits and exploitation regime
Resolution of the Council of Government 103/2019, of 26 September	Establishes the aquaculture production area located in "Baía do Filipe", in Graciosa island

Stakeholder's perception on the legal framework

The stakeholders' consultation developed in the context of the MarSP project aims to gather information on stakeholder's perceptions about the legislative context of maritime sectors applicable in the Azores. Selected stakeholders include representatives of the regional and/or local administration and researchers. The consultation process was performed through individual interviews. Stakeholders were asked if they agreed with the legislative context for scientific research and marine biotechnology and what type of changes would they recommend. In a general way, stakeholders referred that there is no need for more legislation ruling scientific research in the Azores. The existing legislation is enough but it is not operational (too bureaucratic) and the tendency is to prevaricate, even when there is agreement about legislation objectives. Therefore, the need is to simplify the existing legislation and improve its operability and the surveillance for research and bioprospecting activities.

PART II

Methodology for mapping the sector

Scientific research has been increasingly incorporated in processes of MSP. If the activity does not require space reservation, or does not require the temporary establishment of research support platforms, it may take place throughout the Portuguese maritime space, provided that it is authorized in accordance with the sectorial legal framework and constraints in place (PSOEM, 2018). For this reason, as there have not been identified specific needs for space reservation, it is not predicted that it will be necessary to allocate specific areas for this activity while mapping the potential situation. Similarly, marine biotechnology activities, involving essentially the collection of marine organisms, or parts thereof, which are subsequently used in laboratory research and development processes, do not currently need to require reservation of the national maritime space, according to the Decree-Law 38/2015. In the cases that the activity includes production of living organisms in aquatic environment, the activity is included in aquaculture procedures (PSOEM, 2018). For this reason, as regards mapping the potential situation, it is also not predicted the need to allocate specific areas for this activity.

Current spatial distribution

The methodology for spatializing the current situation of scientific research and biotechnology sectors in the Azores is based on existing and available databases on the scientific research and bioprospection activities, occurring in the maritime space, as well as on stakeholders' consultation and engagement. The gathering of information includes the use of the Seasketch, a web-based solution that joins powerful tools for enabling and improving participatory MSP processes, where stakeholders might add polygons identified as potential areas for scientific research and biotechnology activities. In the case of impossibility of using the Seasketch, information collected during interviews is transferred for the GIS tool used in the MarSP project.

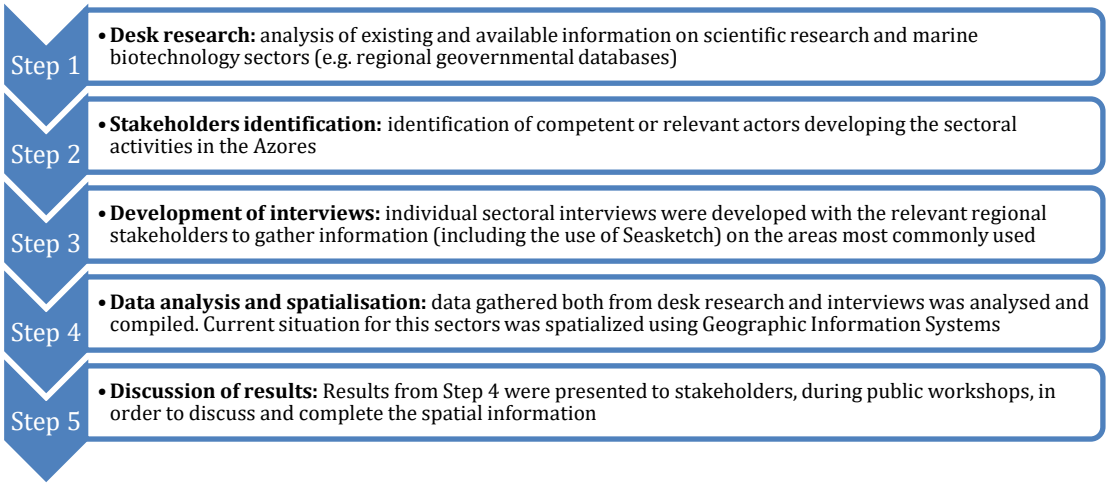
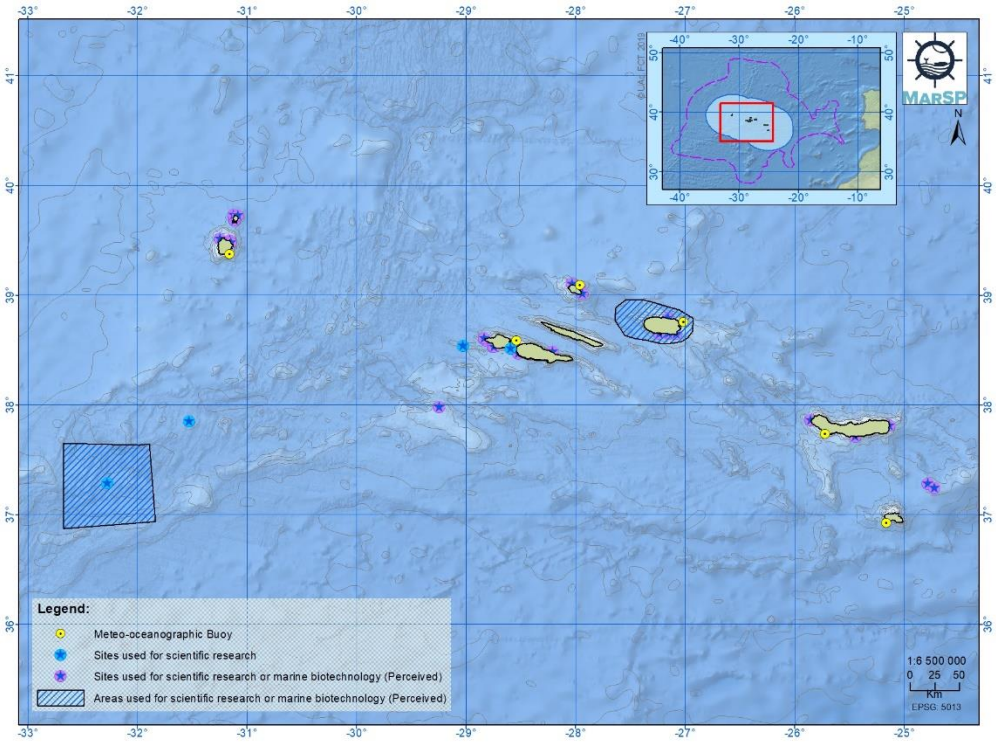


Figure 42. Methodological scheme for the characterization of the existing situation of scientific research and marine biotechnology sectors in the Azores.

Most scientific research and bioprospecting activities do not require space allocation and, for this reason, they may take place throughout the Portuguese maritime space.

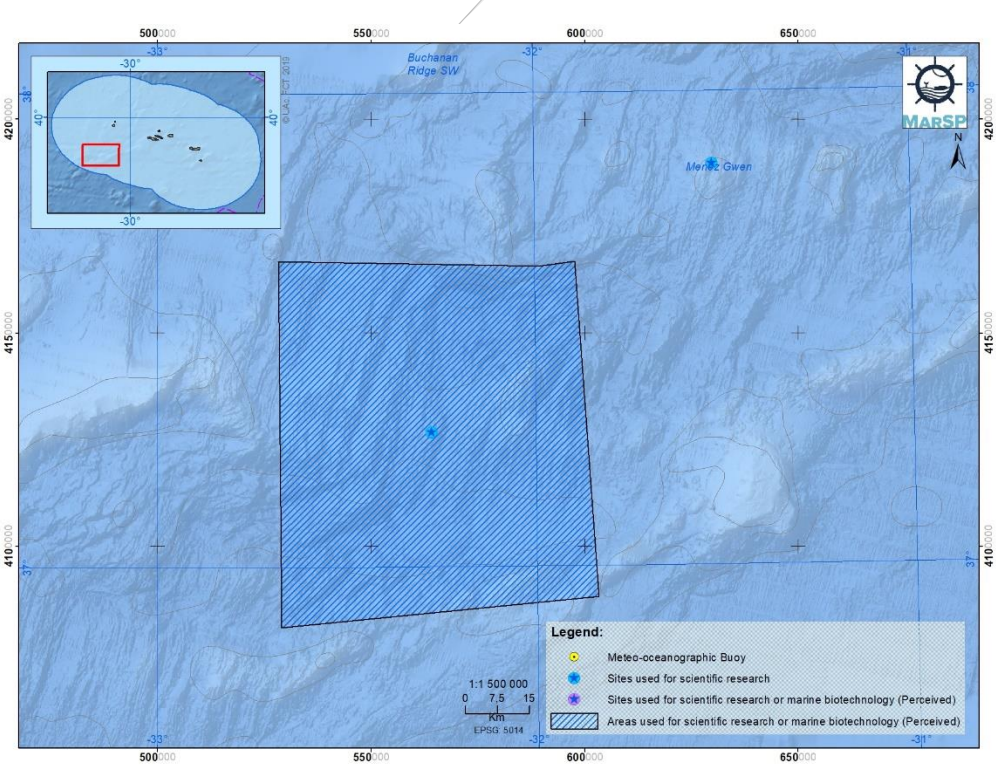
Mapping specific areas is not predicted, however, some maritime areas, due their geographic, oceanographic and ecological features, are particularly important and used for scientific research and marine biotechnology. Considering their importance in the regional context, those areas are identified in **Figure 43** to **Figure 47** as "scientific research sites" and result from existent databases for scientific research and biotechnology, provided by administrative institutions of the Azorean Government, including the entities with competences in science and research and sea affairs, currently DRCT and DRAM, and databases from current and/or past scientific projects with available cartographic information. Examples are meteo-oceanographic buoys (Climaat project) and the Condor seamount, where most fisheries have been forbidden, with understanding and acceptance from fishers, to privilege scientific research and the increase of knowledge of such marine ecosystems.

Resulting mainly from the involvement and consultation of researchers developing the activities in the Azores (through individual interviews and regional workshops), other areas currently used for scientific research and marine biotechnology purposes are also identified in **Figure 43** to **Figure 47** as "perceived". It is worth referring that these areas are currently being used, but other areas might be in use and were not referred during the stakeholders consultation. Information on perceived sites should be used as indicative of areas where the research effort might be more intense and their location is approximate, due to difficulties in gathering exact locations during this type of public workshops. Research teams developing studies in the Azores maritime space, namely the ones involved in monitoring key taxonomic groups, habitats, etc., should be continuously engaged in the MSP process to indicate other areas of current interest to science. During the last workshop (October 2019), stakeholders referred the need to include spatial information from more scientific research projects, as long as they have available information. Additionally, there are fixed equipment and scientific infrastructures (e.g. acoustic stations and ocean bottom seismometers) that were not included in these maps, as there was no cartographic information available in due time for this report.



Sources:
DRAM, 2019.
Stakeholders Engagement Process MarSP, 2019
Background: IH, 2019; DGT, CAOP, 2018; EMODnet Bathymetry WMS, Mean depth (DTM release 2016).

Figure 43. Location of areas more used for scientific research and/or marine biotechnology purposes (archipelago).



Sources:
DRAM, 2019.
Stakeholders Engagement Process MarSP, 2019
Background: IH, 2019; DGT, CAOP, 2018; EMODnet Bathymetry WMS, Mean depth (DTM release 2016).

Figure 44. Location of areas more used for scientific research and/or marine biotechnology purposes (Lucky Strike Hydrothermal Field).

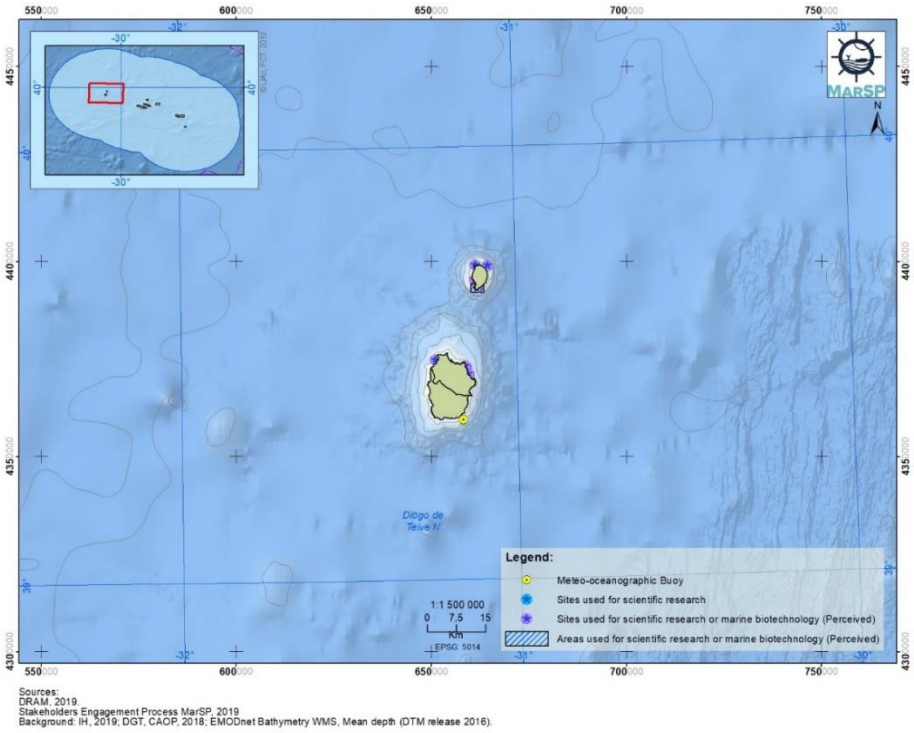


Figure 45. Location of areas more used for scientific research and/or marine biotechnology purposes (western group: Flores and Corvo islands).

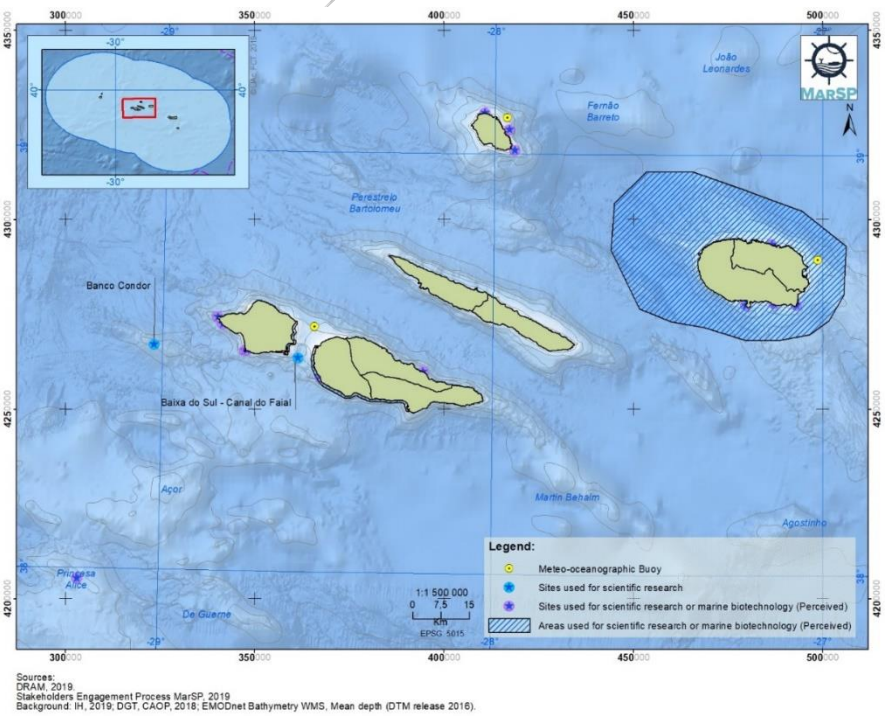


Figure 46. Location of areas more used for scientific research and/or marine biotechnology purposes (central group: Faial, Pico, São Jorge, Graciosa and Terceira islands).

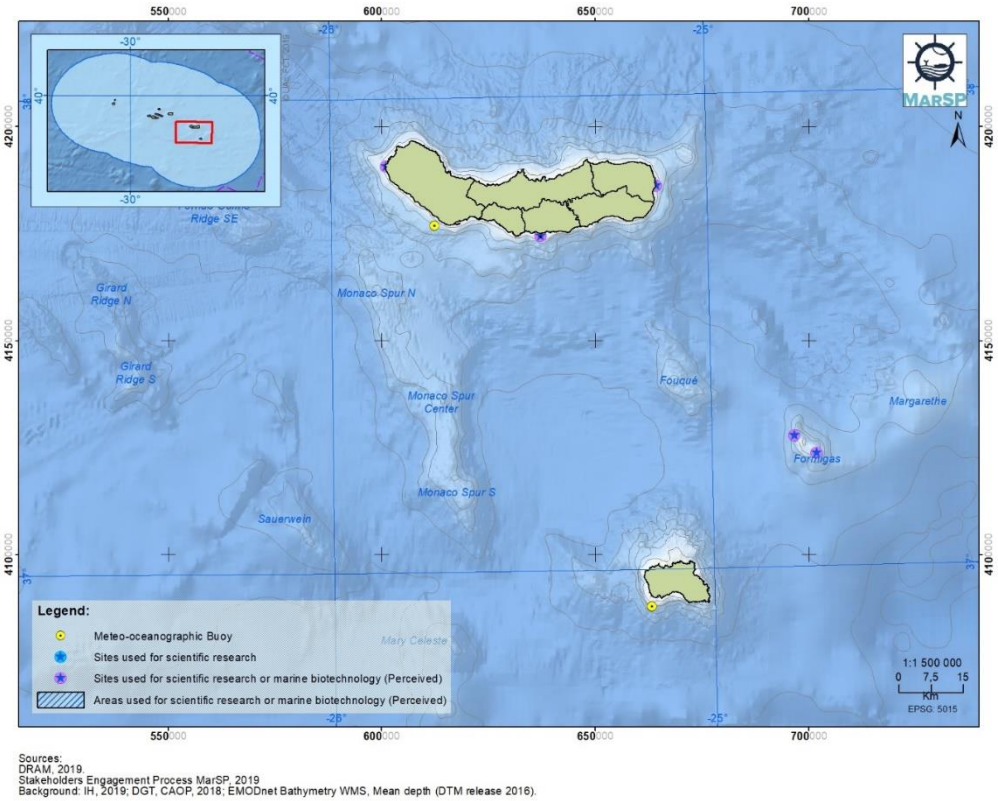


Figure 47. Location of areas more used for scientific research and/or marine biotechnology purposes (eastern group: São Miguel and Santa Maria islands).

PART III

Sector diagnosis

The sector diagnosis presented in this section includes a SWOT analysis and the analysis of sectoral interactions (sector-sector, land-sea interactions, sector-environment). The methodological approach for all analysis was similar and mainly based on regional stakeholders' consultation.

The first step to develop the analysis was based on sectoral representative stakeholders' consultation, through individual interviews. Stakeholders were asked to give their technical opinion on the fulfilment of each analysis for the sector they represent. For scientific research and marine biotechnology sectors, 10 representative regional stakeholders accepted to participate in the individual interviews. The analyses resulting from this step were reviewed during the 2nd MarSP Regional Stakeholders Workshop (developed in April 2019), which had the participation of 78 stakeholders distributed in three Azores Islands: São Miguel, Terceira and Faial. In the workshop, stakeholders were grouped according to the sectors they represent and were asked to comment on and complement the analyses for those sectors. The analysis for each sector includes consensual results from both regional stakeholders' consultation (individual interviews and the workshop) and additional topics from literature review for the sector.

SWOT Analysis

A SWOT analysis was developed for each maritime sector identified for the Azores. Stakeholders were asked to identify the strengths, weaknesses, opportunities and threats they consider as the most important for the sector they represent.

The final SWOT analysis for scientific research and marine biotechnology sectors in the Azores is presented in Table 23 (topics highlighted in bold were considered by stakeholders as most important).

A few topics from the different domains of the SWOT analysis generated some controversy amongst stakeholders, but in the end general consensus was achieved.

Main strengths of scientific research in the Azores, according to stakeholders perceptions, are related to the development level already reached by the scientific research sector, even if it still needs to improve, and the relatively good environmental status of the Azorean ecosystems (if compared to other parts of the world) and easily accessible for research, which can be transformed in opportunities to become a live laboratory.

Most of the main weaknesses have also been identified as important threats and are related to lack of funding and economic stability to implement stable and continuous research groups and research lines, inappropriate funding schemes with very high bureaucracy hindering the research activities, and low capacity to disseminate research results to local communities.

Table 23. SWOT analysis resulting from regional stakeholders' consultation for scientific research and marine biotechnology sectors in the Azores (topics highlighted in bold were considered by stakeholders as most important).

	Positive factors	Negative factors
Internal factors	**Strengths** - **Diversity and proximity of environments and resources, on a relatively small scale;** - **Long research work already developed and available information in several areas of knowledge;** - **Marine ecosystems still slightly altered compared to other regions of the world;** - Location in the middle of the Atlantic; - High diversity of marine life; - Emergence of new research areas, namely Earth observation; - Good infrastructures, some equipment and laboratories for some research areas; - Proximity to the sea and ease of access; - Human resources with quality training; - Existence of long-standing international collaborations and openness to new ones; - External/international recognition of the quality of the research developed in the Azores; - Existence of a University and research centres.	**Weaknesses** - **Need for more available equipment;** - **Research funded by external funds made it difficult to study what was most needed;** - **Low capacity to provide research results from the Azores to the local community;** - Isolation and distance from decision points, in particular at the European level; - Territorial fragmentation and geographical dispersion of research groups increase costs and hinder decision on funds distribution; - There is no complete coverage of areas of knowledge; - Lack of basic information (e.g. geological and soils maps, fine bathymetry, good aerial photo coverage); - Little knowledge of the economic and social component of maritime activities; - Weak structure for the training of new researchers; - Unstable funding mechanisms and lack of investment, particularly for long-term research, opposing to the need for research based on long-term data collection; - Discrepancy between classical and genetic biodiversity studies; - Lack of knowledge on the distribution of organisms/ habitats to analyse the efficiency of Marine Protected Areas (MPA).

External factors	Opportunities	Threats
	- **Marine biodiversity is attractive to researchers from other parts of the world;** - **Integration of economic information with social and/or environmental information;** - **Current public opinion/interest in sea issues easing the allocation of funds for research;** - Creation of a marine biotechnology scientific society, with active members/partners, and a periodic publication for results dissemination; - Sustainable management of marine minerals and resources exploitation; - Much remains to be discovered, including species and habitats; - Creation of the AIR-Center (Atlantic International Research Center), depending on how it will be developed; - Research opportunities are dependent on the requirements (e.g. research topics) of current and future funding mechanisms and frameworks.	- **Lack of security and guarantees due to political and development strategies defined at short-term** - **The whole procedural/administrative scheme required to researchers and to projects development (e.g. rules for public contracting and from public administration), impeding the development of research activities *per se*;** - **Lack of funding mechanisms/limited budget for research;** - Too many external pressures (lobbies); - Lack of commitment between Government and researchers; - Internal competition resulting in lack of cooperation; - Inadequacy of the eligibility of project expenses to actual needs for the development of activities; - Limited project time horizons (e.g., three years of project development); - Climate change might impede the proper development of work and field trips in some scientific areas; - Economic activities sometimes take precedence over scientific activities.

Analysis of interactions

The development of a certain activity in the maritime space is usually linked to interactions with the remaining uses and maritime sectors. Those interactions can be both positive or negative and can be both induced or suffered by a certain sector. In the context of the MarSP project, for each maritime sector, three types of interactions were analysed: sector-sectors interactions, land-sea interactions and interactions with the environment. The analysis intended to identify if interactions exist and the level of intensity of the interactions using the following scale: negative values for negative interactions, positive values for positive interactions and zero for absence of interactions. In the resulting matrices, the column "C" represents the negative impacts induced or suffered by the sector, identified as conflicts, while the column "S" represents the induced or suffered positive interactions, deemed as synergies.

Sector-sectors interactions analyses whether there is any type of conflict and/or synergy between each of the maritime sectors identified and the other sectors. The resulting matrix reflects only the analysis of interactions occurring beyond the 30m bathymetry, not including coastal areas within less than 30m bathymetry (the protection maritime zone of protection defined by the coastal zone spatial Plan - POOC).

Land-sea interactions analyses whether there is any type of conflict and/or synergy between each of the maritime sectors identified and coastal activities (up to the 30m bathymetry) developed in the various areas identified in the POOC.

Interactions with the environment analyses if there is any kind of negative and/or positive effect of each of the maritime sectors identified to the environment, specifically considering the descriptors of the good environmental status, and respective criteria, as defined by the Marine Strategy Framework Directive (MSFD).

During the individual interviews, stakeholders were asked to identify the levels of conflicts and/or synergies of scientific research and marine biotechnology with other sectors. The final values were calculated using the tendency of answers and represent the stakeholders' perception trend. As this first analysis is based on inputs from stakeholders representing the maritime sector, to avoid or decrease possible bias in the results, during the Workshop, stakeholders were asked to comment and, when in disagreement, to propose a different value to classify the level of conflict/synergy. The final values from the workshop were calculated using the mean of all values resulting from all

discussion tables. Literature review was also used to complement the characterization of the interactions, identifying if a conflict or a synergy does in fact exist in the Azores or on other contexts.

Interactions with other sectors

The characterization of the interactions of scientific research and marine biotechnology with the other maritime sectors in the Azores is represented in **Table 24**.

Table 24. Characterization of the interactions between scientific research and marine biotechnology sectors with other maritime sectors in the Azores.

Sector-Sectors	Scientific research						Marine biotechnology					
	Sectoral interviews		2nd Workshop		Literature review		Sectoral interviews		2nd Workshop		Literature review	
	C	S	C	S	C	S	C	S	C	S	C	S
Fisheries	0	2	-1	2.5			0	1	-0.3	1		X
Aquaculture	0	2	0	2.3			0	2	0	2.5		X
Extraction of non-metallic mineral resources	0	0	-0.5	0.5			0	0	-0.5	0.3		
Energy	-2	1	-0.3	1.5			0	0	0	0.8		
Maritime security, defence, surveillance and civil protection	-2	0	-0.8	1.3			0	0	0	0.3		
Navigation and maritime transportation	-1	1	-0.5	1			-1	1	0	1		X
Infrastructures	-2	0	-1	0.3			0	0	-0.3	0		
Coastal and maritime tourism	-1	2	-1	2			0	0	-0.3	0.3		
Underwater cultural heritage	0	3	0	3			0	0	-0.3	0.3		
Environmental conservation and MPA	0	3	0	3			-2	1	-1.8	1		X
Legend	**C** – Conflict; **S** – Synergy; **X** – Existent **-3** – High conflict; **-2** – Moderate conflict; **-1** – Low conflict **0** – Without conflict/synergy **1** – Low synergy; **2** – Moderate synergy; **3** – High synergy **"-"** – Does not answer						Conflict scale low → high Synergy scale					

During sectoral interviews, conflicts with fewer sectors were identified for scientific research during sectoral interviews than in the workshop, but higher levels of conflict were assigned. Differences in results for the synergies were less significant.

In a general way, the conflicts identified are mainly related to spatial conflicts between scientific research and the other sectors, due to potential restrictions on the access to certain maritime areas and for the potential destruction of areas or research subjects being used in field work for scientific studies when other activities are implemented. Conflicts with fisheries arise, for example, from fishing boats taking precedence over scientific activities (e.g. fishing vessels have priority over vessels that are studying marine mammals); conflicts with fisheries might also arise if areas for research are defined and fisheries are forbidden. It was also referred during the interviews that deep-sea mining, despite not yet existent in the Azores, might arise high conflicts with scientific research.

On the contrary, main synergies identified had no spatial references but the fact that scientific research strongly contributes to improve the development and management of other sectors. For example, fisheries can benefit from scientific research to improve catch techniques and

methodologies with less impacts in the environment and can also benefit from a better management of stocks with scientific knowledge base. Environmental conservation and MPA have also high synergies with scientific research, since currently protected area networks and conservation actions are increasingly based on scientific knowledge. Aquaculture and marine energy, two activities dependant on higher technological developments are also linked to scientific research. Scientific research plays also a key role in the effective management and monitoring of MPA and in environmental conservation.
Marine biotechnology has no major conflicts with remaining sectors, only with environmental conservation and MPA, as the prospecting activities might impact and degrade the ecosystems. Marine biotechnology in the Azores, however, is not yet an established maritime sector and the potential growth of these activities needs to be planned in order to avoid increasing conflicts in the future.
The synergies identified for marine biotechnology are mainly related to the potential of biotechnological results to contribute to improve the development of remaining sectors activities.

Uses compatibilization and Multi-uses

Similarly to mainland Portugal (PSOEM, 2018), both the development of scientific research and biotechnology prospection in the Azorean maritime space are, in a general way, compatible with the common use of that space. If some of those activities, however, requires maritime space reservation, the possibility of simultaneous occurrence with other uses and activities will depend on whether there is no conflict with other private uses and on the nature of the common uses and the nature of the scientific research or bioprospection activity. The biotechnology exploitation of marine resources may result in incompatibilities between different activities, which should be accounted.

Ocean multi-use (MU) is an emerging concept which responds to the increasing demand for marine resources and space. It has been defined as the intentional "joint use of resources in close geographic proximity by either a single user or multiple users. It is an umbrella term that covers a multitude of use combinations in the marine realm and represents a radical change from the concept of exclusive resource rights to the inclusive sharing of resources and space by one or more users" (*in* (Schupp, et al., 2019).
A study has already been developed in the Azores (Vergílio, Calado, & Caña Varona, MUSES Project Case study 3B: Development of tourism and fishing in the Southern Atlantic Sea (Azores archipelago – Eastern Atlantic Sea, 2017) to identify opportunities of MU development. The study included sectoral stakeholders' consultation to ensure representatives and practitioners of the main sectors were heard and involved. The study also presented a first approach to drivers, barriers, added values and negative impacts of the main MU identified. The concept, however, is still barely known in the Region.
Existing MU identified in the Azores are mainly related to "soft" or traditional uses of the maritime space, such as fisheries associated with tourism. The MU combinations identified in the Azores involving scientific research sector were:
- Scientific Research & Environmental Protection;
- Scientific Research & Tourism;
- Scientific Research & Fisheries;
- Scientific Research & Defence.

Scientific Research & Environmental Protection
The combination of Scientific Research & Environmental Protection was identified as existent in the Azores, since research is developed inside designated areas, classified or managed with goals

of environmental conservation, beyond the research objectives strictly necessary to accomplish the needs of the same designated area. Availability of funds for scientific research and demand for new marine scientific research are significant drivers to the MU.

Scientific Research & Tourism
The combination of Scientific Research & Tourism was identified as existent in the Azores. A private enterprise developed this combination of uses offering both land and marine expeditions and the opportunity for tourists to experience technical research activities. The team is composed of biologists, field researchers and tourism professionals to provide a differentiated experience to those who search for their services. During sea trips, environmental data is collected, feeding regional and international monitoring and research programs. Additionally, tourists go aboard, paying for the tour and following or collaborating in the data collection. This combination reduces costs to the government and increases satisfaction for participating in a real scientific activity. A link between science and tourism is promoted, as well as a platform for researchers and sharing of knowledge making tourism environmentally more sustainable.
The Azorean potential for marine research, in several research areas, together with the increasing number of tourist and the demand for new touristic products offers, suggests high potential to further develop the MU in the Region.

Scientific Research & Fisheries
Currently there is sharing of efforts from fishers to host onboard researchers from the University of the Azores, frequently as observers, and take the opportunity to collect data and information for their own research. One aspects referred for this MU combination was the fact that currently scientific research gains more from the MU than fisheries, as main shared resources are made available by fisheries and more direct involvement of fishers in research should be promoted.

Scientific Research & Defence
This MU was identified for the Azores considering the existing collaboration between the Portuguese Navy (UAc, Sessão de divulgação dos trabalhos realizados nos Açores pelo Navio da Marinha, NRP D. Carlos I, 2017), specifically between the Hydrographic Institute and the University of the Azores and/or with the Regional Government of the Azores. The Navy and the University of the Azores co-organized a public session to disseminate the scientific work carried out in the summer of 2017, in the Azores, by the Portuguese navy ship D. Carlos I. During that campaign, the navy hosted on-board a few researchers from the University of the Azores and Navy resources were shared to accomplish both the Navy's and University's objectives. The Hydrographic Institute and the Azores Government signed a protocol for technical and scientific cooperation in marine research, through bathymetric surveys, sea floor mapping, training activities or possible joint research and monitoring projects in support of public policies, among others (Governo dos Açores, 2017).

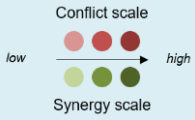
The parties also publicly assumed the interest in continuing and deepening the synergies and other campaigns have already been implemented.

Land-sea interactions

The characterization of the land-sea interactions of scientific research and marine biotechnology sectors in the Azores is represented in the following table.

Table 25. Characterization of the land-sea interactions of scientific research and marine biotechnology sectors in the Azores.

Land-sea		Scientific research						Marine biotechnology					
		Sectoral interviews		2nd Workshop		Literature review		Sectoral interviews		2nd Workshop		Literature review	
		C	S	C	S	C	S	C	S	C	S	C	S
Critical areas for the sustainable coastal use	Natural, cultural and scenic special area	0	2	-0.2	2.6			-1	0	-1	0.5		
	Bathing zones	0	0	-0.4	1			0	0	-0.3	0		
	Built-up areas in risk zones	0	1	-0.4	1.2			0	0	-0.8	0		
Environmental protection	Marine environmental protected areas	0	0	0	3			-1	0	-0.8	1		
	Land environmental protected areas	0	0	0	2.8			0	0	-0.3	0.3		
Coastal protection areas	Built-up areas	0	0	-1.2	1			0	0	-0.5	0		
	Agricultural, forestry and other uses	-1	0	-1	0.4			-1	0	-1.3	0		
	Touristic potential areas	0	0	-1	0.6			0	0	-0.3	0.5		
Infrastructures	Airport	0	0	-0.2	1			0	0	0	0		
	Road	0	0	-0.4	0.6			0	0	0	0		
Navigation	Ports	0	3	-0.4	3			0	0	-0.5	0.5		
	Marinas, small ports	0	2	-0.4	2			0	0	-0.5	0.5		
Legend	**C** – Conflict; **S** – Synergy; **X** – Existent **-3** – High conflict; **-2** – Moderate conflict; **-1** – Low conflict **0** – Without conflict/synergy **1** – Low synergy; **2** – Moderate synergy; **3** – High synergy **"-"** – Does not answer												



No major conflicts in land-sea interaction were found for scientific research, only for coastal protection areas and with low levels of conflict. However, during interviews it was also referred that sometimes there is potential for conflict between scientific research and areas of environmental protection, specifically with governmental agencies with responsibility in managing protected areas (both in the maritime and on land). The argument is that scientific research results contribute to the increase of knowledge and that results are used to portrait the Azores as a touristic destination focused on sustainable practices for ocean conservation. On the other side, when scientific research results reveal that pressures are increasing and there is the need to implement measures to preserve or restore those ecosystems, data are disregarded and this might arise conflicts.

The most synergies identified for both scientific research and marine biotechnology are mainly related to the potential of research and biotechnological results in contributing to improve the development of the remaining sector activities.

Interactions with the environment

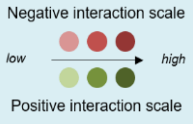
The analysis of the interactions of scientific research and marine biotechnology sectors in the environment, using as reference the descriptors to evaluate the Good Environmental Status (GES), as defined by the MSFD, is also presented through a matrix.

Table 26. Characterization of the interactions of scientific research and marine biotechnology sectors in the environment in the Azores.

Interactions with the environment	Scientific research						Marine biotechnology					
	Sectoral interviews		2nd Workshop		Literature review		Sectoral interviews		2nd Workshop		Literature review	
	N	P	N	P	N	P	N	P	N	P	N	P
Biodiversity	-1	3	-0.2	3			-1	1	-0.5	1.5		X
Non-indigenous species	-1	0	0	3			0	1	0	1.5		
Exploited fish and shellfish	0	0	0	2.6			0	0	0	1		X
Food-webs	0	2	0	2.8			0	0	0	1		X
Human-induced eutrophication	0	3	0	3			0	0	-0.5	0.8		
Sea floor integrity	0	3	0	3			-1	0	-0.8	0.8		
Hydrographical conditions	0	0	0	2.8			0	0	0	0.5		
Contaminants (water, sediments, biota)	0	3	0	3			0	0	-0.3	0.8		X
Contaminants in fish and seafood	0	3	0	3			0	0	-0.3	0.3		
Litter	0	3	0	3			0	0	-0.3	0.5		X
Level of noise	0	3	0	3			0	0	0	0.3		

Legend

N – Negative effect; **P –** Positive effect; **X –** Existent
-3 – High negative effect; **-2 –** Moderate negative effect; **-1 –** Low negative effect
0 – Without negative/positive effect
1 – Low positive effect; **2 –** Moderate positive effect; **3 –** High positive effect
"-" – Does not answer



Regarding scientific research, no negative effects on the GES descriptors were identified, with exception for biodiversity and non-indigenous species. The little negative impacts identified were related to the small disturbance that some research activities are forced to have to develop the studies, namely in field-work involving live organisms and collection of samples. The matrix shows that stakeholders quite unanimously consider that scientific research has high positive impacts, considering the GES descriptors. This was mainly due to the current and potential application of research results in the recovery and/or maintenance of the GES.

In what concerns marine biotechnology, it is worth referring that a lower number of stakeholders participated in the sectoral interviews and results should be considered more carefully. This might also explain the difference of results between sectoral interviews and the workshop, with heterogeneous groups of stakeholders identifying more negative impacts of these activities. It is visible in the matrix that results for marine biotechnology differ from results for scientific research. Few more negative impacts were identified and the positive impacts were considered with lower level of positive effects, as this activity.

Additional documents and links

Associação Portuguesa de Algologia Aplicada (https://www.facebook.com/associacaoalgologia/)
BioMarine Business Convention: an industry and investment platform and a global accelerator (https://biomarine.org/page/what-is-biomarine)
ERA-MarineBiotech: a consortium of national funding bodies seeking complementarities between national activities to pool resources to undertake joint funding of transnational projects in the area of Marine Biotechnology (http://www.marinebiotech.eu/)
EURAXESS: a portal providing information and support to researchers moving to and from Portugal (https://www.euraxess.pt/)
FCT: Fundação para a Ciência e Tecnologia (https://www.fct.pt/index.phtml.pt)
Galway Statement on Atlantic Ocean Cooperation: a Research Alliance, signed on 24 May 2013, by the European Union, Canada and the United States of America, focused on aligning the ocean observation efforts of the three partners, aiming at better understanding of the Atlantic Ocean and promoting the sustainable management of its resources (https://ec.europa.eu/research/iscp/pdf/galway_statement_atlantic_ocean_cooperation.pdf)
InterRidge: InterRidge statement of commitment to responsible research practices at deep-sea hydrothermal vents (https://www.interridge.org/irstatement)
Mar 2020: Decree order 54/2018, of 28 May, approving the regulation of the investment support scheme for the development of partnerships between scientists and fishermen
OSPAR: Ospar code of conduct for responsible marine research in the deep seas and high seas of the ospar maritime area (https://www.ospar.org/documents?d=32633)
P-BIO: Portugal's Biotechnology Industry Organization (http://p-bio.org/pt/)
REBECA: Rede de Excelência em Biotecnologia Azul na região da Macaronésia (Açores, Madeira, Canárias e Cabo Verde) (http://www.proyectorebeca.eu/pt/)
RIS3: Research and Innovation Strategies for Intelligent Specialization for the Azores (http://www.azores.gov.pt/NR/rdonlyres/6DE18582-F5E5-4CB8-BA18-79B9BAFC31B0/795912/RIS3AoresRelatrioFinal1.pdf)

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Supplement I. Azores European projects 2007-2018

The list of projects presented in this section is preliminary and compiles information provided by DRCT. In the Azores, other projects focusing on the sea and maritime space were started, such as MARCET, PLASMAR, Mistic Seas, SMARTBLUE, EMSODEV, LuMinAves, BEST III and INDICIT.

Programme	Acronym	Title	Beginning year	Coordination	Azores institutions
H2020	AtlantOS	Optimizing and Enhancing the Integrated Atlantic Ocean Observing System	2015-04-01	Germany	IMAR- INSTITUTO DO MAR
H2020	ATLAS	A Trans-AtLantic Assessment and deep-water ecosystem-based Spatial management plan for Europe	2016-05-01	United Kingdom	SECRETARIA REGIONAL DO MAR, CIENCIA E TECNOLOGIA / IMAR- INSTITUTO DO MAR
H2020	BiodivERsA3	Consolidating the European Research Area on biodiversity and ecosystem services	2015-02-01	France	FUNDO REGIONAL PARA A CIENCIA E TECNOLOGIA
H2020	BlueBio	ERA-NET Cofund on Blue Bioeconomy - Unlocking the potential of aquatic bioresources	2018-12-01	Norway	FUNDO REGIONAL PARA A CIENCIA E TECNOLOGIA
H2020	CONCHA	The construction of early modern global Cities and oceanic networks in the Atlantic: An approach via OceaN's Cultural HeritAge	2018-01-01	Portugal	OMA - OBSERVATORIO DO MAR DOS ACOREACORES
H2020	DiscardLess	DiscardLess – Strategies for the gradual elimination of discards in European fisheries	2015-03-01	Denmark	IMAR- INSTITUTO DO MAR
H2020	MARINE-EO	Bridging Innovative Downstream Earth Observation and Copernicus enabled Services for Integrated maritime environment, surveillance and security	2017-01-01	Greece	FUNDO REGIONAL PARA A CIENCIA E TECNOLOGIA
H2020	MarineUAS	Autonomous Unmanned Aerial Systems for Marine and Coastal Monitoring	2015-01-01	Norway	IMAR- INSTITUTO DO MAR
H2020	MERCES	Marine Ecosystem Restoration in Changing European Seas	2016-06-01	Italy	IMAR- INSTITUTO DO MAR
H2020	MUSES	Multi-Use in European Seas	2016-11-01	United Kingdom	FUNDACAO GASPAR FRUTUOSO
H2020	PADDLE	Planning in A liquiD worlD with tropicaL StakEs: solutions from an EU-Africa-Brazil perspective	2017-07-01	France	FUNDACAO GASPAR FRUTUOSO
H2020	pp2EMBRC	European Marine Biology Resource Centre preparatory phase 2	2015-10-01	Portugal	IMAR- INSTITUTO DO MAR
H2020	SponGES	Deep-sea Sponge Grounds Ecosystems of the North Atlantic: an integrated approach towards their preservation and sustainable exploitation	2016-03-01	Norway	IMAR- INSTITUTO DO MAR
INTERREG V	GROW RUP	Entrepreneurship development and capacity building policies for business creation and growth in outermost regions	2017/01/01	Spain	Regional Department for Employment and Professional Training
INTERREG V	iFADO	Innovation in the framework of the Atlantic deep ocean	2017/11/04	Portugal	Fundo Regional para a Ciência e a Tecnologia
FP7	COEXIST	Interaction in coastal waters: A roadmap to sustainable integration of aquaculture and fisheries	2010-04-01	Norway	IMAR- INSTITUTO DO MAR

Programme	Acronym	Title	Beginning year	Coordination	Azores institutions
FP7	CORALCHANGE	Factors controlling carbonate production and destruction of cold-water coral reefs of the NE Atlantic	2009-01-01	Portugal	IMAR- INSTITUTO DO MAR
FP7	CORALFISH	Assessment of the interaction between corals, fish and fisheries, in order to develop monitoring and predictive modelling tools for ecosystem based management in the deep waters of Europe and beyond	2008-06-01	Ireland	IMAR- INSTITUTO DO MAR
FP7	DEVOTES	DEVelopment Of innovative Tools for understanding marine biodiversity and assessing good Environmental Status	2012-11-01	Spain	IMAR- INSTITUTO DO MAR
FP7	EAMNET	Europe Africa Marine Network	2010-03-01	United Kingdom	IMAR- INSTITUTO DO MAR
FP7	FIXO3	Fixed Point Open Ocean Observatories Network	2013-09-01	United Kingdom	IMAR- INSTITUTO DO MAR
FP7	HERMIONE	Hotspot Ecosystem Research and Man's Impact on European seas	2009-04-01	United Kingdom	Universidade dos Açores
FP7	KNOWSEAS	Knowledge-based Sustainable Management for Europe's Seas	2009-04-01	United Kingdom	IMAR- INSTITUTO DO MAR
FP7	MADE	Mitigating ADverse Ecological impacts of open ocean fisheries	2008-05-01	France	IMAR- INSTITUTO DO MAR
FP7	MEFEPO	Making the European Fisheries Ecosystem Operational	2008-09-01	United Kingdom	IMAR- INSTITUTO DO MAR
FP7	MIDAS	Managing Impacts of Deep-seA reSource exploitation	2013-11-01	United Kingdom	IMAR- INSTITUTO DO MAR
FP7	MORPH	Marine robotic system of self-organizing, logically linked physical nodes	2012-02-01	Germany	IMAR- INSTITUTO DO MAR
FP7	NETBIOME-CSA	Strengthening European research cooperation for smart and sustainable management of tropical and subtropical biodiversity in outermost regions and overseas countries and territories	2013-05-02	Portugal	Fundo Regional para a Ciência e a Tecnologia
FP7	PESI	A Pan-European Species-directories Infrastructure	2008-05-01	The Netherlands	Universidade dos Açores
FP7	SINGULAR	Smart and Sustainable Insular Electricity Grids Under Large-Scale Renewable Integration	2012-12-01	Portugal	EDA - ELECTRICIDADE DOS ACORES SA
FP7	SPECIAL	Sponge Enzymes and Cells for Innovative AppLications	2010-12-01	Portugal	Universidade dos Açores
FP7	WISER	Water bodies in Europe: Integrative Systems to assess Ecological status and Recovery	2009-03-01	Germany	IMAR- INSTITUTO DO MAR
INTERREG IV	4 POWER	Policy and Public-Private Partnerships for Offshore Wind EneRgy	2012/01/01	The Netherlands	Azorina - Sociedade Gestão Ambiental e Conservação Natureza SA
INTERREG IV	BANGEN	BANGEMAC Network: Marine Gene Bank from Macaronesia	2009/10/01	Spain	University of the Azores
INTERREG IV	BIOVAL	Valorización, control y gestión de los recursos marinos de Macaronesia	2013/07/01	Spain	University of the Azores
INTERREG IV	CARMAC	Mejora de la calidad de las aguas recreativas y costeras de la Macaronesia	2009/10/01	Spain	Direcção Regional do Ordenamento do Território e dos Recursos Hídricos
INTERREG IV	EASYCO	Collaborative European Atlantic Water Quality Forecasting System	2009/01/02	Portugal	University of the Azores

Programme	Acronym	Title	Beginning year	Coordination	Azores institutions
INTERREG IV	EP@M		2009/10/01	Spain	Direcção Regional do Ordenamento do Território e dos Recursos Hídricos
INTERREG IV	ESTRAMAR	Estrategia Marino-Marítima de I+D+i en la Macaronesia	2010/10/20	Spain	University of the Azores
INTERREG IV	GEPETO	Fisheries Management and Transnational Objectives	2012/06/01	Spain	University of the Azores
INTERREG IV	GESMAR	Sustainable Management of Marine Resources	2009/10/01	Spain	University of the Azores
INTERREG IV	GESTATLANTICO		2010/10/20	Spain	Direcção Regional do Ordenamento do Território e dos Recursos Hídricos
INTERREG IV	LITOMAC		2009/10/01	Spain	Direcção Regional do Ordenamento do Território e dos Recursos Hídricos
INTERREG IV	MACAROMOD		2010/10/20	Spain	University of the Azores
INTERREG IV	MacSIMAR	Incorporation of an Integrated Meteorological and Oceanographic Monitoring System for Macaronesia in the European marine/maritime research strategy	2009/10/01	Portugal	Administração dos Portos das Ilhas de São Miguel e Santa Maria, SA / University of the Azores
INTERREG IV	MaReS	Macaronesian research strategy	2009/10/01	Spain	Regional Fund for Science and Technology
INTERREG IV	MARPROF	Basis for the Management and Gastronomic Valorization of the Deep-water Fishery Resources from the Macaronesia	2009/10/01	Portugal	University of the Azores
INTERREG IV	MeshAtlantic	Mapping Atlantic Area seabed habitats for better marine management	2010/01/01	France	University of the Azores
INTERREG IV	SOST-MAC		2009/10/01	Spain	Direcção Regional do Ordenamento do Território e dos Recursos Hídricos
INTERREG IV	VERTEBRATUR		2010/10/20	Spain	Associação Regional de Turismo; Turismo dos Açores
LIFE	LIFE CWR	Ecological Restoration and Conservation of Praia da Vitória Coastal Wet Green Infrastructure	2013-08-01	Portugal	Município da Praia da Vitória
LIFE	LIFE INVASAQUA	Aquatic Invasive Alien Species of Freshwater and Estuarine Systems: Awareness and Prevention in the Iberian Peninsula	2018-11-01	Spain	ASPEA (Açores)
LIFE	SAFE ISLANDS FOR SEABIRDS	Safe islands for seabirds/ Initiating the restoration of seabird-driven ecosystems in the Azores	2009-01-01	Portugal	Câmara Municipal do Corvo / Secretaria Regional do Ambiente e do Mar dos Açores
COST	EMBOS	Development and implementation of a pan-European Marine Biodiversity Observatory System	2011	The Netherlands	University of the Azores - Dept Oceanography & Fisheries
COST	SMOS-MODE	SMOS Mission Oceanographic Data Exploitation	2011	Spain	University of the Azores - Dept Oceanography & Fisheries
EUROCORES	CHEMECO	Monitoring colonisation processes in chemosynthetic ecosystems	2007	France	University of the Azores
EUROCORES	DEECON	Unravelling population connectivity for sustainable fisheries in the Deep Sea	2007	Norway	University of the Azores

TOURISM, RECREATION AND SPORTS

Introduction

For the characterization of the existing conditions in the Azorean maritime space, several maritime sectors and activities need to be considered. In the context of the MarSP project, coastal and maritime tourism sector is defined as follows and according to European Union (EU) level (ECORYS, Study in support of policy measures for maritime and coastal tourism at EU level, 2013):

- **Coastal tourism** covers beach-based recreation and tourism (e.g. swimming, surfing, sun bathing), and non-beach related land-based tourism in the coastal area (all other tourism and recreation activities that take place in the coastal area for which the proximity of the sea is a condition), as well as the supplies and manufacturing industries associated to these activities;
- **Maritime tourism** covers tourism that is largely water-based rather than land-based (e.g. boating, yachting, cruising, water sports), but includes the operation of landside facilities, manufacturing of equipment, and services necessary for this segment of tourism.

It is relevant to explain that nautical tourism and maritime tourism as defined by Ecorys (ECORYS, Study in support of policy measures for maritime and coastal tourism at EU level, 2013) are broadly similar concepts. For the purpose of this briefing, nautical tourism is taken to be a subset of maritime tourism as it does not cover cruise ship activities. Depending on the type of the activity (sailing, scuba-diving, whale-watching etc.), coastal and marine tourism may vary in spatial and temporal scale (from summer activities only, to all seasons) and may be found at all vertical levels of the sea (from the sea surface to the seabed). At the same time, coastal and marine tourism activities may vary in location (from the shore out to the high seas) as well as in intensity ("Eco" or "mass"), according to what kind of facilities and number/type of tourists they involve (Papageorgiou, 2016).

Located in the Mid Atlantic, the Azores Archipelago has a number of peculiar features, such as insularity and autonomy statute. The Azores subarea of the Portuguese Exclusive Economic Zone (EEZ) is the largest, when compared to the mainland and Madeira subareas, placing the archipelago in the spotlight (Paramio, Porteiro, Alves, & Veloso-Gomes, 2008). The Azores is an emerging tourism destination for marine-related activities such as sailing, surfing, whale watching and scuba diving (Calado, Ng, Borges, Alves, & Sousa, 2011), and has great potential, for example, for marine wildlife tourism (MWT), given the highly diverse marine ecosystems and various types of resident and migrating cetaceans (Bentz, Dearden, & Calado, Strategies for marine wildlife tourism in small islands – the case of the Azores, 2013). Several MWT activities currently taking place are, however, lacking in effective management. Whale watching and other MWT activities such as scuba diving have an increasingly important role within the coastal tourism sector, as the Azores offer good conditions in terms of sea life close to the shoreline (Bentz, Dearden, & Calado, Strategies for marine wildlife tourism in small islands – the case of the Azores, 2013). Therefore, managing the coastal and maritime activities is required in the archipelago, particularly the coastal tourism segment, under increasing pressure due to a growing demand.

Purpose

This sector briefing summarises the current status of the coastal and maritime tourism sector in the Autonomous Region of the Azores (Portugal), under MarSP project work package 2. "Mapping the current conditions and creating a vision for the MSP in Macaronesia" and Task 2.2. "Mapping the maritime uses and activities and defining the MSP current conditions". It includes a characterization of the current situation of coastal and maritime tourism in the Azores, the proposed methodology to map the activities, a sector diagnosis and its main interactions with other sectors, the environment and the land-sea interactions for the different activities (e.g. whale watching, scuba diving, pesca-tourism).

PART I

Sector characterization

The maritime space is currently a highly sought after resource for the development of activities related to the tourism sector. Decree-Law n.º 191/2009, of August 17, established the Basic Law of Tourism Public Policies, as a strategic sector of the national economy, and defined the instruments for its implementation (PSOEM, 2018). Based on an open and participative discussion at national level, was developed the Strategy for Tourism in Portugal 2027 (TdP, 2017).

In the Azores, in 2016, was published the Strategic and Marketing Plan for Tourism in the Azores (PEMTA) (Governo dos Açores, Plano Estratégico e de Marketing do Turismo dos Açores, 2015). This plan has as its main objective the definition of a set of strategies, in a dichotomous approach between markets and products that, based on the needs of the territory and the various stakeholders of the destination, aims to achieve three results: i) Qualification and sustainable development of the tourism sector; ii) Preservation of the environment; iii) Development of tourism activity as a tool to boost the regional economy in all the islands. The nautical tourism appears in the PEMTA as a complementary product that diversifies and enriches the Azorean offer. The plan reinforces that the Azores must position itself as a destination of nature tourism, allowing the enrichment of the tourist experience through the enjoyment and experience of nautical tourism (Governo dos Açores, Plano Estratégico e de Marketing do Turismo dos Açores, 2015), which is a product with potential growth in the archipelago.

In 2017, it was determined the revision of the Touristic Planning Program of the Autonomous Region of the Azores (POTRAA, approved by Regional Legislative Decree 38/2008/A, of 11 August) by the Government Council Resolution 74/2017, of 7 August. The revision of the program, aims at defining strategic options for economic development policy, in the short and medium term, with particular focus on the regional tourism sector and in the perspective of valuing the region's tourist activity, improving the quality of regional tourism products, changes operated in the international tourism market and the safeguarding and enhancement of the natural and cultural resources of the regional area.

The coastal and maritime tourism is a particularly complex and fragmented sector and it is the main maritime sector in terms of employment and gross added value in a European level. In its 2010 Communication, the Commission announced a strategy for sustainable coastal and maritime tourism "A European Strategy for more Growth and Jobs in Coastal and Maritime Tourism" (COM(2014) 86 final). Furthermore, the Blue Growth Communication of 2012 (COM(2012) 494 final) listed coastal and maritime tourism as one of five focus areas for delivering sustainable growth and jobs in the blue economy. At the national level, the group "Recreation, sport, culture and tourism" is in fact the one with the greatest expression and terms of gross value added (GVA), according to

the satellite account of the sea. In terms of employment, it is the second group in terms of employment, not the first.

Maritime-Tourism Activity in the Azores

In the Azores, the maritime-tourism activity corresponds to all the services of a cultural, leisure, tourist fishing, commercial promotion and taxi nature, developed by the use of vessels for-profit purposes. This sector has a quantitative and qualitative expression, unparalleled in the remaining parts of the national territory, presenting a unique development potential. This activity constitutes, due to its specificities and the way in which it is carried out, one of the main tourist attractions of the Archipelago. On the other hand, the development of coastal and maritime-tourism activities using fishing vessels, named pesca-tourism, can and should play an important social and economic role, complementing the income of this sector and providing tourists with genuine cultural experiences. The need to promote, qualify and diversify the supply of tourism services linked to the sea requires the establishment of high standards of quality and safety that should be followed by companies related to the sector, embodied in the regulations that bind them. The Azores Maritime-Tourism Activity Regulation (RAMTA) (Regional Legislative Decree n.º 23/2007/A, of October 23), regulates the maritime-tourism modalities in the Region:

a) Boating tours, with programs previously established and organized - modality licenced by the Regional Directorate for Transport (DRT) and accessible to all operators (depending on the type of license), providing they respect the classification of the vessel and its navigation areas;
b) Whale watching – activity licenced by the Regional Directorate for Tourism (DRTourism) and obeys to specific legislation on the matter. The licences of the vessels used in this activity are emitted by DRT;
c) Scuba diving – activity licenced by the DRT; when it falls within the limits of classified marine protected areas, the activity requires previous authorization from DRAM;
d) Tourist fishing – activity licenced by the DRT, requiring prior notice from the Regional Directorate for Fisheries (DRP). The licence request must indicate which species will be caught;
e) Pesca-tourism – activity licenced by the DRP, exclusively taking place aboard a registered commercial fishing vessel and depending on the validity of the commercial fishing license;
f) Submersible tours – activity licenced by the DRT;
g) Boat rental with or without crew – activity licenced by the DRT;
h) Services provided by taxis – activity licenced by the DRT;
i) Services of a maritime-tourism nature provided by the use of moored or anchored vessels and without means of independent or sealed locomotion – activity licenced by the DRT;
j) Rental of water scooters and small vessels exempted from registration – activity licenced by the DRT;
l) Other services, in particular those relating to towing services for recreational equipment – activity licenced by the DRT.

Maritime-tourism operators or other entity may request a licence to cetacean audio-visual recording operations, issued by DRAM, in accordance with the exceptional regime provided for in article 20 of Decree-Law n.º 49/2005 of February 24 (Habitats Directive).

In the Azores, in 2018, were licenced a total of 154 maritime-tourism operators. The largest number of licenced operators was registered in São Miguel Island (SMG), 57 on total, which is not unexpected, since this is the largest island in the archipelago and the most populous (**Figure 48**). The second island with the largest number of licences was Faial (FAI), with 24 licences attributed in 2018 (**Figure 48**).

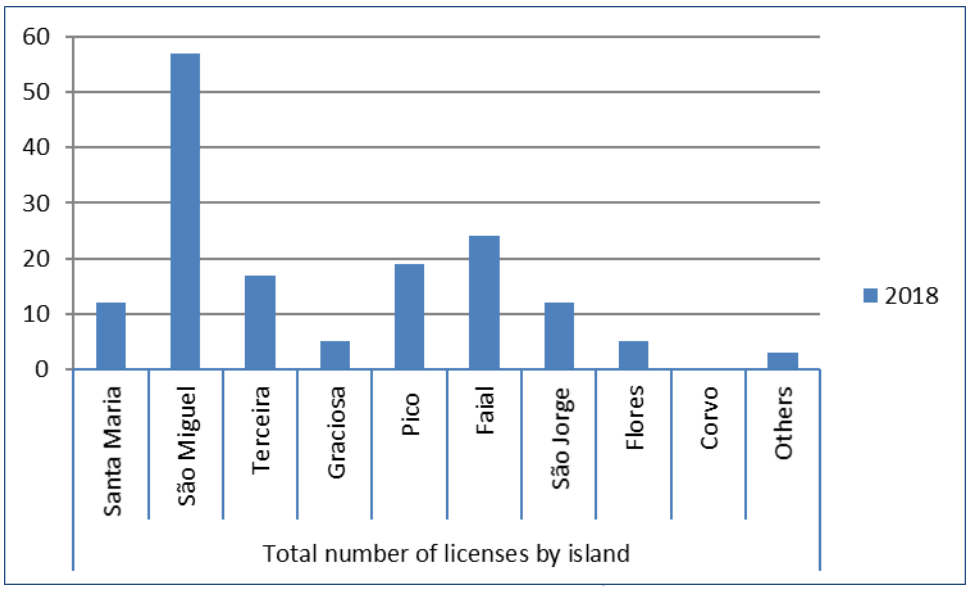
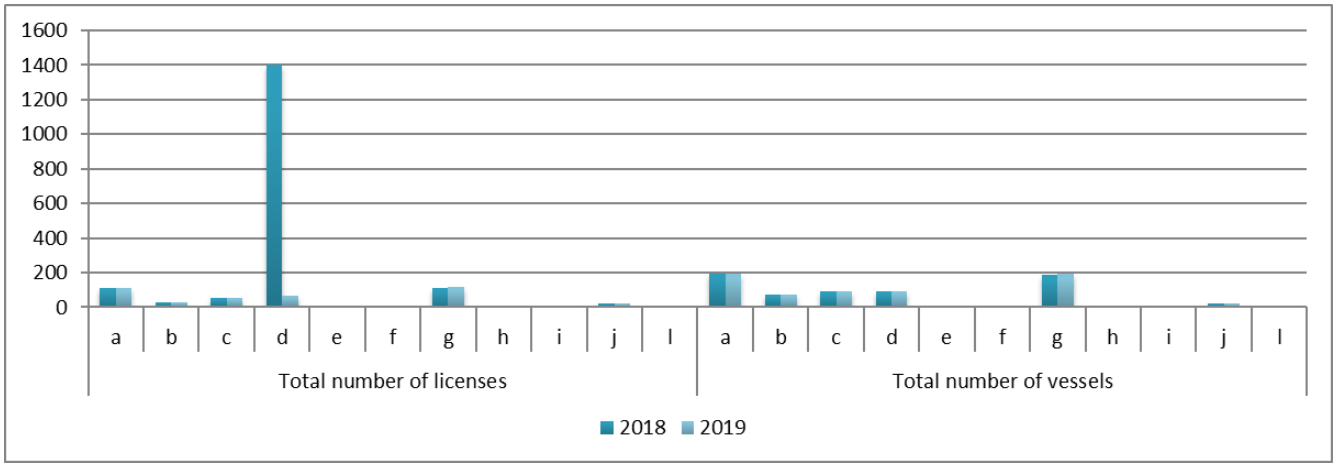


Figure 48. Number of licences attributed in the Azores, in 2018, by island (Source: Azorean Government on http://www.azores.gov.pt, 2018).

By June of 2019 were licenced 152 maritime-tourism operators in the RAA (Government of the Azores, unpublished data).

In 2018, the modality with the largest number of licences attributed was touristic fishing (d) with 1402 licences (DRP, 2019;)[6]**Figure 49**. Furthermore, the RAMTA modalities with the largest number of vessels licenced in the Azores in 2018 and 2019 are: Boating tours, with programs previously established and organized (a); and Boat rental with or without crew (g) (**Figure 49Figure 49**).

[6] information about the number of licences attributed in 2019 was not available



Legend: a) Boating tours, with programs previously established and organized; **b)** Whale watching; **c)** Scuba diving; **d)** Tourist fishing; **e)** Pescatourism; **f)** Submersible tours; **g)** Boat rental with or without crew; **h)** Services provided by taxis; **i)** Services of a maritime-tourist nature provided by the use of moored or anchored vessels and without means of locomotion proper or sealed; **j)** Rental of water scooters and small vessels exempted from registration; **l)** Other services, in particular those relating to towing services for recreational equipment.

Figure 49. Number of licences attributed and vessels licenced, by modality according to RAMTA, in 2018 and 2019, in the Azores (Source: Azorean Government on http://www.azores.gov.pt, 2018 and 2019).

Main coastal and maritime activities/modalities developed in the Azores

Demand for coastal and maritime tourism activities (like yachting, whale watching, scuba diving, cruising, etc.) is increasing in the Azores. The archipelago is a destination increasingly sought after for water sports enthusiasts.

The following section contains a general description of the main water-based activities/modalities developed in the Azores Region, subdivided by tourism, recreational activities, leisure activities and sports:

Tourism

Maritime-tourism activity, according to the RAMTA

(a) Boating tours

Boating tours, as a maritime-tourism activity, with programs previously established and organized by maritime-tourism operators, is one of the most popular maritime activities demanded by tourists in the Azores. In the Archipelago, in 2018, were licenced on total 113 operators. The number of vessels licenced for the development of this activity was 194 vessels.

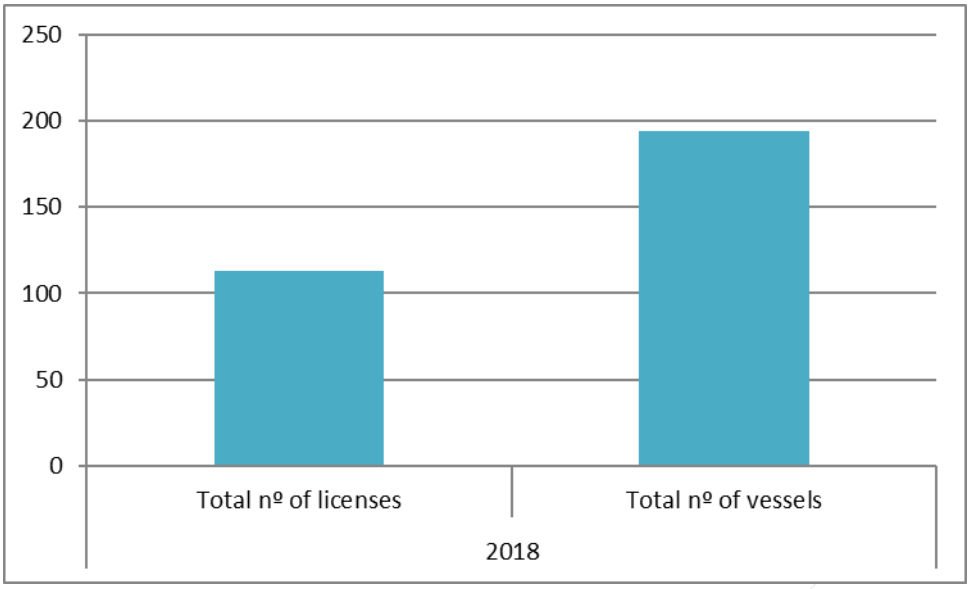


Figure 50. Number of licences attributed and vessels licenced for the activity boating tours in the Azores, in 2018 (Source: Azorean Government on http://www.azores.gov.pt, 2018).

In the first semester of 2019 the number of OMTs licenced was 113 and the number of vessels registered was 194.

(b) Whale watching

In the Azores, whale watching is one of the main activities in a rapidly growing coastal tourism economy (Bentz, Rodrigues, Dearden, Calado, & Lopes, 2015). The Azores presents a great diversity of marine mammals, with seasonal frequency fluctuations. Around twenty-five cetacean species can be observed in the waters of the archipelago close to the shore (Bentz, Dearden, & Calado, Strategies for marine wildlife tourism in small islands – the case of the Azores, 2013). Resident populations of common dolphins and bottlenose dolphins can be spotted all year long. Migratory species such as blue whales and sei whales (baleen whale) can be spotted in certain seasons (Bentz, Lopes, Calado, & Dearden, 2016). In the archipelago, in 2018 and in the first semester of 2019, 25 whale watching operators offer their services. Whale watching occurs around the Azorean islands and the licences are attributed by zones - Zones A, B, C e Z - according to Order Decree n.° 5/2004, of January 29 (the boundaries of each zone are established in the document). Most whale watching operators use rigid hull inflatable boats for twelve to twenty-four passengers, and on São Miguel and Faial there are also medium-sized cabin-boats for up to 80 people. The legislation regulating the activity determines the rules for the approach to marine mammals, minimum distances as well as direction and speed of boats and time spent near the animals. The distance depends of the situation but must not be less than 50 m and the approach is done from behind, leaving a free zone in front of the animals. A maximum of two boats may be in the proximity, but not closer than 200 m each other. Each boat can stay a maximum 30 minutes with the same animal or group. No scuba diving is allowed with cetaceans, and snorkelling/swim is allowed only with certain species of dolphins. Operators dedicated to whale watching must apply for a permit (Law Decree n.° 10/2003/A; Ruling n.° 5/2004; Regional Legislative Decree n.° 13/2004/A).
In 2018 the total number of licences attributed to the 25 operators was 72.

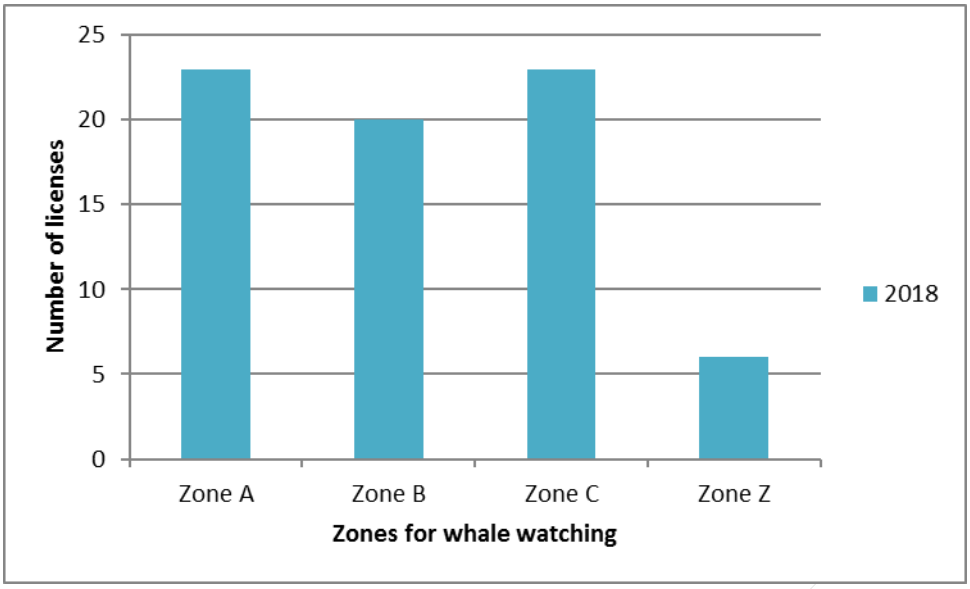


Figure 51. Number of licenced operators in the modality whale watching in the Azores, by zone, in 2018 (Source: Azorean Government on http://www.azores.gov.pt, 2018).

By the first semester of 2019, the total number of licences was the same as in 2018.
The whale watching activity licence needs to be required until January 31 of the year in which the operator intends to start the activity, by completing the form provided by the respective services and gathering all the documentation required by the diploma and its regulations. The licences identify the platforms that can be used by the holder to observe cetaceans and may introduce limitations on the number and characteristics of the platforms, the daily number of trips, areas of operation and other factors that may be regulated by the Regional Legislative Decree n.º 9/99/A, of 22 March. The title of the licences and the respective concession process will be approved by order of the Regional Secretary of Economy (SRE). Whenever there is an excess demand for licences with respect to the load capacity fixed for a given area, the available licences will be awarded by tender, to be regulated by order decree. Without prejudice to other criteria to be defined in the same order decree, the available licences will be awarded to the best competitor/operator with technical and human resources, who has the best tourist exploitation program, economically and financially viable and compatible with cetacean protection. Cetacean observation platforms must comply with the technical requirements laid down by law for the area in which they will operate and, in addition, be equipped with GPS (global positioning system) and VHF (very high frequency) communication systems, not only for navigation and safety purposes, but also for recording the location of cetacean observations. Operators licenced for whale watching activity shall ensure the collaboration of a minimum technical staff, like a technician with a medium or higher education in scientific fields related to marine biology or animal behaviour, or with proven experience in cetology, responsible for advising on the conduct of cetaceans, carrying out dissemination actions and recording observations information of cetaceans. It is also necessary to have aboard an academically and professionally qualified crew, with in-depth knowledge of the meteorological and oceanographic conditions of the area, which has attended a training course on conduct before the cetaceans; on-board guide or monitor, providing tourists with relevant information about marine life, cetaceans in particular, and the Region, whose functions may be combined with other crew functions.

(c) Scuba diving

In the Azores, scuba diving is also one of the main activities in a rapidly growing coastal tourism economy (Bentz, Rodrigues, Dearden, Calado, & Lopes, 2015). This activity has emerged recently in the archipelago mainly due to its large iconic species, namely groupers, tunas, sharks and manta rays, and its geological underwater characteristics such as caves, arches, tunnels and seamounts. In the Archipelago, in 2018, there were licenced 51 diving operators and 91 boats (**Figure 52**). The rigid hull inflatable boats are the more common type of boat that the dive operators use, for less than 10 divers. Recently, they started to use small cabin-boats with hard-bottom and open deck for around 15 divers. These more comfortable boats are used particularly for the rapidly growing shark diving activity, where divers have to be taken to more distant dive sites (Bentz, Rodrigues, Dearden, Calado, & Lopes, 2015). The legislation which regulates the scuba diving activity addresses diver safety, certification and equipment. Scuba diving is allowed in most marine protected areas (MPAs) with few constraints. The Azorean Government has published a code of conduct for scuba diving with recommendations on how to minimize impact on marine life and on the seafloor (**Figure 53**). This code of conduct is available on the official tourism website of the Azores (http://dive.visitazores.com/en/dive-conduct). Also, the Regional Government has published a code of conduct for shark and manta ray diving in the Azores that is available in http://servicos-sraa.azores.gov.pt/grastore/DRAM/Codigo_Conduta_Tubaroes.pdf (**Figure 54**). This code focuses on the interaction between divers and animals and aims to foster diver safety and animal welfare, promoting the sustainability and quality of the activity.

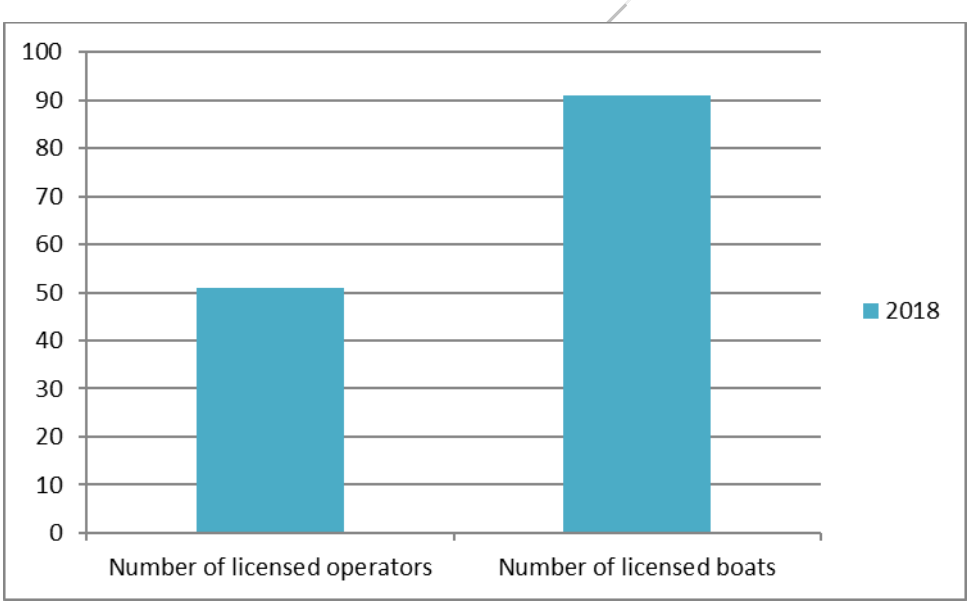


Figure 52. Number of licenced operators and boats in the modality Scuba diving in the Azores, in 2018 (Source: Azorean Government on http://www.azores.gov.pt, 2018).

In the Azores, in the first semester of 2019 were licenced 52 diving operators and 92 boats to the development of the activity.

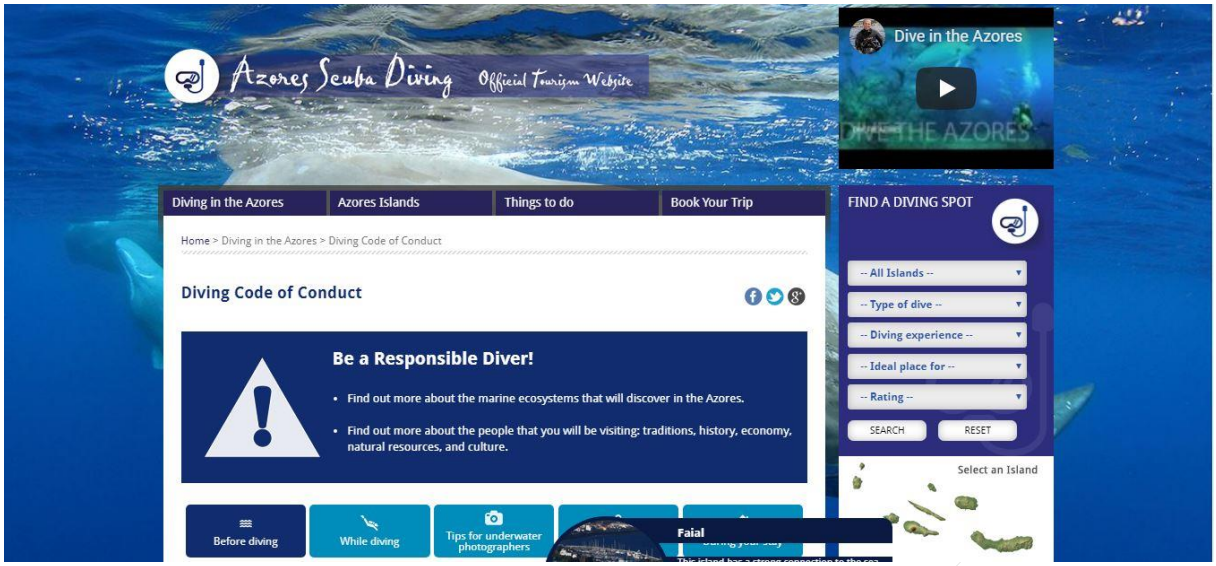


Figure 53. Diving Code of Conduct (Source: Regional Tourism Directory, 2019 in http://dive.visitazores.com/en/dive-conduct).

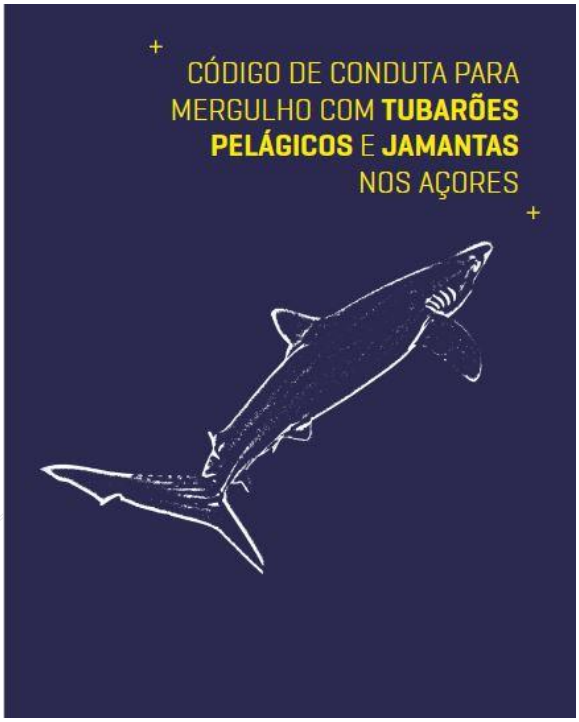


Figure 54. Code of conduct for shark and ray diving in the Azores (DRAM, 2015).

The three island groups of the Azores Archipelago are equipped with a hyperbaric chamber for decompression of divers, each serving the islands of the respective group (Governo dos Açores, Estratégia Marinha. Relatório do 2º Ciclo. Parte C: Análise Económica e Social.).

(d) Touristic fishing

In the Azores, touristic fishing is considered to be fishing practiced in a vessel within the scope and under the terms provided for in the RAMTA, being allowed the use of any type of vessel. During the period in which a vessel authorized for maritime-tourism activity is licenced for leisure fishing, it may not be used for any type of commercial activity. In 2018, were attributed 1402 licences for the development of this activity in the archipelago (DRP, 2019). The higher number of licences was attributed in Pico Island (286), following Terceira (247) and São Miguel Island (237), **Figure 55**. This activity is subdivided in two types of fisheries: i) inshore fishing and ii) sport fishing (e.g. Big Game fishing). In inshore fishing are caught small species of fish (e.g. groups, parrotfish) and in Big Game fishing are fished pelagic fish species (e.g. tuna, marlin).

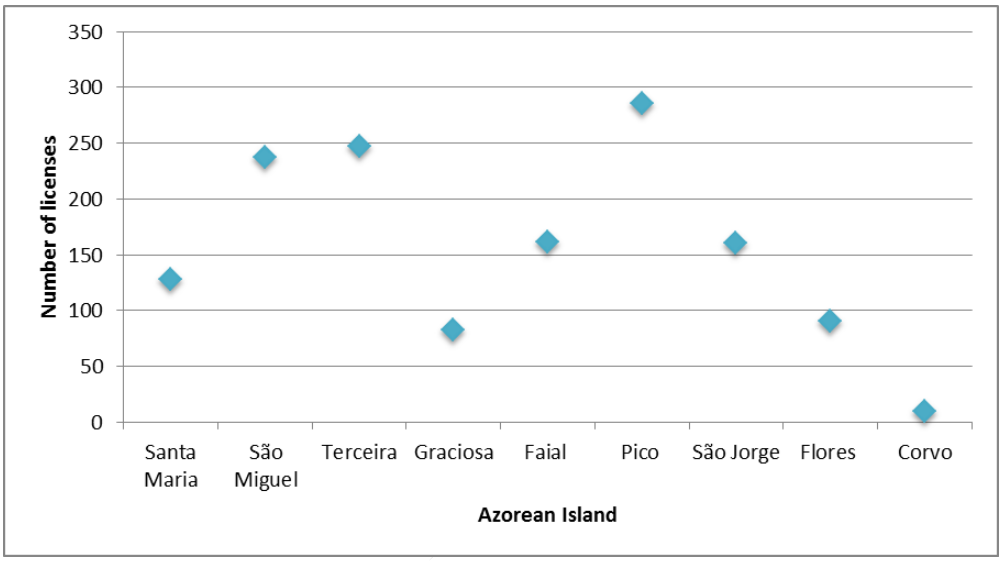


Figure 55. Number of licences attributed in 2018, by Azorean Islands, for the modality Tourist fishing (DRP, 2019).

(e) Pesca-tourism

The difference between tourist fishing and pesca-tourism is the fact that the latter is conducted aboard a registered commercial fishing vessel. Pesca-tourism in the Azores provides fishers with an additional, complementary income source and diversifies the tourism activities of the archipelago. It can contribute to environmental protection as it can reduce fishing impacts and provide tourists with an insight into the world of fishing and how this can be done sustainably. Therefore, it can also improve the image of the profession and make it more appealing to young people.
This activity is characterized by professional small-scale fishers welcoming tourists on their boats to go along with fishers and watch, or even participate, in the traditional fishing. In the Azores, the activity requires an annual licence, which has to be requested from the Regional Directorate for Fisheries (Vergílio, Calado, & Caña Varona, MUSES Project Case study 3B: Development of tourism and fishing in the Southern Atlantic Sea (Azores archipelago – Eastern Atlantic Sea, 2017). In 2018, 13 permits were given in the region. The higher numbers of permits were given in São Miguel Island (5 permits) and in São Jorge Island (3 permits), **Figure 56**.

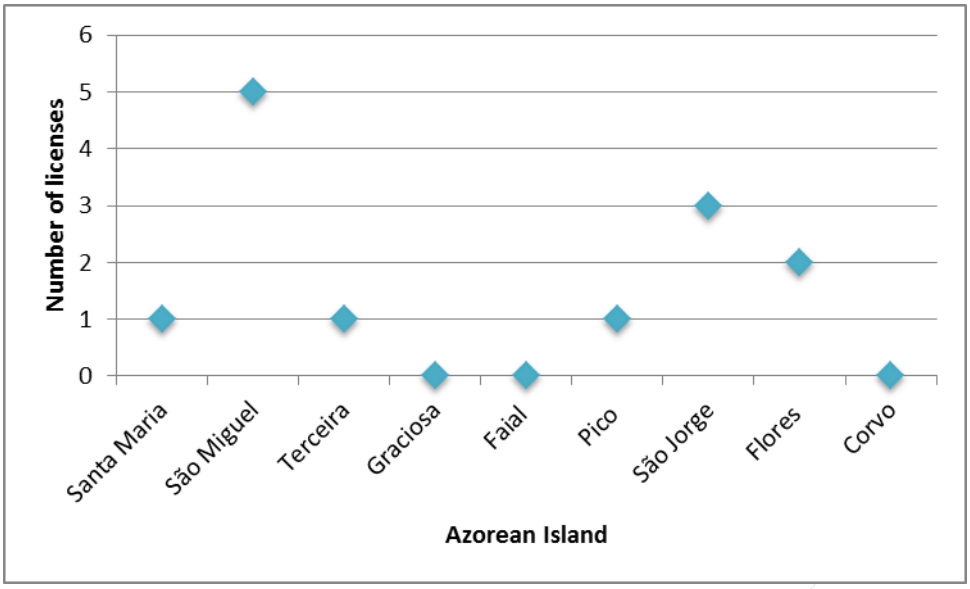


Figure 56. Number of licences attributed in 2018, by Azorean Islands, for the modality Pesca-tourism (DRP, 2019).

In the specific case of pesca-tourism activity, those who are employed in fishing may engage in maritime tourism activities with a single registered fishing vessel owned or ship owner. Pesca-tourism is regulated by the Regional Legislative Decree n.º 23/2007/A, of October 23 and by the Regional Legislative Decree n.º 36/2008/A, of July 30, and subject to the payment of maritime activity licence issued by the entity with competence in the fisheries area (see Order Decree n.º 45/2009 of June 4). The licencing for this activity is annual, coinciding with the validity of the licence with the calendar year and depending on the validity of the commercial fishing licence. The licence issued identify the operator, the fishing vessel to be used, insurance policy number, identification of wharfs or places of embarkation, fishing gear and groups of authorized target marine species, minimum number of seafarers and non-maritime staff required to operate the vessel, maximum capacity of persons and passengers on board, as well as the identification of the location and entity responsible for the onshore logistics structure and, if applicable, the identification of the entity contracted for complementary catering services.

(f) Boat rental with or without crew

Yachting activity is found across all coastlines of the Archipelago, and the Azorean yacht industry has developed into an economic activity of importance within the maritime tourism. In the Azores, according to the RAMTA, it is possible to rent a boat (e.g. yacht boat) with or without crew, for a few days or long periods of time (e.g. two weeks, three weeks) according to stakeholders interviewed. In 2018, on total, were attributed 113 licences for the development of this activity and 189 vessels were registered (**Figure 57**).

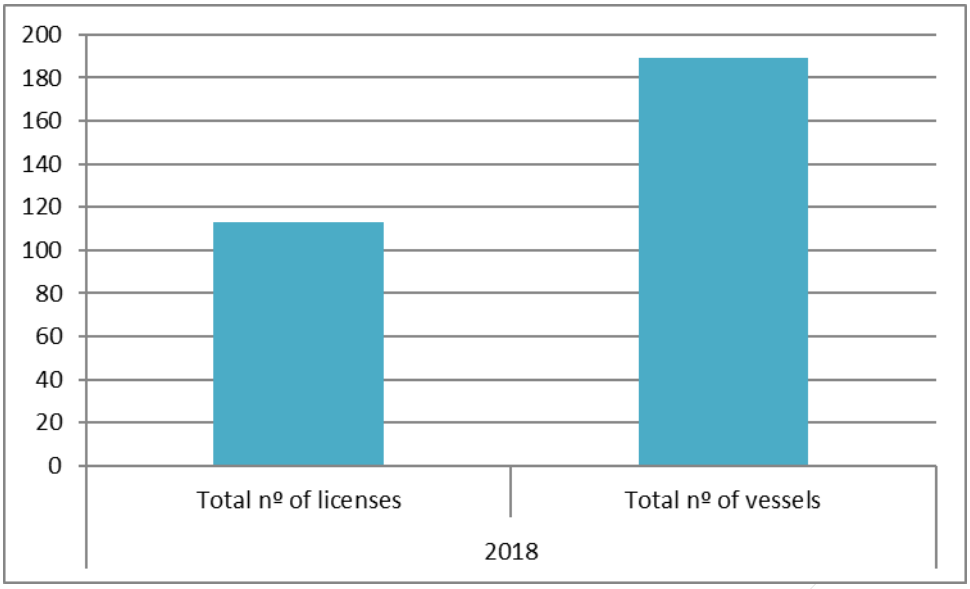


Figure 57. Number of licences attributed and vessels licenced for the activity Boat rental with or without crew in the Azores, in 2018 (Source: Azorean Government on http://www.azores.gov.pt, 2018).

Other tourist entertainment activities

The two activities presented below have some routes with exit need to be by sea, more concretely need to be performed in some areas of the Azorean coastline. According to Canyoning Guide of the Azores (Silva, Almeida, & Pacheco, 2014), on routes where the exit must necessarily be by sea, it is essential to assess whether and the state of the sea for safely of participants. Its need be attention to the orientation of the coast and its exposure to the swell at the exit point of the canyoning. While some outings can be made using swimming from small passages through the sea, others are only viable using the support of a vessel. In the latter situation, it is necessary to previously combine the service with a local maritime-tourism operator, have a mobile phone and share the contacts, although not all exits are sure to have sufficient signal. The outings by sea also differ when it occurs directly into the water or ends at a rocky pebble beach. In case the exits are directly to the sea, it is recommended to do the last abseiling only after the vessel arrives. In the second case, it is necessary to consider that the surf on the rocky beaches makes it difficult to leave, being necessary to cross that surf zone and swim to the boat, which cannot get too close to the coast.

Canyoning

The Azores are a territory of excellence for the practice of canyoning, with currently equipped routes on six of the nine islands of the archipelago. Of these, the islands of Flores, São Jorge, São Miguel and Santa Maria present good conditions for practicing the sport, while in Faial and Terceira the offer is limited. There may still be some potential for canyoning on the island of Pico, with dry routes most of the year, as they essentially have a torrential flow regime, although still to be explored. As the islands are of volcanic origin, canyoning routes have similar characteristics throughout the archipelago in terms of geological structure and geomorphology, but the different types of volcanic rocks and environments create significant diversity. In the mild generality, the open itineraries are of great beauty and present very different levels of difficulty (Silva, Almeida, & Pacheco, 2014). The levels are presented in the table below.

Table 27. Interest and difficulty of canyoning routes in the Azores (Source: (Silva, Almeida, & Pacheco, 2014)).

Island	Open paths	High interest (≥3,0)	Low difficulty (<v4)	Medium difficulty (v4)	High difficulty (>4)
Flores	42	32	20	11	11
São Jorge	25	20	6	11	8
São Miguel	18	8	14	4	0
Santa Maria	8	5	2	3	3
Faial	8	4	4	3	1
Terceira	3	1	3	0	0
Total	104	70	49	32	23

There are courses characterized by large verticals, aimed at experienced technicians and very appealing to regular practitioners of this modality. However, most itineraries have medium difficulty, quite slope, many bumps and some natural pools that make the activity more fun. There are also very accessible and beautiful routes and therefore with great interest for tourist entertainment. Due to the abundance of water and a mild climate, it is possible to practice this activity in the Azores during almost the whole year, being the best period between April and October, although always conditioned by the meteorology and flow of the streams. In 2014, the Azores had about a hundred equipped canyoning itineraries, figure below. The islands of Flores and São Jorge stand out both for the number of routes and for the offer of itineraries of great interest and beauty, presenting conditions to assert themselves as destinations of excellence at the international level for the practice of the sport (Silva, Almeida, & Pacheco, 2014).

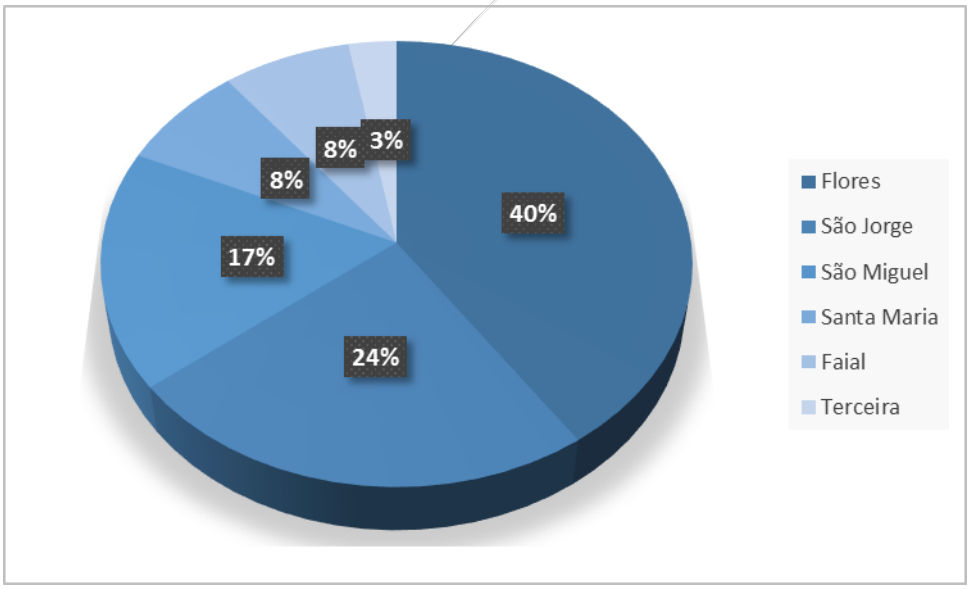


Figure 58. Cayoning open paths in 2014 by island (Source: (Silva, Almeida, & Pacheco, 2014)).

Coasteering

In the Azores, this modality is very recent. Coasteering consists of progressing along the coast through the rocks and the sea, using swimming, climbing, abseiling, slide, jumping into the water and walking. Some companies offer to the clients, also, a snorkelling experience during the coasteering activity. It is possible to perform this modality in Flores, Graciosa, São Jorge, Terceira

and São Miguel Island (in São Miguel this activity is especially developed in Caloura, Ribeirinha and Porto Formoso). A series of safety measures are necessary and the activity be accompanied by experienced professionals.

Cetacean audio-visual recording operations

In the Azores is possible to perform cetacean audio-visual recording. For the development of this activity, a licence must be requested to DRAM.
Considering that these operations mostly take place during the high season and often affect groups of sperm whales (*Physeter macrocephalus*) accompanied by their young offspring, there is a need to minimize disturbance situations. The authorization to develop this activity needs to be requested at least two months in advance, together with a detailed description of the objectives and methodology of the operation; identification of target species; duration and place of operation; type and characteristics of the vessels to be used; human means involved in the operation. In 2018, by zone (defined in Order Decree n.º 5/2004 of January 29), where on total attributed by DRAM 26 permits. The largest number of permits granted was for Zone A (14), **Figure 59**.

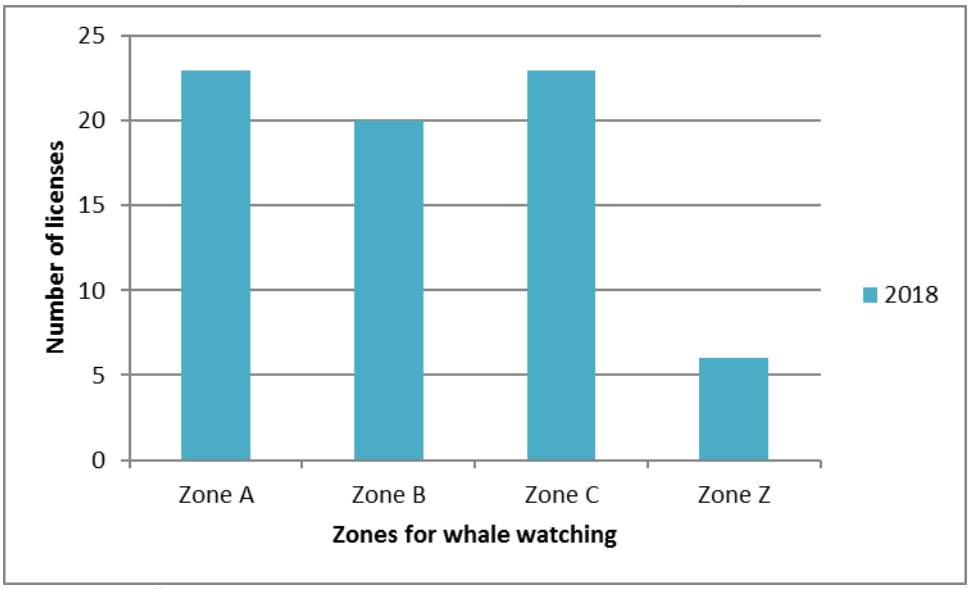


Figure 59. Number of licences attributed for the activity cetacean audio-visual recording operations in the Azores, in 2018, by zone (Source: Azorean Government on http://www.azores.gov.pt, 2018).

The legislation which regulates the cetacean audiovisual recording activity in the Azores addresses that the authorization to develop this activity needs to be requested at least two months in advance to the regional authority. Also, information like detailed description of the objectives and methodology of the operation; identification of target species; duration and place of operation; type and characteristics of the vessels to be used; human means involved in the operation; are requested by the competent entity to grant the authorization.

Cruise tourism

Cruise tourism can be economically quite valuable for a port and surrounding region and for the islands. However, the cruise market is very seasonal in the Azores. This sector generates wealth and business opportunities in the Region but also represents big challenges for the receiving ports.

The cruising high season in the Archipelago occurs during the months of March, April and May and the total number of cruise ships and passengers boarded, landed and in transit in 2018 was 272, 1388, 1378 and 324810, respectively (**Figure 60** and **Figure 61**). The islands that received the biggest number of cruise ships during the year of 2018 were São Miguel, Terceira and Faial (**Figure 62**). These three islands have the three main ports of the Azores (Class A ports). The highest number of passengers in transit occurred in 2018 on the island of São Miguel (**Figure 63**).

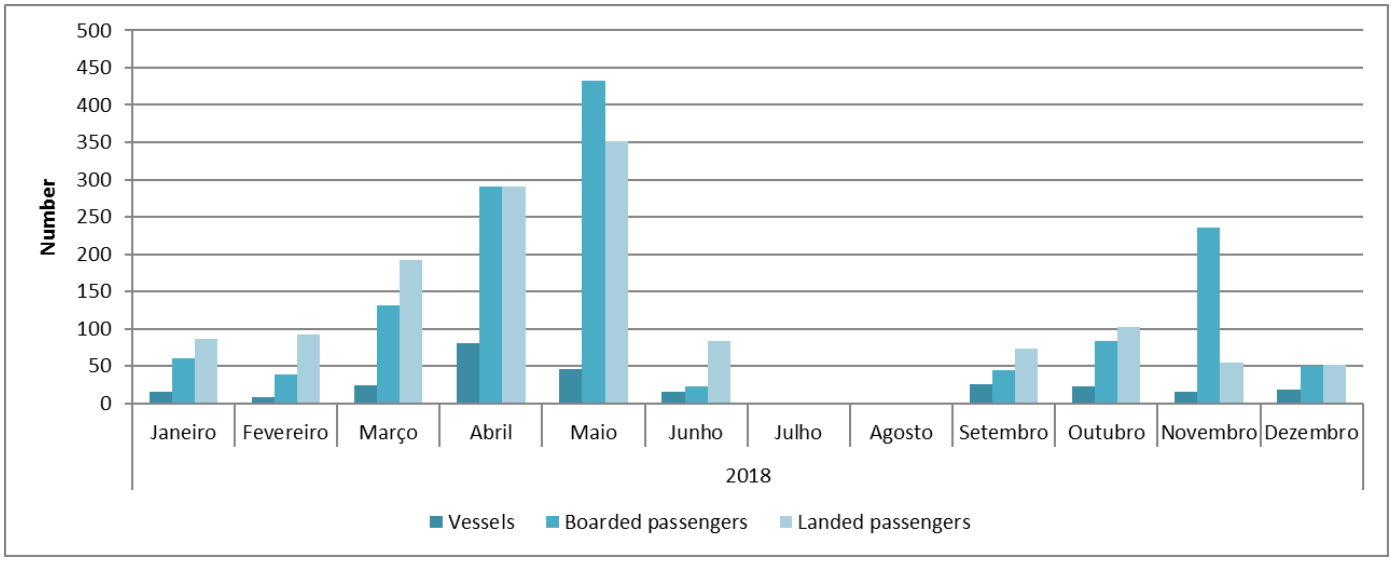


Figure 60. Number of cruise ships and passengers boarded and landed in the Azores, by month, in 2018 (Source: SREA, 2019).

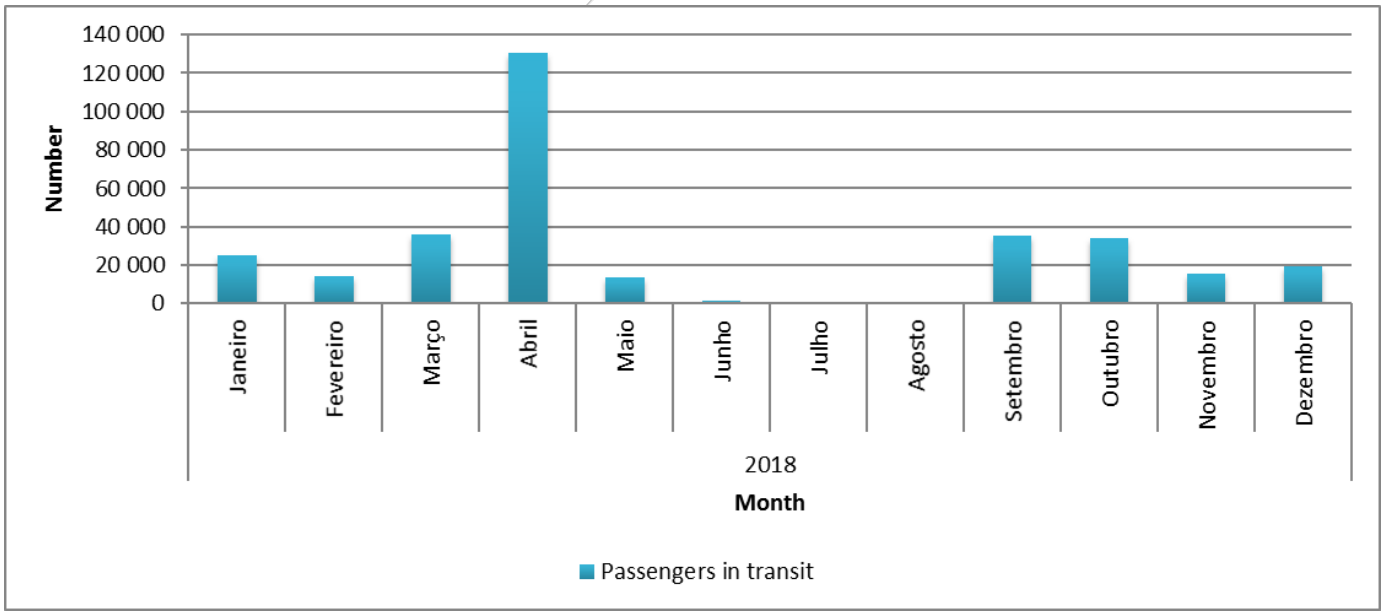
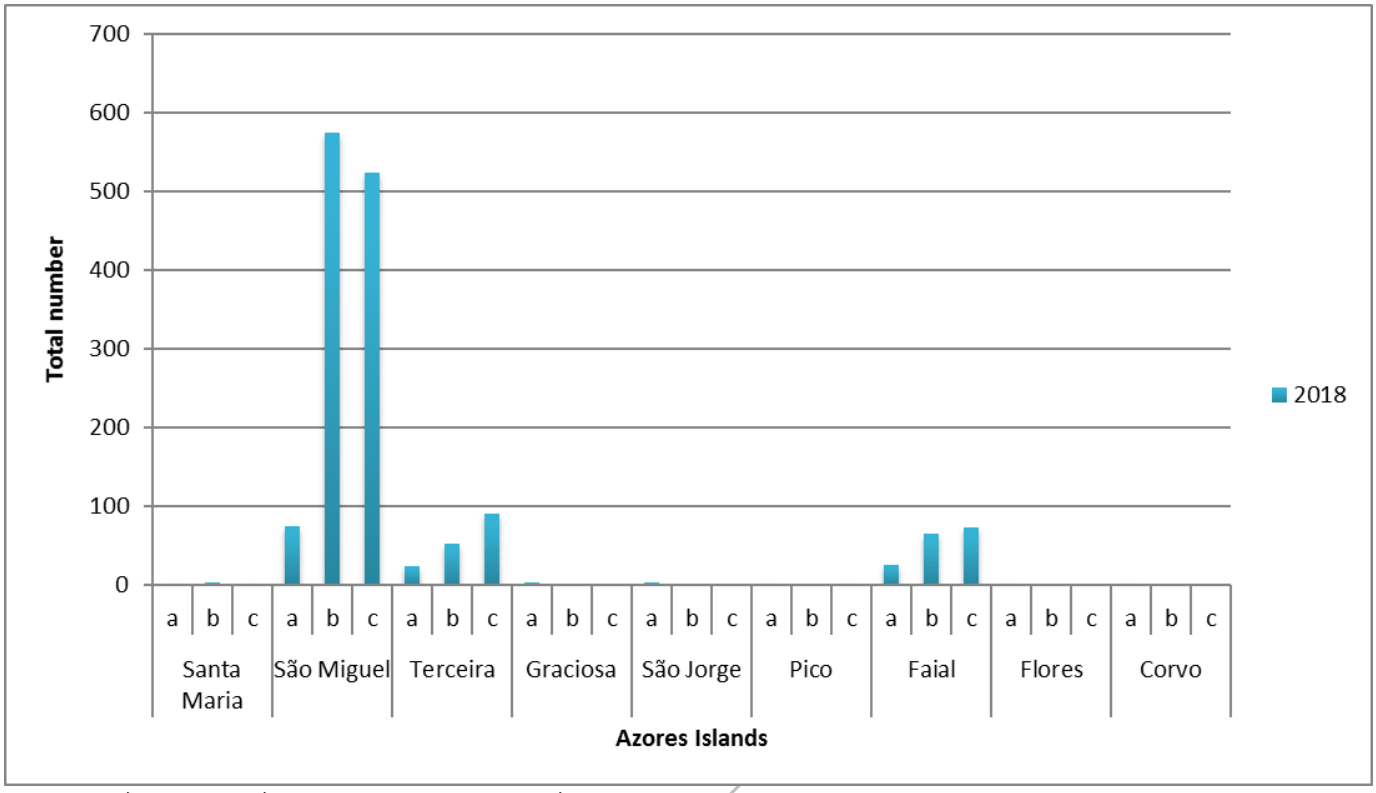


Figure 61. Number of passengers in transit in the Azores, by month, in 2018 (Source: SREA, 2019).



Legend: a) Vessels; **b)** Boarded passengers; **c)** Landed passengers.

Figure 62. Number of cruise ships and passengers boarded and landed in the Azores, by Island, in 2018 (Source: SREA, 2019).

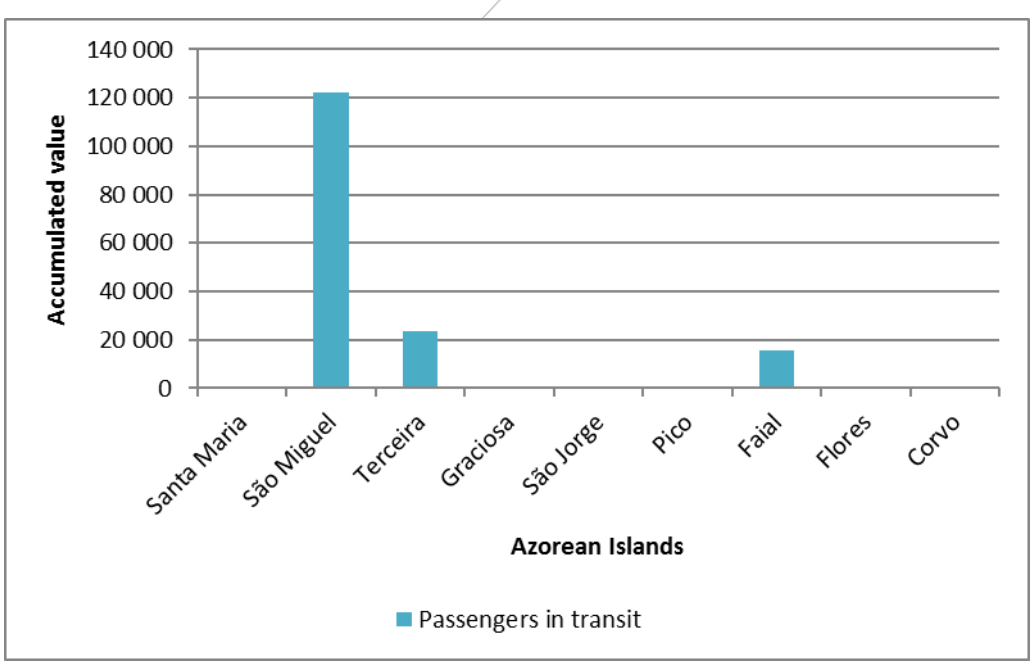


Figure 63. Number of passengers in transit in the Azores, by Island, in 2018 (Source: SREA, 2019).

The number of cruise ships has been increasing since 2012, having reached its peak in 2017, with 294 stopovers in the RAA. More information is available in the "Ports and marinas" sector briefing

(Vergílio, et al., 2019) in D.2.5 Report on current maritime uses and constraints in each region of Macaronesia, such as data (e.g. number of cruise ship) from 2012 until 2017.

In terms of ship scales, several types of operations are taking place in the Azores (Governo dos Açores, Estratégia Marinha. Relatório do 2º Ciclo. Parte C: Análise Económica e Social.): i) Scales of repositioning, transatlantic or even world cruises ("world cruises"); ii) Connections between England and the Caribbean; iii) Atlantic islands circuit; v) "Azores" circuit.

Recreational and leisure activities

Recreational boating

In Portugal, recreational boating assumes a growing economic and social importance since it is associated with the tourism industry. The Azores are no exception and have excellent conditions for the practice of nautical activities.
In the tourism industry, nautical tourism, which includes recreational boating, has the highest growth rates. The growth of recreational boating, as it implies an increasing number of vessels and nautical sportsmen, justifies the need for a permanent adjustment of the legal regime in force in order to maintain the level of security required for vessels and their users, to allow greater speed and flexibility in the vessel registration process and certification of recreational navigators. The Decree-Law 93/2018, of November 13, approves the new Recreational Boating Regulation, establishing the need for accreditation by the competent authorities of training entities in the area of Recreational Boating. This law defines the recreational craft classification and identification, and defines all the phases of the registration procedure. Recreational boats (ER) are compulsorily subject to property registration and may only be used after registration.
Furthermore, in the Azores there are several ports of refuge for recreational boating distributed across the different islands.

Table 28. List of Ports of refuge for recreational boating in the Azores (DGRM, 2019).

Port Captaincy	Ports of Refuge	Observations
Ponta Delgada	a. Portos de Ponta Delgada b. Lagoa – Porto dos Carneiros c. Agua de pau, porto da Caloura d. Vila Franca do Campo e. Ribeira Quente f. Povoação g. Nordeste h. Porto Formoso i. Rabo de Peixe j. Capelas k. Mosteiros	
Santa Maria Island	Porto de Vila do Porto	
Praia da Vitória	a. Porto da Praia da Vitória b. Porto de Pescas de Vila Nova	
Angra do Heroísmo	a. Porto das Pipas b. Porto de Pescas de S. Mateus c. Portinho dos Biscoitos d. Porto Judeu	
Angra do Heroísmo Graciosa Island	a. Porto de Vila da Praia b. Portinho de Sta. Cruz da Graciosa	

	c. Portinho da Folga	
Horta **Faial Island**	a. Horta b. Feteira[1] c. Castelo Branco d. Varadouro e. Porto do Comprido[1] f. Ribeirinha[1]	[1] Seasonal ports: considered shelter ports between May 1st and September 15th. However, these dates can be changed under a detailed order or Notice of Captain of Porto in view of the meteo-oceanographic conditions.
Horta **Pico Island**	a. Madalena b. São Roque c. Prainha[1] d. Santo Amaro e. Baixa da Ribeirinha[1] f. Calhau da Piedade[1] g. Manhenha[1] h. Calheta do Nesquim i. Santa Cruz das Ribeiras j. Lajes do Pico k. São João[1] l. São Caetano[1] m. São Mateus[1] n. Porto do Calhau[1] o. Pocinho[1] p. Areia Larga[1]	[1] Seasonal ports: considered shelter ports between May 1st and September 15th. However, these dates can be changed under a detailed order or Notice of Captain of Porto in view of the meteo-oceanographic conditions.
Horta **São Jorge Island**	a. Velas b. Fajã do Ouvidor[1] c. Topo[1] d. Calheta e. Fajã das Almas[1] f. Urzelina[1]	[1] Seasonal ports: considered shelter ports between May 1st and September 15th. However, these dates can be changed under a detailed order or Notice of Captain of Porto in view of the meteo-oceanographic conditions.
Flores **Flores Island**	a. Porto de Ponta Delgada[1] b. Lajes das Flores c. Porto das Poças d. Porto Velho da Fajã Grande[1] e. Porto Novo da Fajã Grande[1]	[1] Seasonal ports: considered shelter ports between May 1st and September 15th. However, these dates can be changed under a detailed order or Notice of Captain of Porto in view of the meteo-oceanographic conditions.
Flores **Corvo Island**	Porto da Casa	

Recreational fishing

Recreational fishing is defined as the capture of marine, animal or plant species for non-commercial purposes and is referred to as recreational harvesting when manual collection. Recreational fishing may take the following forms according to Regional Legislative Decree n.º 9/2007/A, of April 19:

- Leisure fishing – this modality of fishing is mere recreation;
- Sport fishing – this modality of fishing is aimed at organized competition and the attainment of sports brands;

- Tourist fishing – this modality of fishing is that which is practiced in a boat within the scope and under the terms of the RAMTA;
- Spearfishing – this modality of fishing can only be conducted by an apnea practitioner, without the use of any artificial or auxiliary breathing apparatus, except for a snorkel (not due to any detonating power resulting from an artificially compressed chemical or gas).

Recreational fishing may be carried out:

- From land – conducted from firm ground or of boat or floating platform, when moored;
- By boat - carried on board a boat when sailing, hovering or at anchor;
- Underwater - conducted when floating or in apnoea submersion.

This activity in the Azores has been poorly studied and most of the information on this topic comes from the research of Diogo & Pereira (Nuñez, 2019). Furthermore, according to Nuñez (Nuñez, 2019), recreational fishing extends over 5.476 Km^2 in São Miguel Island. Boat fishing extends over 5.304 Km^2 and is practised both inshore (close to the coast) and offshore. Spearfishing extends over 256 Km^2 and it happens exclusively close to the coast. The overlap between modalities is 84 Km^2, what is less than 2% of boat fishing area and 33% of spearfishing area.

Licenses for recreational fishing in the waters of the sub-area of the Azores of the Portuguese Exclusive Economic Zone (EEZ) shall be issued by electronic means in accordance with the model set out in Normative Order n.º 62/2007, of December 21. With a view to the conservation and rational management of living marine resources or compliance with the rules of the European Union Common Fisheries Policy, the Member of the Regional Government responsible for fisheries (DRP) may, without prejudice to the provisions of the Regional Legislative Decree n.º 9/2007/A, of April 19, lay down by rules additional rules to the legal regime governing the exercise of recreational fishing, defining the conditions to which it is subject, in particular as regards: a) Characteristics of the gear, utensils, equipment and licensed vessels, as well as conditions of their use; b) delimitation of areas and specific conditions for the exercise of recreational fishing; c) prohibition or restriction of recreational fishing directed at certain species in certain areas or for certain periods; d) recreational fishing in classified areas, without prejudice to their respective regimes; e) setting the minimum size or weight of the species likely to be caught, without prejudice to the rules laid down under the technical measures for the conservation and management of marine resources; f) catch limitation by species or groups of species, by seafarer or operator or by boat; g) licensing process; h) limitation of the maximum number of licenses to be granted, by fishing area and by species; i) subject to the exercise of recreational fishing to formalization of activity records for information and control purposes.

Bathing uses

The Azores also has a diverse range of bathing zones, from beaches with different shades of sand (golden to black), puddles and pools in the middle of lava flows, sheltered bays, open sea areas and even craters of ancient volcanoes. The identification of coastal bathing zones and the length of the bathing season of the respective bathing area is published annually by DRAM. Each year DRAM monitors the quality of the water of the identified coastal bathing zones and also from those zones that are classified as unidentified. For this purpose, it is defined a monitoring program and a sampling calendar. In the first semester of 2019, were identified 70 bathing zones in the Azores (**Figure 64**). However, besides from the 70 bathing zones identified, there are more 52 zones categorized by the Azorean Government as unidentified (**Figure 64**). In 2017 and 2018, in the Azores, were identified also 70 bathing zones.

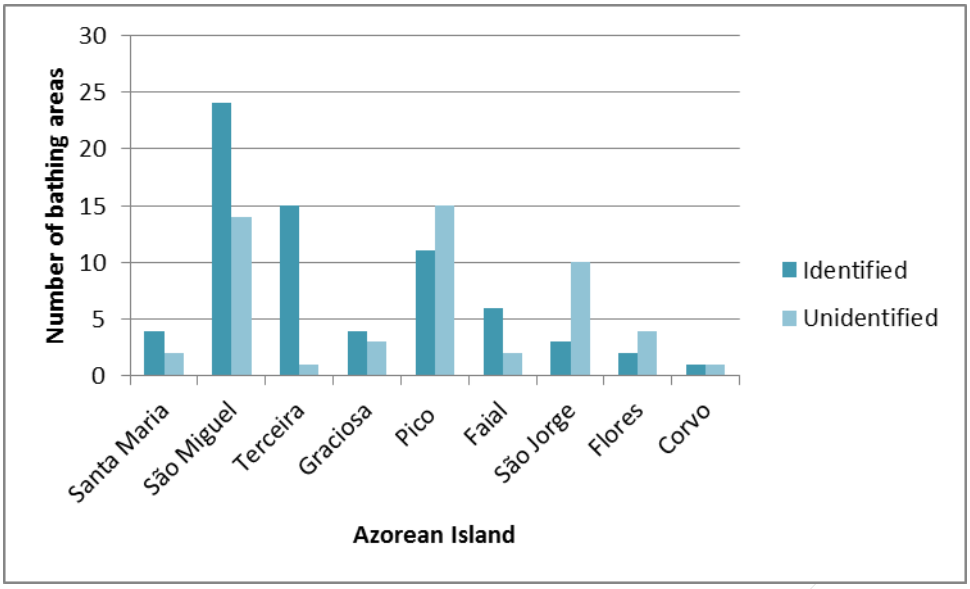


Figure 64. Number of bathing zones categorized as identified and unidentified in the Azores, in 2019, by island (source: Azorean Government, 2019).

Almost all bathing waters in the Region had a classification of "Good" or "Excellent" quality, according to the classification criteria stipulated by the legislation in force (Governo dos Açores, Estratégia Marinha. Relatório do 2º Ciclo. Parte C: Análise Económica e Social.). Only the bathing waters of Ponta da Ferraria in Ponta Delgada and the waters of the islet of Vila Franca do Campo in São Miguel had an "Acceptable" quality. Over the last few years, there has been a positive evolution in the status of bathing waters in the Azores. Then, there is no prospect of a change in the quality of bathing water in the Azores, considering that it will remain essentially in excellent and good states (Governo dos Açores, Estratégia Marinha. Relatório do 2º Ciclo. Parte C: Análise Económica e Social.).

Below is presented the list of coastal bathing water established in 2019 for the RAA (Order Decree n.º 141/2019, of May 14).

Table 29. Coastal bathing waters identified, by municipality, in the RAA, in 2019.

Island	Municipality	Coastal bathing water
Corvo	Corvo	Corvo/Areia
Faial	Horta	Almoxarife
		Castelo Branco
		Conceição
		Fajã
		Porto Pim
		Varadouro
Flores	Lajes das Flores	Fajã Grande
	Santa Cruz das Flores	Santa Cruz Flores
Graciosa		Barro Vermelho

Island	Municipality	Coastal bathing water
	Santa Cruz da Graciosa	Piscina do Carapacho
		Praia
		Zona Balnear Santa Cruz (Calheta)
Pico	Lajes do Pico	Zona Balnear das Lajes do Pico
	Madalena	Zona Balnear das Baixas
		Zona Balnear da Barca
		Criação Velha
		Cais do Mourato
		Zona Balnear da Madalena
		Zona Balnear do Pocinho
		Zona Balnear de São Mateus
	São Roque do Pico	Furna de Santo António
		Piscina do Cais
		Poças de São Roque
Santa Maria	Vila do Porto	Anjos
		Formosa
		Maia
		São Lourenço
São Jorge	Calheta	Portinhos - Fajã Grande
	Velas	Poça dos Frades
		Preguiça – Velas
São Miguel	Lagoa	Piscinas Naturais Lagoa
		Caloura
		Baixa da Areia
	Ponta Delgada	Milícias
		Praia dos Mosteiros
		Pópulo
		Poças Sul dos Mosteiros
		Portas do Mar
		Forno da Cal
		Poços de S. Vicente Ferreira
		Ponta da Ferraria
	Povoação	Portinho Faial da Terra
		Praia do Fogo (Ribeira Quente)
		Praia do Morro
		Ribeira dos Pelames
	Ribeira Grande	Areal de Santa Bárbara
		Calhetas
		Praia dos Moinhos
		Poças da Ribeira Grande
	Vila Franca do Campo	Água d'Alto
		Corpo Santo

Island	Municipality	Coastal bathing water
		Ilhéu de Vila Franca do Campo
		Prainha de Água d'Alto
		Vinha da Areia
Terceira	Angra do Heroísmo	Baía do Refugo
		Cinco Ribeiras
		Negrito
		Prainha (Angra do Heroísmo)
		Salga
		Salgueiros
		Silveira
	Praia da Vitória	Biscoitos
		Escaleiras
		Praia Grande
		Porto Martins
		Praia da Riviera
		Prainha (Praia da Vitória)
		Quatro Ribeiras
		Sargentos

Sport

Nautical and Aquatic sports

Nautical and aquatic sports include all the activities which core is the component of competition and leisure, regardless of whether they are being practiced at an amateur or professional level (PSOEM, 2018). In the Azores, there are particular popular spots for the practice of nautical and aquatic sports based on local conditions (e.g. wind, wave height for surfing; water clarity & sea life for diving). Follows a list of the main nautical and aquatic sports practices in the Azores:

- Bodyboarding;
- Canoeing;
- Recreational dive;
- Kayaking;
- Kitesurf;
- Longboarding;
- Motorized water sports (e.g. jet ski);
- Open water swimming;
- Paddle surfing (sup);
- Rowing;
- Sail;
- Skimboarding;
- Surfing;
- Water-ski;
- Windsurfing.

In 2017 and 2018 the federated modalities practices in the Azores according to the Regional Directorate of Sport (DRD), by Azorean island, are presented in the table below. In São Miguel Island occurs the biggest number of federated modalities (7).

Table 30. List of federated modalities practices in the Azores, by island (DRD, 2019).

Modalities	STA MARIA	S. MIGUEL	TERCEIRA	GRACIOSA	FAIAL	PICO	S. JORGE	FLORES	CORVO
Subaquatic modalities	x	x		x	x	x			
Canoeing		x	x		x				
Jet ski		x	x		x		x		
Swimming	x	x	x		x				
Deep sea sport fishing	x	x		x	x				
Sport fishing	x				x	x			
Surf and Bodyboard		x	x						
Sail	x	x	x	x	x	x		x	
Total number of modalities by island	5	7	5	3	7	3	1	1	0

All these uses and activities take place predominantly in a strip adjacent to the coastline that can extend between 0 and several km from land, and in a context of common use and enjoyment of maritime space. The individual and/or collective practice of water sports, as well as training activities should not interfere with commercial navigation, according to Decree-Law n.º 93/2018, of November 13.

Marinas of Horta (Faial Island), Angra do Heroísmo (Terceira Island), Ponta Delgada (São Miguel Island) and Vila do Porto (Santa Maria Island), together with the Nautical Recreation Centres of Velas (São Jorge Island), Lajes das Flores (Flores island) and Lajes do Pico (Pico islands), are managed by Portos dos Açores, S.A.. Marina of Vila Franca do Campo (São Miguel Island) is managed by the Nautical Club of Vila Franca, marina of Praia da Vitória is managed by the municipality of Praia da Vitória and marina of Povoação is managed by the municipality of Povoação.

Relatively to sailing activity, in the Azores, there are a number of naval and nautical clubs distributed throughout the islands that provide sailing classes to the population, more often to the youngest generations:

- Naval Club of Lajes (Flores Island);
- Naval Club of Horta (Faial Island);
- Naval Club of Lajes (Pico Island);

- Naval Club of São Roque (Pico Island);
- Naval Club of Madalena (Pico Island);
- Naval Club of Graciosa (Graciosa Island)
- Naval Club of Praia da Vitória (Terceira Island);
- Angra Iate Club (Terceira Island);
- Naval Club of Rabo de Peixe (São Miguel Island);
- Naval Club of Vila Franca do Campo (São Miguel Island);
- Naval Club of Ponta Delgada (São Miguel Island);
- Naval Club of Santa Maria (Santa Maria Island);
- Nautical Club of Lagoa (São Miguel Island).

Most clubs are provided with sailing instructors and the equipment necessary to sailing practices (e.g. Optimist vessels; 420 vessels), as well as support vessels to accompany athletes during the training classes and competition events (e.g. rigid inflatable boat). The stakeholders interviewed within the MarSP Project reported that sailing classes occur throughout the year but most frequently in spring and summer. They also indicated several regatta and training areas which are used depending on the wind and weather conditions.

The Azores archipelago, given its geographical location, is a region of excellence for the practice of wave sports. The morphology of the different islands makes it possible to practice surf, bodyboard, sup, windsurf in various contexts, beach breaks, reef breaks and point breaks. It is possible to consult the main spots for each modality at the Official Tourism Website of the Azores (http://surf.visitazores.com/en), **Figure 65**. It is also available in the website a webcam service to check the conditions of the sea and weather in the different spots. Moreover, it is available a list of Surfing Operators and Schools to those who want to learn the sports or rent material.

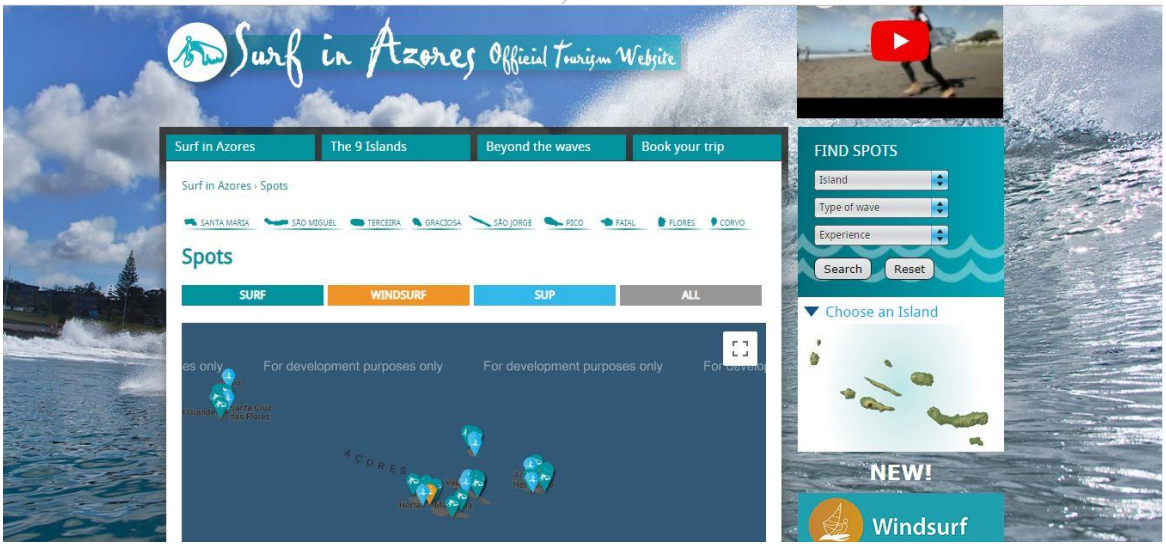


Figure 65. Surf page at the Official Tourism Website of the Azores (http://surf.visitazores.com/en/spots), consulted in 2019.

In the Archipelago, canoeing, rowing and kayaking are developed as tourism activities (some maritime tourism operators provide this experience to their customers) or sports. In the Azores, the naval and nautical clubs are the entities that provide the classes for the youngest generations and the necessary equipment. In the case of canoeing activity, in the winter it is often occurring indoor training (in general the athletes practice 2 times a week indoor). The clubs also have support vessels to accompany athletes during the training classes and in competitions events (e.g. rigid

inflatable boat). Like sailing classes, the classes of canoeing, rowing and kayaking given by nautical clubs occur throughout all the year but most frequently in spring and summer. Canoe or kayak vessels that meet the requirements to be registered as recreational craft are only allowed to operate up to half a mile from the shoreline during the daytime, with good visibility and good weather and sea conditions.

Recreational diving (e.g. scuba dive) and snorkelling are other activities frequently practiced in the Azorean islands, that offer a panoply of different natural scenarios for their development. According to Nuñez (Nuñez, 2019), the spatial extent of recreational scuba diving in São Miguel Island is 771 Km^2 and the activity is developed mainly in the coastal area, with the exception of Formigas Islets, which is a seamount with small emerged islets and shallow reefs (< 50 meters), located 40 NM SE of São Miguel and 20 NM NE of Santa Maria.

Legal framework and constraints

This section had the collaboration of the MarSP Deliverable D.6.5. (MSP Governance Analysis of the Macaronesia) (Pallero, Cordero, García-Onetti, García-Sanabria, & Andrés, 2019).

Normative basis

In the Azores, the different activities of coastal and maritime tourism are ruled by specific legislation helping coordinating the sector. The following documents have a regional scope[7].

Table 31. Main legal documents ruling the coastal and maritime tourism sectors in the Azores.

Law	Observations
Plano de Ordenamento Turístico da Região Autónoma dos Açores (POTRAA)	
Regional Legislative Decree n.º 38/2008/A, of August 11	approves the Tourism Planning Plan of the Autonomous Region of the Azores (POTRAA). Altered by the Regional Legislative Decree n.º 13/2010/A, of April 7, which determines the partial suspension of POTRAA.
Order Decree n.º 102/2010, of October 28	defines what are projects, equipment and activities with a strong touristic component, referred to in paragraph c) of paragraph 3 of article 5, of the Regional Legislative Decree n.º 13/2010/A, of April 7.
Governing Council Resolution n.º 101/2015, of July 15	determines the revision Plan of Tourist Planning of the Autonomous Region of the Azores (POTRAA)
Government Council Resolution n.º 74/2017, of 7 August	amends and republishes Governing Council Resolution n.º 101/2015, of July 15.
Maritime-Tourism Activity	
Regional Legislative Decree n.º 13/2004/A, of March 23	amends the Regional Legislative Decree n.º 10/2003/A of March 22, which republishes the Regional Legislative Decree n.º 9/99/A of 22 March, establishing the legal regime for whale watching
Order Decree n.º 5/2004, of January 29	regulates the legal regime for whale watching, as amended by Order Decree n.º 49/2004, dated June 24, by Order Decree n.º 70/2005, of September 8, by Order Decree n.º 17/2007, of March 29, by Order Decree n.º 47/2011, of June 24 and by Order Decree n.º 64/2012, of June 19.

[7] Additional related legislation might be found at the Azores Government Portal: https://www.azores.gov.pt/Portal/pt/entidades/srtop-drt/textoImagem/Legislacao_Mar%C3%ADtimo-Tur%C3%ADstica.htm

Decree-Law n.º 16/2007, of January 22	define the new framework for amateur diving according to the current characteristics, based on the three fundamental areas of this activity: conditions for practice, training process and diving service providers.
Order Decree n.º 1340/2007, of October 11	regulates compulsory personal accident insurance for divers.
Regional Legislative Decree n.º 23/2007/A, of October 23	establishes the Azores Maritime-Tourism Activity Regulation (RAMTA), which defines the rules applicable to the maritime-tourism activity of maritime operators and the vessels used by them in the exercise of this activity. Altered by the Regional Legislative Decree n.º 3/2017/A, of April 13
Decree-Law n.º 149/2014, of October 10	which approves the regulation of vessels used in maritime-tourist activity.
Order Decree n.º 14/2011, of March 14	certificates of safety of recreational craft, as well as of auxiliary vessels in maritime-tourism activity.
Order Decree n.º 651/2009, of June 12	code of conduct of tourism companies and maritime-tourism activities and logotype that identifies them.
Decree-Law n.º 108/2009, of May 15	establishes the conditions for access and exercise of the activity of tourism companies and maritime-tourism operators. Amended by Decree-Law n.º 95/2013, of July 19, and Decree-Law n.º 186/2015, of May 15
Resolution of the Council of Government nº 39/2017, of May 9	approves the fees to be charged for the issuance of the tourist-operator operator licences and the endorsements, exempting pesca-tourism.
Order Decree n.º 45/2009, of June 4	approves the licensing process and the logbooks of the customers shipped and of the unloadings made by clients concerning pesca-tourism activity.
Regional Legislative Decree n.º 36/2008/A, of July 30	defines the legal framework for pesca-tourism in the waters of the Azores subarea of the Portuguese EEZ.
Regional Legislative Decree n.º 23/2007/A, of October 23	approves the Azores Maritime-Tourism Activity Regulation. Amended by Regional Legislative Decree n.º 3/2017/A, of April 13.
Law n.º 24/2013, of March 20	approves the legal regime applicable to recreational diving in the entire national territory.
Recreational and leisure activities, and sport	
Decree-Law n.º 93/2018, of November 13	new legal regime applicable to recreational boating.
Decree-Law n.º 478/99, of November 9	approves the process of training and assessment of recreational navigators, the issuance of the respective letters and the accreditation and supervision of the training entities. Amended by Decree-Law n.º 181/2014, of December 24
Regional Legislative Decree n.º 35/2004/A, of August 27	establishes the boundaries of recreational navigation areas in the Autonomous Region of the Azores.
Order Decree n.º 1464/2002, of November 14	approves recreational craft equipment for rescue and safety equipment, radio communication apparatus and equipment, nautical instruments, navigational equipment, nautical publications and first aid.
Order Decree n.º 1491/2002, of December 5	Establishes security requirements for the construction, modification and classification of recreational boating vessels. Rectified by the Statement of Rectification n.º 31-J/2002, of December 31
Edict 340/2018, of March 26	Edict of the Captaincy of Porto da Horta
Maritime Rescue Plan for Horta Port Captaincy	Available at https://portosdosacores.pt/wp-content/uploads/2019/08/HOR-Plano_de_salvamento.pdf
Edict 554/2018, of June 4	Edict of the Captaincy of the Port of Santa Cruz das Flores
Edict 030/2019, of 3 December	Notice to Navigation (Conditions of Practice of Lajes das Flores Port) and cancels the Edict 22/2019

Maritime Rescue Plan for Santa Cruz das Flores Port Captaincy	Available at https://portosdosacores.pt/wp-content/uploads/2019/08/FLO-Plano_de_salvamento.pdf
Edict 419/2018, of April 24	Edict of the Captaincy of the Port of Angra do Heroísmo
Edict 327/2018, of March 23	Edict of the Captaincy of the Port of Praia da Vitória
Edict 813/2017, of October 17	Edict of the Captaincy of the Port of Ponta Delgada
Edict 420/2018, of April 26	Edict of the Captaincy of the Port of Vila do Porto
Maritime Rescue Plan for Vila do Porto Port Captaincy	Available at https://portosdosacores.pt/wp-content/uploads/2019/08/VDP-Plano_de_salvamento.pdf
Regional Legislative Decree n.º 9/2007/A, of April 19	defines the legal framework for directed fishing for marine, animal or plant species for recreational purposes in the waters of the Azores subarea of the Portuguese Exclusive Economic Zone (EEZ).
Normative Order n.º 62/2007, of December 21	defines activity licensing.
Normative Order n.º 19/2015, of May 8	amends the Normative Order n.º 62/2007, of December 21 that regulates the licensing of recreational fishing in the RAA.
Regional Legislative Decree n.º 9/2007/A, of April 19	approves the legal regime for recreational fishing in Azorean waters.
Bathing uses	
Regional Legislative Decree nº 16/2011/A, of May 30	Legal regime for the management of bathing areas.
Decree-law n.º 135/2009, of June 3	Bathing Water identification, management, monitoring and quality regime.
Order Decree n.º 33/2017, of March 22	coastal bathing water identification.
Order Decree n.º 30/2018, of March 28	coastal bathing water identification.
Order Decree n.º 141/2019, of May 14	proceeds, for the year 2019, with the identification of coastal and transitional bathing waters and inland bathing waters, establishing the respective bathing seasons, under the terms of paragraph 6 of article 4 of Decree-Law 135/2009, of June 3, amended by Decree-Law n.º 113/2012, of May 23.
Order Decree n.º 66/2018, of June 20	regulation of access to the protected area for the management of habitats or species of the islet of Vila Franca do Campo, integrated in the Natural Park of the Island of São Miguel.
Regional Regulatory Decree n.º 15/2008/A, of June 25	Santa Maria Island Coastal Planning Plan (POOC).
Regional Regulatory Decree n.º 6/2005/A, of February 17	POOC North coast of São Miguel Island.
Regional Regulatory Decree n.º 29/2007/A, of December 5	POOC South coast of São Miguel Island.
Regional Regulatory Decree n.º 1/2005/A, of February 15	POOC of Terceira Island.
Regional Regulatory Decree n.º 13/2008 / A, of 25 June	POOC of Graciosa Island.
Regional Regulatory Decree n.º 24/2005/A, of 26 October; Regional Regulatory Decree n.º 14/2015/A, of 12 August	POOC of São Jorge Island.
Regional Regulatory Decree n.º 24/2011/A, of 23 November	POOC of Pico island.
Regional Regulatory Decree n.º 19/2012/A, of 3 September	POOC of Faial Island.
Regional Regulatory Decree n.º 24/2008/A, of 26 November	POOC of Flores Island.

Regional Regulatory Decree n.º 14/2008/A, of 25 June	POOC of Corvo Island.

Following the provisions of Law no. 17/2014 of 10 April and Decree-law no. 38/2015, of 12 March, tourism, leisure, recreation and sports activities are typically considered common uses, which do not require the allocation of an area or volume of the maritime space. However, there may be cases where there is a need for space allocation for a certain period of time, prolonged or temporary, intermittent or seasonal, which fall under what is considered a private use of the maritime space, thus subject to the prior issuance of a TUPEM, usually a license (except if they occur inside areas under port jurisdiction). Examples of such situations are the installation of support infrastructures such as mooring; underwater itineraries/museums; fluctuating structures for tourism and leisure purposes; sports competitions (e.g. regattas, surf championships) that temporarily restrict the access of that area for other uses/activities; any other uses/activities that require the installation of fixed infrastructures in the maritime space. The respective TUPEM request must be accompanied by a description of the area, zone or itinerary subject to space allocation; the duration of the activity; the type of service provision associated; the vessels used, if applicable; the infrastructures on land that are necessary to support the activity (access areas and parking spaces, if applicable); signalling methods and security measures to be adopted, if applicable; emergency/contingency plan; and, in case of sports activities, it should also be referred the date, time and characteristics of the competition.

Instruments

The Azorean Government developed and approved, in 2008, the Tourism Planning Plan of the Autonomous Region of the Azores (POTRAA). The objectives of POTRAA, in accordance with the Resolution of Governing Council n.º 101/2015, of July 15 are:

- Redefining the organization of the Azores tourism destination in accordance with a sustainable and integrated development of tourism;
- Improve the quality of the regional tourist offer;
- Contribute to the increase in tourism demand in the Region, the average stays and revenues from tourism;
- Distributing tourism flows more equitably throughout the nine islands and throughout the year, in order to soften the negative effects of the seasonality of tourism;
- Preserve natural and cultural heritage;
- Identify, on each island, the areas assigned to the different activities and the location of new tourist enterprises, indicating the respective typology and the carrying capacity of each zone;
- Prevent the degradation of destiny, through a sustainable tourism policy.

This Program, according to Regional Legislative Decree n.º 35/2012/A, of August 16, which establishes the Legal Regime of the Territorial Management Instruments of the Azores (RJIGT Azores), constitutes a Sector Program.

The Government of the Azores developed and approved, in 2015, the Strategic and Marketing Plan for Tourism in the Azores (PEMTA), approved by Government Council Resolution n.º 39/2016, of 30 March, which main objective is the definition of a set of strategies, in a dichotomous approach between markets and products that, based on the needs of the territory and the various stakeholders of the destination, allows to achieve the following results:

- Qualification and sustainable development of the tourism sector;
- Preservation of the environment;
- Development of tourism as a tool to boost the regional economy in all islands.

Administrative constraints and restrictions

In **Order n.° 5/2004**, of January 29, with purposes of licensing the touristic exploration of whale watching activity, are define specific zones. The zones and their limits are:

a) Zone A: those within the jurisdiction of the Captaincy of Porto da Horta, except for the outer maritime limit, which is reduced to the outer limit of the territorial sea, without prejudice to the jurisdiction of the Captaincy of the Port of Angra do Heroísmo;
b) Zone B: those from the territorial sea, around São Miguel Island;
c) Zone C: those of the Azores territorial sea, except Zones A and B;
d) Zone Z: those of the Exclusive Economic Zone of the Azores, excluding the areas referred in the previous paragraphs.

The Azorean OMTs can only operate in the zone indicated in the licence granted for the development of the whale watching activity.

According to **Decree-Law n.° 93/2018**, of November 13, the navigation zone is limited by the type of vessel. Recreational vessels (ER) are classified according to the navigation area as:

a) ER type 1 - vessels for oceanic navigation with design category A. ER designed and suitable to sail without limit of area;
b) ER type 2 - vessels for offshore navigation, with design category A or B. ER designed and suitable for sailing up to 200 miles from the coast;
c) ER type 3 - vessels for coastal navigation, with design category A, B or C. ER designed and suitable for sailing up to a distance not exceeding 40 miles from the coast;
d) ER type 4 - vessels for restricted coastal navigation, with design category A, B or C. ER designed and suitable for sailing up to 25 miles from any port of refuge and up to 6 miles from the coast;
e) ER type 5 - vessels for navigation in sheltered waters, with design category A, B, C and D. ER designed and suitable for sailing in sheltered waters or inland waters within a radius of 3 miles from any port of refuge. ER type 5 if powered solely by oars, cannot sail beyond a mile from the coast.

In the RAA, windsurfer and kitesurfer located at more than 1 mile from the coastline must do so in accordance with the advisable safety conditions, namely being in a group, wearing thermal protection suits with flotation capacity and being equipped with a communication system. During the bathing season, windsurfing and kitesurfing are not allowed in the bathing areas less than 100 meters from the beach. During the bathing season, in the bathing areas, windsurfers and kitesurfers must use, when available, the marked corridors for recreational boats and always outside the bathing areas.

Additionally, the practice of nautical sports and recreational navigation, 'varar' and anchored are not allowed in the following areas:

i) In bathing areas, up to 300 meters from the water's edge line, in the period between June 1st and September 30th;
ii) Bathing waters are identified annually by Ordinance that establishes the period of the bathing season, being able to define for a given zone a period that does not fall within the scope of the previous paragraph, beginning earlier or ending later. In such cases, the prohibition referred to in the preceding paragraph extends in time so as to also cover the entire bathing season defined in the Ordinance;

iii) Although outside the periods referred to in the previous paragraphs, whenever, when approaching land, there is a bathing practice, the nautical sportsman or recreational navigator must maintain a distance of 300 meters;
iv) Less than 30 meters from the ships at anchor or moored, except if in direct outbound or inbound ports;
v) Less than 100 meters from the ships in mooring or starting manoeuvre;
vi) In classified areas or protected areas under the applicable legislation, it is governed in accordance with the legal regime related to sports and recreational practice in those places (e.g. natural Reserve of Caldeirinhas) (**Edict n.º 340/2018**, of March 26).

For example, according to **Edict n.º 813/2017**, of October 17, the practice of Wind-Surfing in the jurisdiction area of Ponta Delgada Port Captaincy is subject to compliance with the following provisions:

i) It is only allowed during the daytime, with good visibility, good weather and small waves;
ii) All Wind-Surf boards must have a sail with a transparent screen that allows visibility to the leeward;
iii) It is only allowed to leave the coast up to 1 nautical mile from the low tide line. Practitioners must wear a belt with a cable and a cat fixed to the board;
iv) Wind surfers must carry a small orange flag, made of quick drying material to use as a means of calling for help;
v) During the bathing season, windsurfing is not allowed in the bathing areas less than 300 meters from the beach;
vi) During the bathing season, in the bathing areas, windsurfers, in order to leave or take to the beach, must use, when they exist, the marked corridors intended for recreational vessels; in case there are no such corridors, the practitioners, to leave or take to the bathing areas, will have to swim away or approach the beach, respectively, in a path perpendicular to it and not less than 100 meters.

Another example are the rules applied to the use of jet skis and motorized boards (**Edict n.º 813/2017**, of October 17):

i) Are only allowed during the daytime, up to an hour before sunset and with good visibility;
ii) During the bathing season, are not allowed in the bathing zones less than 300 meters from the beach;
iii) During the bathing season, near the bathing zones, its users must use the marked corridors intended for recreational vessels, and, if they do not exist, they should always do so outside the demarcated bathing area;
iv) As long as the weather and sea conditions allow and do not appear in isolation, they can sail across the island's coastline up to a distance of no more than 3 nautical miles from the coast;
v) When sailing in isolation, they can only go up to 1 nautical mile from the coast.

In accordance with **Edict n.º 813/2017**, of October 17, is prohibited swimming in the entire wet area of the port of Ponta Delgada and marina, with the exception of the area defined, for this purpose, in the "Pesqueiro" pool. Also, is forbidden amateur diving, spearfishing and fishing in the port area. The practice of windsurf, sailing, jet ski, water-ski, kitesurfing, rowing and motorized water sports and even users of seagulls, is prohibited inside the port. When in transit through the port area, the practitioners of these modalities must always give the right to the ships or vessels in the port area, keeping the entrance and exit permanently unimpeded.

Edict n.º 327/2018, of March 23, indicate that the practice of recreational fishing on board is prohibited, inside all ports and 'portinhos' under the jurisdiction of the Captaincy of Porto da Praia da Vitória. Also, the use of a kayak or canoe type vessel, registered in the recreational boating activity, for the exercise of recreational fishing, is only allowed during the daytime, up to one hour before sunset, and the vessel cannot move away to a half nautical mile from the coastline, with good visibility and good weather. Additionally, this Edict indicate that spearfishing cannot be carried out within 300 m inside commercial, passenger and fishery ports (classified in classes A, B and C of the Region's port network) or less than 100 m, and inside ports classified with class D, and in 'portinhos' and marinas. Also, spearfishing cannot be carried out less than 100 m from bathing zones or areas frequently used as bathing areas during the bathing season. In ocean waters and inland maritime waters under the jurisdiction of the Captaincy of Porto da Praia da Vitória, spearfishing is prohibited in the period between sunset and sunrise. Under the legislation that regulates the practice of recreational diving, Law n.º 24/2013, of March 20, combined with other restrictions provided in specific legislation, under the jurisdiction of the Captaincy of Porto da Praia da Vitória, for reasons of safety and navigation safety, recreational diving is prohibited: i) in the channels/areas of approach to the ports of Angra do Heroísmo and Vila da Praia and within the ports, 'portinhos' and marinas, and; ii) in classified areas or protected areas under the applicable legislation, the activity is governed in accordance with the legal regime related to sports and recreational practice in those places. The practice of windsurf, kitesurf, hobbie-cat, stand up paddle, canoeing and other related nautical activities or other class of sailing vessel without registration, in the area of jurisdiction of Captaincy of Porto da Praia da Vitória, outside the port area, is conditioned to the fulfilment of the following provisions: i) it is only allowed during the daytime, up to an hour before sunset and with good visibility; ii) windsurfers and kitesurfers who are more than 1 nautical mile from the coastline, should do so respecting the advisable safety conditions, namely being in a group, using thermal protection suits with buoyancy and being equipped with communications; iii) during the bathing season, windsurfing and kitesurfing is not allowed in the bathing areas less than 100 meters from the beach; iv) during the bathing season, in the bathing areas, windsurfing and kitesurfing practitioners must use the marked corridors for recreational boats and always outside the bathing areas when they exist, or when they are available; v) the practice of these activities is prohibited in the case of a promulgation of bad weather, pursuant to Decree-Law n.º 283/87, of July 25, or promulgation by the Portuguese Institute of the Sea and the Atmosphere (IPMA) of meteorological warning corresponds to the risk situation in maritime agitation; vi) practitioners are obliged to stay away from all ships and vessels that sail and demand the mooring areas and shelter ports in the area of jurisdiction of the Captaincy of Porto da Praia da Vitória; vii) practitioners who are more than half a nautical mile from the coast, in the open sea, must carry a small orange flag, made of quick drying material to use as a means of asking for help and, whenever possible, must have mobile communications capable of communicating with the national emergency number or with the Maritime Police Picket number; viii) it is recommended that, before the beginning of the activity, each practitioner gives knowledge to a family member or friend on land about the place and period he intends to be at sea.

According to **Edict n.º 340/2018**, of March 26, concerning the jurisdiction are of the Captaincy of Porto da Horta, the practice of water sports and recreational navigation cannot interfere with commercial navigation. Beside this, the practice of nautical sports and recreational navigation, 'varar' and anchored are not allowed in the following areas: i) In bathing areas, up to 300 meters from the water's edge line, in the period between June 1st and September 30th; ii) Bathing waters are identified annually by Ordinance that establishes the period of the bathing season, being able to define for a given zone a period that does not fall within the scope of the previous paragraph, beginning earlier or ending later. In such cases, the prohibition referred to in the preceding

paragraph extends in time so as to also cover the entire bathing season defined in the Ordinance; iii) Although outside the periods referred to in the previous paragraphs, whenever, when approaching land, there is a bathing practice, the nautical sportsman or recreational navigator must maintain a distance of 300 meters; iv) Less than 30 meters from the ships at anchor or moored, except if in direct outbound or inbound ports; v) Less than 100 meters from the ships in mooring or starting manoeuvre; vi) In classified areas or protected areas under the applicable legislation, it is governed in accordance with the legal regime related to sports and recreational practice in those places (e.g. natural Reserve of Caldeirinhas). Also, in line with the rule 42 of the edict, recreational navigators holding a Coastal Skipper certification can navigate freely between the islands that make up each of the archipelago's groups, the same applies to type 4 recreational vessels. Under the terms of the previous paragraph, the maximum distance to the coast is 22 miles, both for recreational navigators holding a Coastal Skipper license and for type 4 recreational vessels when sailing out of the island group area, for example, south of Pico Island or Faial Island, or north of São Jorge Island. Windsurfing is subject to compliance with the following provisions (Edict n.º 340/2018): i) it is only allowed during the day and with good visibility; ii) during the bathing season, it's not possible the practice in bathing areas less than 300 meters of the bathing zones; iii) land distancing is only permitted up to two miles from the coastline; iv) whenever they are more than half a mile from the coast, they must wear a belt with a cat attached to the board and carry a small orange flag, made of quick drying material to use as a means of calling for help. Furthermore, the use of sailing vessels intended exclusively for competition without registration is subject to compliance with the following provisions: i) if in training, they should restrict navigation to an area limited to one mile away from the coast line and one mile to each side of the respective arms port, or in an area authorized by the Captain of Porto; ii) if in competition, they must restrict navigation to the area duly authorized by the Captain of Porto and to the transit to and from the said area; iii) in sailing school training there must be a number of support vessels appropriate to the number of sailing vessels in the water, and they must have at least one support vessel. Support vessels must be physically close to the sailing vessels they support and must be equipped with communications devices; iv) its use is only allowed during the day and with good visibility. Off the south coast of São Jorge Island, in the area between Morro da Queimada and the port of Urzelina and between the port of Calheta and Fajã das Almas, offshore, endurance, closedcourse, slalom training is authorized, in Runa-bout modalities - jet skis, under the following conditions: i) navigation can be done from sunrise to one hour before the sunset; ii) if the vessel is sailing with another vessel, less than 300 meters away, it may sail between 300 meters and 3 miles of coastline; iii) if the vessel is sailing in isolation, it can sail between 300 meters and 1 mile of coastline; iv) in terms of manoeuvring, safety and navigation rules, regardless of whether they are competition vessels, vessels are subject to the application of International Regulation to Prevent Collisions at Sea (RIEAM). Canoes, kayaks, seagulls, coconuts and other beach vessels without a motor or sail and without registration are not allowed to sail more than 300 m from the coastline. The organization of events using the vessels referred to in the previous paragraph, such as tours or sports events, requires authorization from the Captain of Porto, with safety conditions being assessed on a case-by-case basis, namely with regard to the minimum distance and maximum from the land and the number of support vessels needed. When registered as type 5 recreational vessels (canoes, kayaks, seagulls, coconuts and other beach vessels without a motor or sail) may not depart from the coast more than half a mile (0.5 miles) and only up to 1 mile from a port. Embarked, commercial or recreational fishing, or spearfishing, is not allowed, less than 300 meters away, from the ports of Horta, Madalena, São Roque, Velas, Calheta and Lajes do Pico. Spearfishing is not allowed inland, nor less than 100 m from the ports and 'portinhos' referred to in rule 40 of Edict n.º 340/2018. Spearfishing cannot be carried out less than 100 m from the places frequently used as bathing areas, referred to in Annex II of Edict n.º 340/2018, provided that the existence of bathing practice is verified. Recreational fishing cannot be carried out less than 50 m from the places used as bathing

areas, namely those referred to in Annex II of Edict n.º 340/2018, as long as there is a bathing practice. Spearfishing or recreational diving is permitted, under the terms of the national and regional legislation in force, for all citizens holding the respective license or certification, throughout the coast of the islands of Faial, Pico and São Jorge, except in the following areas: i) less than 100 m from the bathing areas, at any time of the year as long as there is a bathing practice; ii) at the Caldeirinhas Natural Reserve, integrated in the Faial Natural Park, the limits of which can be consulted in Regional Legislative Decree n.º 46/2008 / A, of November 7; iii) within the ports referred to in paragraph 1 of rule 40 of Edict n.º 340/2018; iv) in a 500 m strip centered on the entrance line of the port of Horta and on a 200 m strip centered on the entrance lines of the ports of Madalena, São Roque do Pico, Lajes do Pico, Velas and Calheta. In the protected areas integrated in the Faial Natural Park, whose limits can be consulted in Regional Legislative Decree n.º 46/2008/A, of November 7, the practice of spearfishing is prohibited, namely in the following areas: i) Protected area for resource management of Castelo Branco; ii) Capelinhos protected resource management area; iii) Cedros resource management protected area. The practice of recreational diving in the area of Caroline's Underwater Archaeological Park is only allowed if organized by maritime-tourism operators or by naval clubs.

Edict n.º 419/2018, of April 24, specify that the practice of recreational fishing on board is prohibited, inside all ports and 'portinhos' under the jurisdiction of the Captaincy of the Port of Angra do Heroísmo. The use of a kayak or canoe type vessel, registered in the recreational boating activity, for the exercise of recreational fishing, is only allowed during the daytime, up to one hour before the sunset, and the vessel cannot be distancing to half a nautical mile from the coastline, with good visibility and good weather. Spearfishing cannot be carried out within 300 m of commercial, passenger and fishery ports, classified with the classes A, B and C of the region's port network or less than 100 m inland. It's also forbidden in ports classified as class D, in 'portinhos' and marinas. Also, cannot be carried out within 100 m of bathing areas or areas frequently used as bathing zones during the bathing season. In ocean waters and inland waters under the jurisdiction of the Captaincy of the Port of Angra do Heroísmo, spearfishing is prohibited in the period between sunset and sunrise. Under the legislation that regulates the practice of recreational diving, Law n.º 24/2013, of March 20, combined with other restrictions provided for in specific legislation, in the jurisdiction of the Captaincy of the Port of Angra do Heroísmo, for reasons of safety and navigation, recreational diving is prohibited: i) in the channels/areas of approach to the ports of Angra do Heroísmo and Vila da Praia and within the ports, ´portinhos' and marinas; ii) in classified areas or protected areas under the applicable legislation (the activity is governed in accordance with the legal regime relating to sports and recreational practice in those areas). The use of jet skis: a) it is only allowed during the daytime, up to one hour before sunset and with good visibility; b) during the bathing season, bathing areas less than 300 (three hundred) meters from the beach are not allowed; c) during the bathing season, near the bathing areas, its users to leave or sunbathe on the beach, must use the marked corridors intended for recreational boats, and, if they do not exist, they should always do so outside the demarcated bathing area; d) as long as weather and sea conditions permit and do not appear in isolation, they can sail across the island's coastline up to a distance of no more than 3 nautical miles from the coast; e) when sailing in isolation, they can only depart up to 1 nautical mile from the coast. The practice of windsurfing, kitesurfing, hobbie-cat, stand up paddle, canoeing and other similar nautical activities or other class of sailing vessel without registration, in the area of jurisdiction of the Captaincy of the Port of Angra do Heroísmo, outside the port area, is conditioned to the fulfilment of the following provisions: a) windsurfers and kitesurfers who are more than 1 nautical mile from the coastline should do so respecting the advisable safety conditions, namely being in a group, using thermal protection suits with buoyancy and being equipped with communications ; b) during the bathing season, windsurfing and kitesurfing is not allowed in the bathing areas less than 100 (one hundred) meters from the beach;

c) during the bathing season, in the bathing areas, windsurfers and kitesurfers, in order to leave or take to the beach, must use, whenever they exist, the marked corridors intended for recreational vessels and always outside the bathing areas.

In accordance with **Edict n.º 420/2018**, of April 26, the practice of recreational fishing on board is prohibited, inside all ports and 'portinhos' under the jurisdiction of the Captaincy of the Port of Vila do Porto. The use of a kayak or canoe type vessel, with registration of recreational vessel, for the exercise of recreational fishing, is only allowed during the daytime, up to one hour before sunset, and the vessel cannot move beyond half a nautical mile from the coastline, with good visibility and good weather. Spearfishing may not be carried out within 300 m of commercial, passenger and fishery ports, classified in classes A, B and C of the Region's port network or less than 100 m inland. Neither in Ports classified in class D and 'portinhos'. As well as, cannot be carried out within 100 m of bathing areas or areas frequently used as bathing areas during the bathing season. In ocean waters and inland maritime waters under the jurisdiction of the Captaincy of the Port of Vila do Porto, spearfishing is prohibited in the period between sunset and sunrise. Under the legislation that regulates the practice of recreational diving, Law n.º 24/2013, of March 20, combined with other restrictions provided for in specific legislation, in the jurisdiction of the Captaincy of the Port of Vila do Porto, for reasons of safety of practitioners and navigation, recreational diving is prohibited in the channels/areas of approach to the ports of Santa Maria and inside the ports, 'portinhos' and marinas. In classified areas or protected areas under the applicable legislation, the activity is governed in accordance with the legal regime for sports and recreational activities in those places. The use of jet skis: a) it is allowed during the day, up to one hour before sunset and with good visibility; b) during the bathing season, it's not allowed in bathing areas less than 300 meters from the beach; c) during the bathing season, near the bathing areas, must use the marked corridors intended for recreational boats, and, if they do not exist, they should always do so outside the demarcated bathing area; d) as long as the weather conditions permit and do not appear in isolation, they can sail along the entire coastline of the island to a distance not exceeding 3 nautical miles from the coast; e) when sailing in isolation, they can only depart up to 1 nautical mile from the coast. The practice of windsurfing, kitesurfing, stand up paddle, canoeing and other similar nautical activities or other class of sailing vessel without registration, in the area of jurisdiction of Captaincy of the Port of Vila do Porto, outside the port, is subject to compliance with the following provisions: a) windsurfers and kitesurfers who are more than 1 nautical mile from the coastline should do so respecting the advisable safety conditions, namely being in a group, using thermal protection suits with buoyancy and being equipped with communications; b) during the bathing season, windsurfing and kitesurfing is not allowed in the bathing areas less than 100 meters from the beach; c) during the bathing season, in the bathing areas, windsurfers and kitesurfers, in order to leave or take to the beach, must use, when they exist, the marked corridors intended for recreational vessels and always outside the bathing areas.

Edict n.º 554/2018, of June 4, indicate that the practice of water sports and recreational navigation cannot interfere with commercial navigation. The practice of water sports, recreational navigation, 'varar', or anchoring in the following areas is not allowed: a) in the bathing areas, up to 300 meters from the water's edge, in the period between June 1st and September 30th; b) bathing waters are identified annually by Order Decree that establishes the period of the bathing season, being able to define for a given zone a period that does not fall within the scope of the previous paragraph, beginning earlier or ending later. In such cases, the prohibition referred to in the preceding paragraph extends in time so as to also cover the entire bathing season defined in the Order Decree; c) Even if outside the periods referred to in the previous paragraphs, whenever, when approaching land, there is a bathing practice, the nautical sportsman or recreational navigator must maintain a distance of 300 meters; d) Except for what is determined in the previous paragraph, the

case of areas with bathing practice which are also used as ports. However, the person responsible for governing the vessel, before making the approach to the berth, verify that there are no bathers on the way and that whoever is in that area, on land or at sea, realized the intended manoeuvre before executing it. The sites in question are namely: (a) Flores Island: Porto de Ponta Delgada and Porto do Boqueirão; (b) Corvo Island: Porto do Boqueirão. The practice of windsurfing is subject to compliance with the following provisions: a) during the bathing season, the practice is not allowed less than 300 meters from the bathing areas; b) land distancing is only permitted up to two miles from the coastline; c) whenever they are more than half a mile from the coast, they must wear a belt with a cat attached to the board and carry a small orange flag, made of quick drying material to use as a means of asking for help. The use of sailing vessels intended exclusively for competition without registration is subject to compliance with the following provisions: a) if in training, they must restrict navigation to an area limited to one mile away from the coast line and one mile to each side of the respective arms port, or in an area authorized by the Captain of Porto; b) if in competition, they must restrict navigation to the area duly authorized by the Captain of Porto and to the transit to and from the said area. Canoes, kayaks, seagulls, coconuts and other beach vessels without a motor or sail and without registration are not allowed to sail more than 300 m from the coastline, nor depart from the coastline that defines the area of baths where they left off. When registered as type 5 recreational vessels, vessels with the typology referred to in previous paragraph may not depart from the coast more than half a mile (0.5 miles) and only up to 1 mile from a port. Embarked, commercial or recreational fishing, or spearfishing inside ports is not allowed. Embarked, commercial or recreational fishing, or spearfishing, is not allowed, less than 300 meters away, from the ports of Lajes das Flores, Porto das Poças and Porto da Casa. Spearfishing is not allowed inland, nor less than 100 m from Porto Velho in Santa Cruz das Flores, Porto do Boqueirão, Porto de São Pedro, Porto de Ponta Delgada, Porto Velho da Fajã Grande and Porto Novo from Fajã Grande. Spearfishing cannot be carried out less than 100 m from the places frequently used as bathing areas, referred to in Annex II of this Edict, provided that the existence of bathing practice is verified. Recreational fishing cannot be carried out less than 50 m from the places used as bathing areas, namely those referred to in Annex II of this Edict, as long as there is a bathing practice. Spearfishing or recreational diving is permitted, under the terms of the national and regional legislation in force, for all citizens with the respective license or certification, throughout the coast of the islands of Flores and Corvo, except in the following areas: a) less than 100 m from the bathing areas, at any time of the year, as long as there is a bathing practice; b) underwater hunting is not allowed inland, nor less than 100 m from Porto Velho in Santa Cruz das Flores, Porto do Boqueirão, Porto de São Pedro, Porto de Ponta Delgada, Porto Velho da Fajã Grande and Porto Novo da Fajã Grande; c) in a 200 meter strip centered on the entrance lines of the port of Lajes das Flores and Porto das Poças.

In accordance with **Edict n.º 813/2017**, of October 17, the practice of recreational fishing on board is prohibited, inside all ports and ports under the jurisdiction of the Captaincy of the Port of Ponta Delgada. The use of a kayak or canoe type vessel, with registration of recreational vessel, for the exercise of recreational fishing, is only allowed during the daytime, up to one hour before sunset, and the vessel may not depart for as well as half a mile from the coastline, with good visibility and good weather. Spearfishing may not be carried out within 300 m or within commercial, passenger and fishery ports, classified in classes A, B and C of the Region's port network or less than 100 m inland. Also, in ports classified in class D and 'portinhos'. This activity cannot be practiced in the Dóri underwater archaeological park, as well as within 100 m of bathing areas or areas frequently used as bathing areas, during the bathing season. In ocean waters and inland maritime waters under the jurisdiction of the Captaincy of the Port of Ponta Delgada, spearfishing is prohibited in the period between sunset and sunrise. Under the legislation that regulates the practice of recreational diving, Law n.º 24/2013, of March 20, combined with other restrictions provided for in

specific legislation, in the jurisdiction of the Captaincy of the Port of Ponta Delgada, for reasons of the safety of practitioners and the safety of navigation, the practice of recreational diving is prohibited in the following places: (1) In the channels/areas of approach to the ports of São Miguel and inside the ports, 'portinhos' and marinas; (2) In classified areas or protected areas under the applicable legislation, it is governed in accordance with the legal regime for sports and recreational activities in those places. The practice of windsurfing, kitesurfing or another class of sailing vessel without registration, in the jurisdiction of the Captaincy of the Port of Ponta Delgada, outside the port, is subject to compliance with the following provisions: i) windsurfers and kitesurfers who go more than 1 mile from the coast line must do so respecting the advisable safety conditions, namely being in a group, wearing thermal protection suits with buoyancy capacity and must also be equipped with communications; ii) during the bathing season, windsurfing and kitesurfing is not allowed in the bathing areas less than 100 meters from the beach; iii) during the bathing season, in the bathing areas, windsurfers and kitesurfers, when starting or taking off at the beach, must use, when they exist, the marked corridors intended for recreational vessels and always outside the bathing areas. During the bathing season, the use of jet skis is not allowed in the bathing areas less than 300 meters from the beach. During the bathing season, next to the bathing areas, users of jet skis will be obliged to use the marked corridors intended for recreational boats to leave or take to the beach. If there are no such corridors, they should always be done outside the demarcated bathing area. Jet skis, as long as weather conditions permit and do not present themselves in isolation, can sail across the island's coastline up to a distance of no more than 3 miles from the coast. When sailing in isolation, jet skis can only move up to 1 mile from the coast and up to 4 miles from a port. Swimming is prohibited in the interior of ports and marinas, with the exception of the area defined for that purpose, and called "Pesqueiro" in the port of Ponta Delgada, or in situations that are expressly authorized in the context of sporting events. The practice of amateur diving and spearfishing is prohibited inside port areas. Recreational nautical activities, with motorized and non-motorized means, may be practiced within the port of Ponta Delgada, in the areas established for this purpose. Outside these established areas, activities with non-motorized means may also be practiced, provided that safety conditions are safeguarded and do not affect port movement.

Stakeholder's perception on the legal framework

The stakeholders' consultation developed in the context of the MarSP project allowed the gathering of information on stakeholder's perceptions about the Azorean legislative context of maritime sectors. Selected stakeholders include representatives of the regional and/or local administration, associations and maritime tourism operators and consultation was performed through individual interviews. Stakeholders were asked if they agreed with the legislative context for coastal and maritime tourism sector and what type of changes would they recommend. Follows the opinion of stakeholders interviewed (these stakeholder comments refer to the sectoral legislation that regulates the activity. The MSP, under the terms of Basis of the National Maritime Spatial Planning and Management Policy (LBOGEM), does not intervene in this aspect:

- For some stakeholders, and regarding the whale watching activity, the Zone Z should end or the definition should be reviewed (Order Decree n.º 5/2004, of January 29). Stakeholders complained that the existing legislation/regulation varies from zone to zone (Zone A, B, C and Z) and that Order Decree n.º 5/2004, of January 29, should be reviewed, namely the vessel sizes indicated for each zone. Stakeholders reported that occurs an absence of management of whale watching activity in the Azores and the legislation in force for this activity need to be adapted;
- Stakeholders reported that there is a need to review recreational fishing legislation, being one of the reasons the need to be imposed new different sizes of caught fish (impose

decent sizes on fish caught). Some of them agreed that some areas should be closed/interdicted to this activity and that occurs an absence of inspection of the same. They also consider the legislation concerning recreational fishing much more restrictive, yet those who carry out this activity have much less obligations (e.g. insurance, navigational instruments, vessel size and distances) and this fact is worrying because professional fishermen are leaving the profession and devoting themselves to recreational fishing;

- Stakeholders mentioned that the access legislation to the Vila Franca Islet in São Miguel Island is hampering the development of some of its coastal activities. The entire bureaucratic process of access to the Vila Franca Islet, as well as inappropriate rules hinder the development of certain activities (e.g. nautical sports like stand up paddle, canoeing and kayaking);
- In the Azores, stakeholders consider the existence of a big gap in the inspection/supervision of the coastal and maritime activities and MPAs. Relatively to MPAs, they reported the lack of a diploma to penalize anyone who commits offenses (e.g. illegal fishing in the area) and which regulates the reserves;
- Stakeholders reported that Azorean politicians do not take into account the empirical knowledge of those who work in the area of coastal and maritime tourism when creating legislation and this is a big gap;
- Stakeholders reported the need to Azorean government clarify the legislation concerning the rental of sailboats with regard to tourists spend the night on board the boats. The inspection carried out by the competent authorities in the Sailing activity differs from island to island of the archipelago. The inspection should be standardized.

Sectorial stakeholders identified the need to change the legal framework in the Azores for this maritime sector, namely amend the whale watching regulation and the RAMTA. Also, create a maritime compendium (a bible), considering all the maritime activities developed in the archipelago. Investing on training, knowledge and qualification, was also suggested by stakeholders, for this sector.

PART II

Methodology for mapping sector activity

Current spatial distribution

The methodology for mapping the current situation of coastal and maritime tourism sector in the Azores is based on the existence of information and its availability. Scientific literature, baseline studies, databases and legislation were consulted. Also, consultation of the various stakeholders, namely governmental entities, maritime-tourism operators (OMTs) associations and naval and nautical clubs was performed. Several legislation as well as scientific documents, were consulted.
Follows an outline of the methodology used to characterize the current coastal and maritime tourism sector in the Azores.

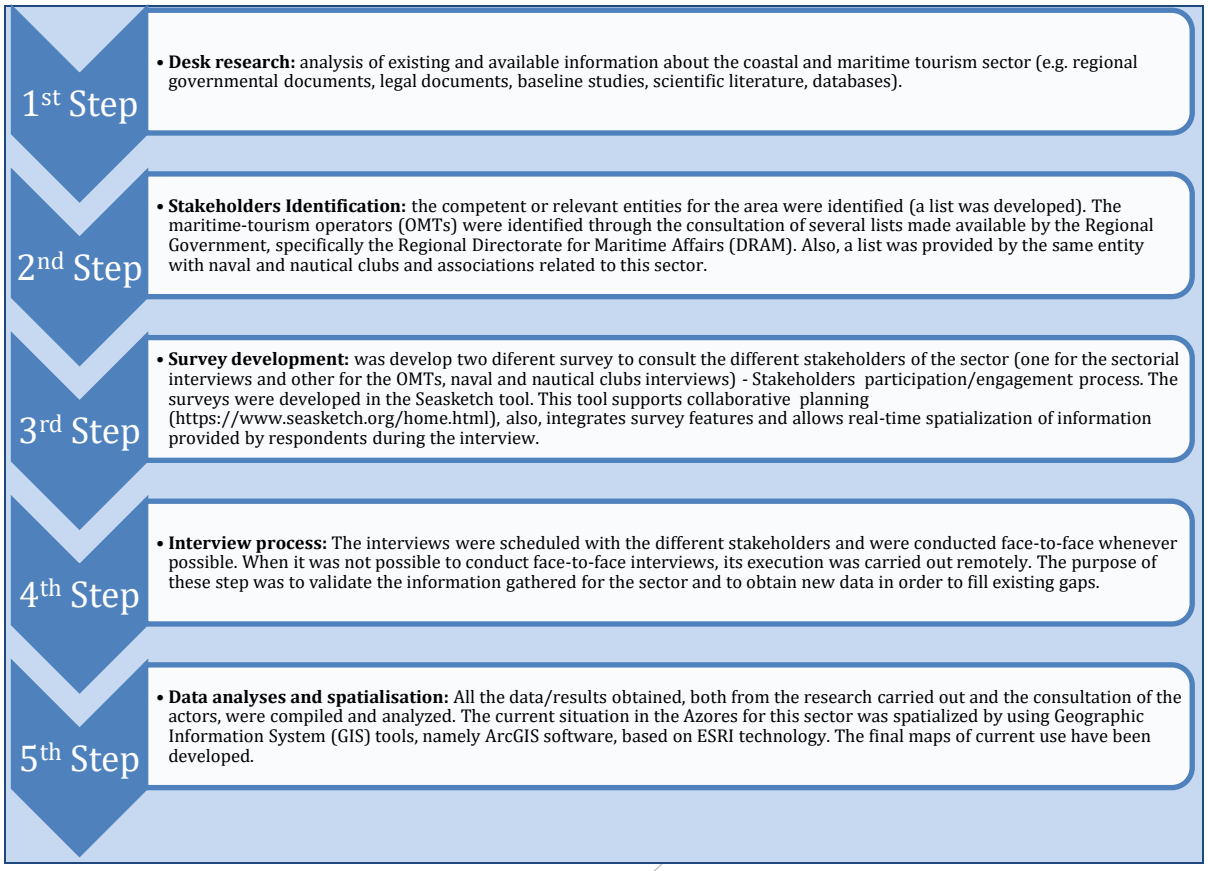


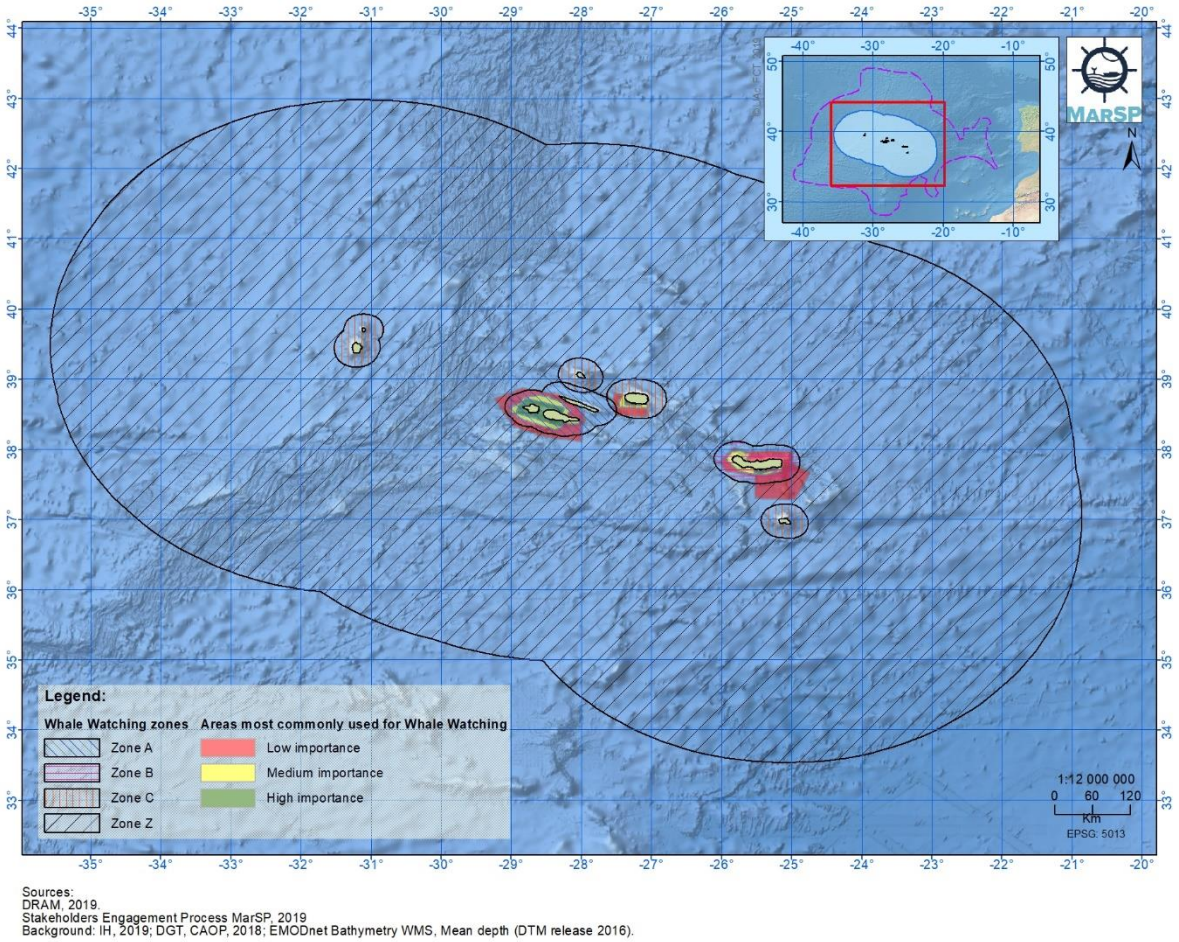
Figure 66. Methodological scheme for the characterization of the existing situation of the coastal and maritime tourism sector in the Azores.

Sectorial stakeholders were asked if they agreed with the methodology proposed to characterize the current spatial distribution of the coastal and maritime sector and what type of changes would they recommend. In a general way, stakeholders did not identify the need for changes in the methodology to characterize the current situation in the Azores for this maritime sector.

The current spatial distribution of areas for coastal and maritime tourism in the Azores include the following:

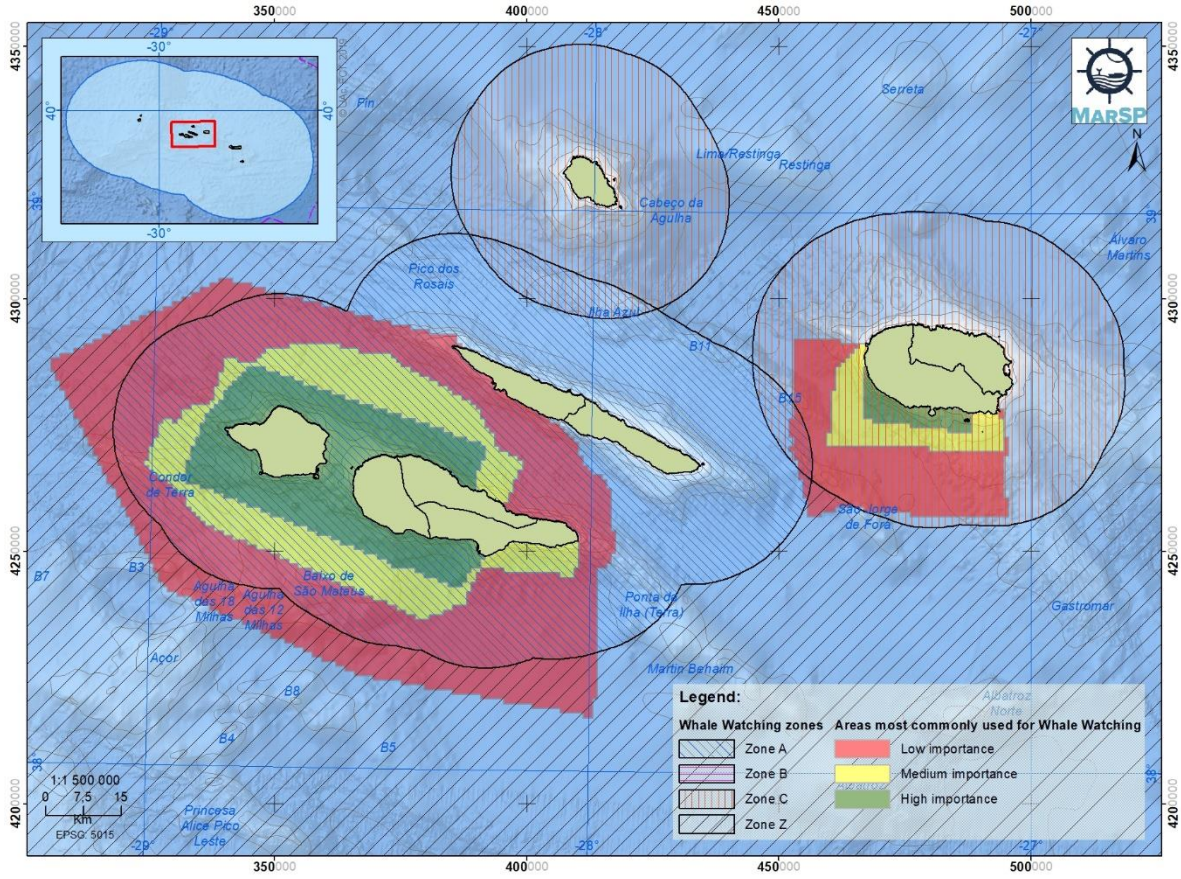
- Whale watching zones (Order Decree n.° 5/2004, of January 29);
- Areas and spots most commonly used by stakeholders for whale watching activity;
- Project MONICET data (sightings data);
- Navigation areas used by each type of recreational vessel (Decree-Law n.° 93/2018, of November 13);
- Refuge ports identified in legislation;
- Areas and spots most commonly used by stakeholders for the practice of nautical sports;
- Spots of surf, stand up paddle and windsurf identified by Regional Tourism Directory (2019);
- Bathing zones according to information given by DRAM;
- Bathing zones according to information existent in POOCs;
- Scuba diving spots identified by stakeholders;
- Scuba diving spots identified in the LOCAQUA Project;
- Areas and spots most commonly used by stakeholders for boating tours activity;
- Areas and spots most commonly used by stakeholders for touristic fishing activity;
- Routes most commonly used by stakeholders for Yachting (indicative routes);
- Race fields and training areas for sailing identified by stakeholders.

The area's most commonly used and identified by stakeholders are represented in the cartograms by a colour scale (green, yellow and red). This colour gradation indicates the degree of importance of these areas for the stakeholders. The degree of importance was calculated considering the number of responses for a given area and the rating for each of these areas (both the number of responses and the rating factor had the same weight in the analysis developed).



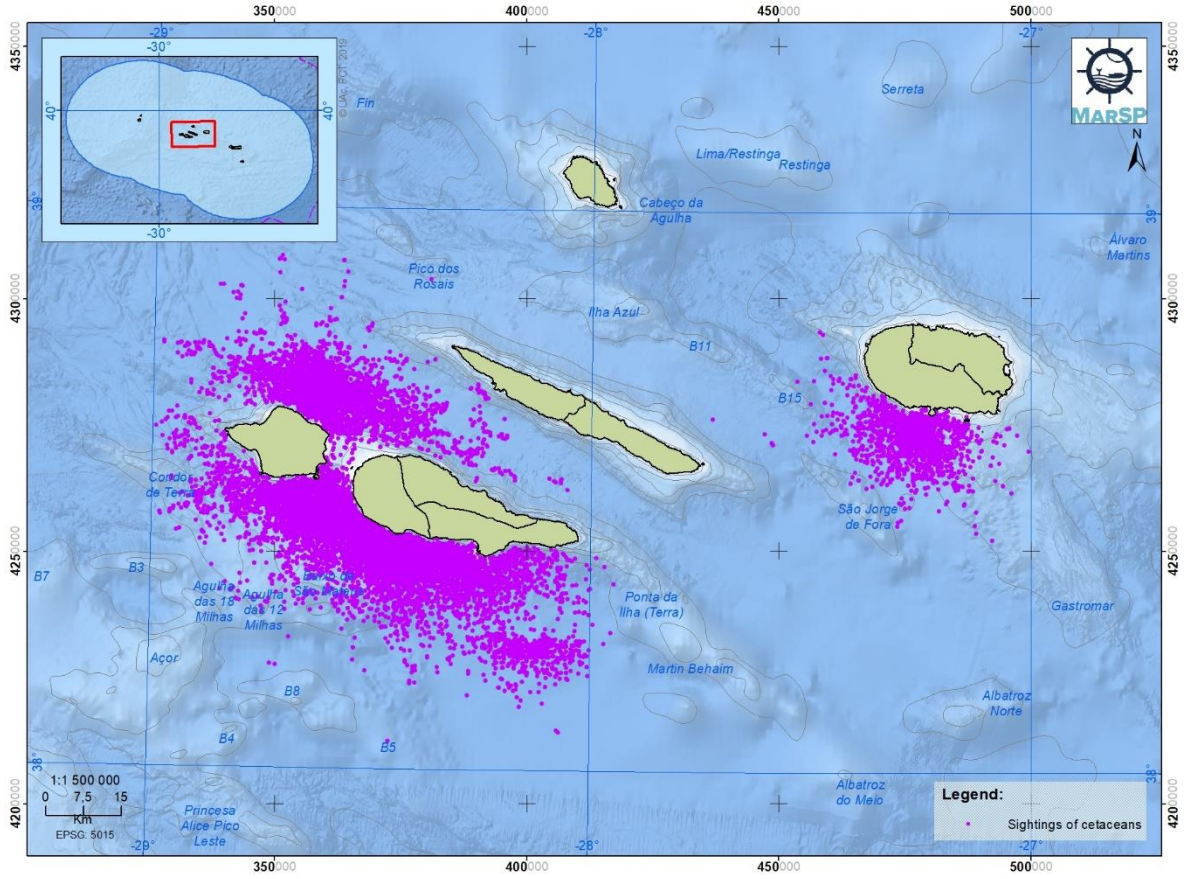
Sources:
DRAM, 2019.
Stakeholders Engagement Process MarSP, 2019
Background: IH, 2019; DGT, CAOP, 2018; EMODnet Bathymetry WMS, Mean depth (DTM release 2016).

Figure 67. Whale watching zones according to Order Decree n.° 5/2004, of January 29 and areas most commonly used by stakeholders for the activity in the Azores.



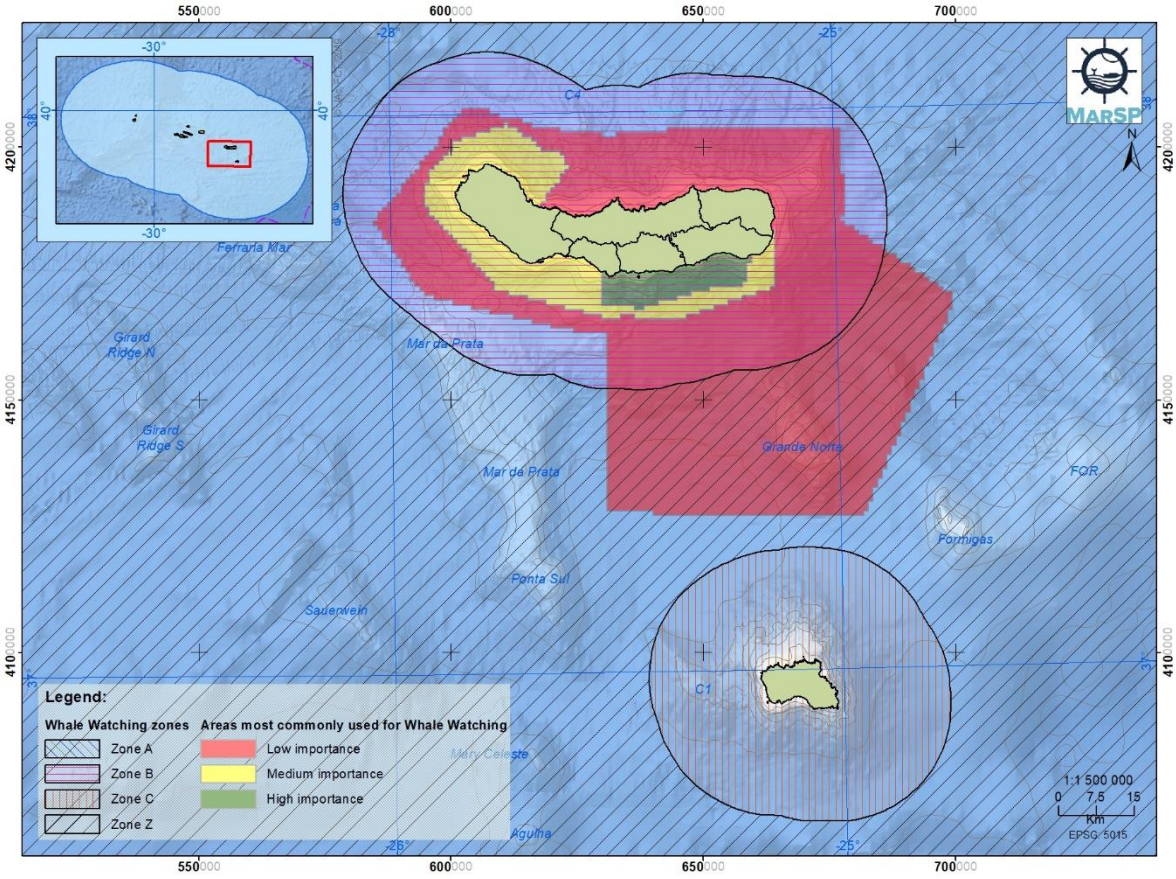
Sources:
DRAM, 2019.
Stakeholders Engagement Process MarSP, 2019
Background: IH, 2019; DGT, CAOP, 2018; EMODnet Bathymetry WMS, Mean depth (DTM release 2016).

Figure 68. Whale watching zones according to Order Decree n.° 5/2004, of January 29 and areas most commonly used by stakeholders for the activity in the Central Group of the Azores.



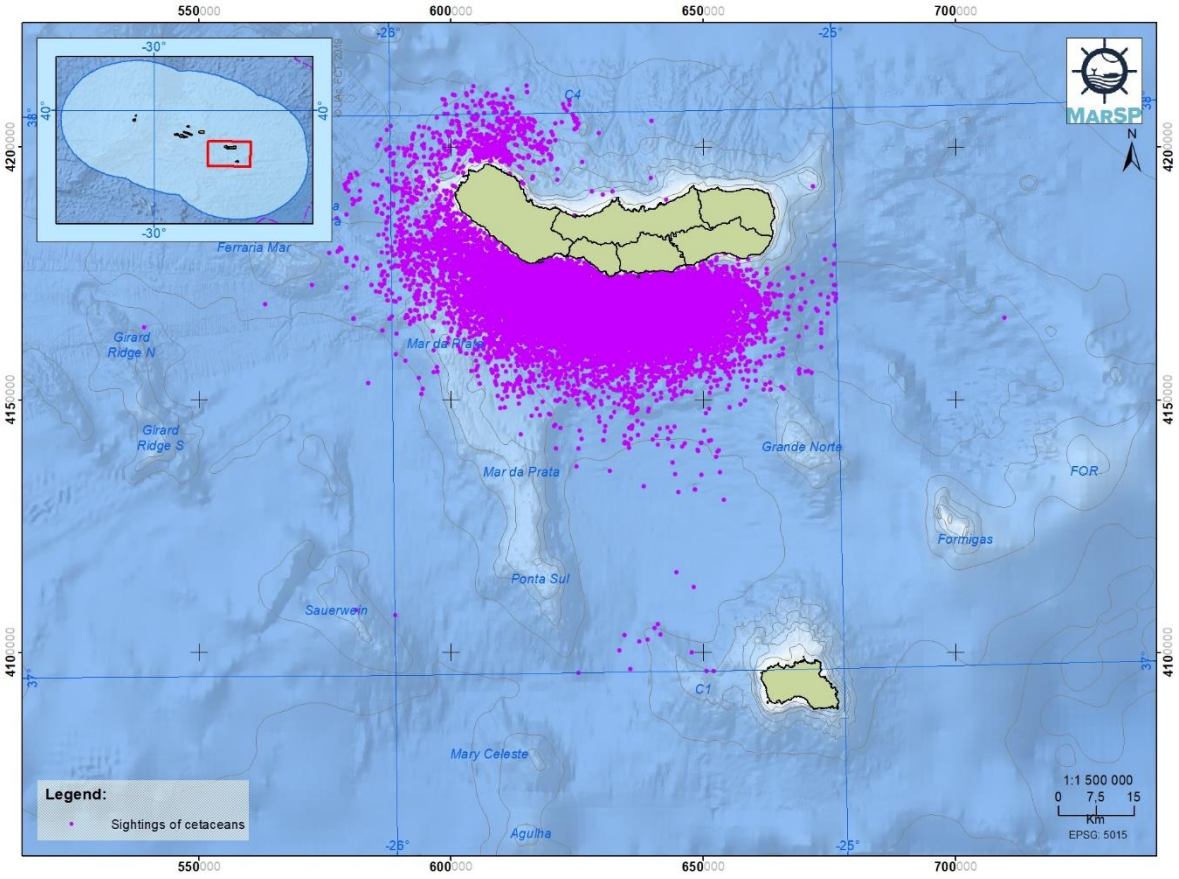
Sources:
MONICET data (2009 - 2018).
Background: IH, 2019; DGT, CAOP, 2018; EMODnet Bathymetry WMS, Mean depth (DTM release 2016).

Figure 69. MONICET cetaceans' data sightings in the Central Group of the Azores.



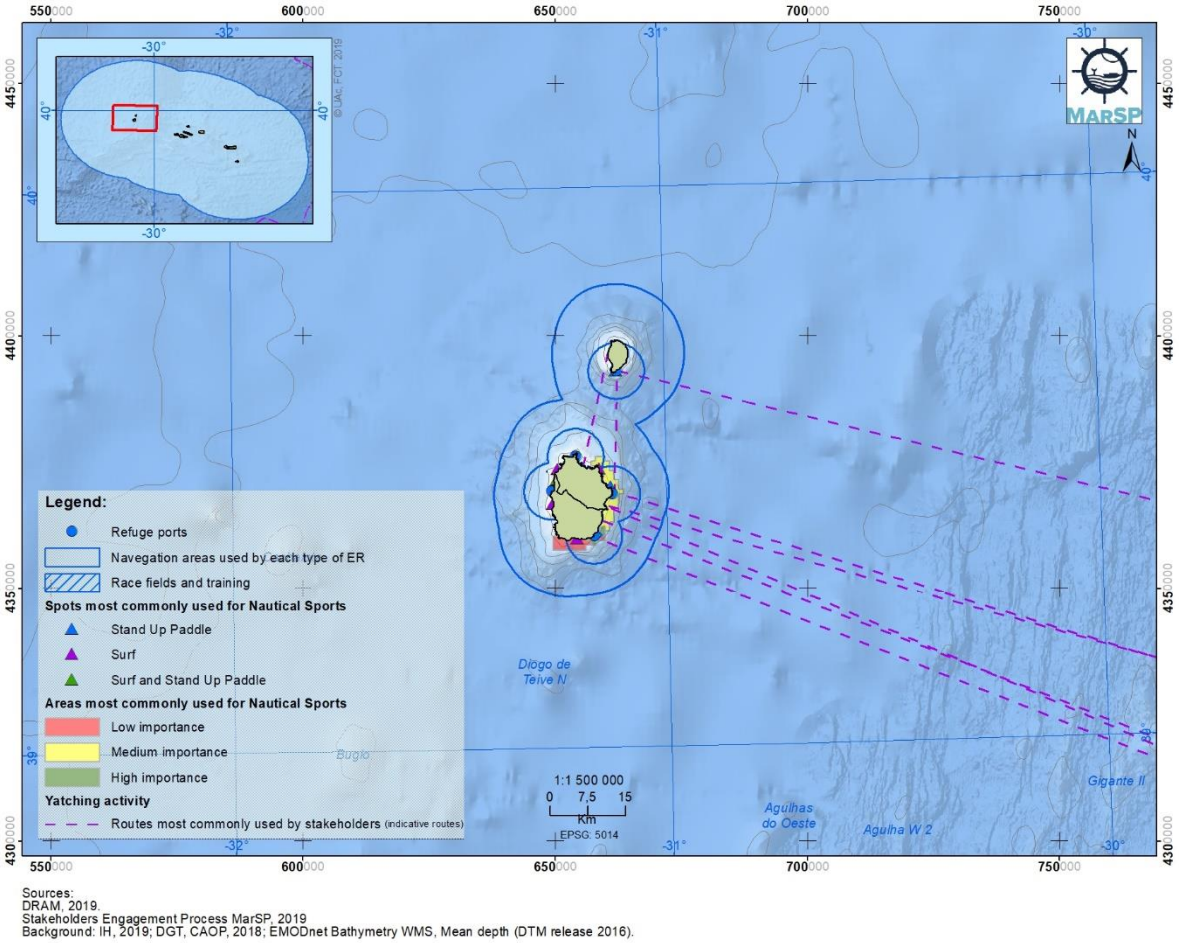
Sources:
DRAM, 2019.
Stakeholders Engagement Process MarSP, 2019
Background: IH, 2019; DGT, CAOP, 2018; EMODnet Bathymetry WMS, Mean depth (DTM release 2016).

Figure 70. Whale watching zones according to Order Decree n.° 5/2004, of January 29 and areas most commonly used by stakeholders for the activity in the Eastern Group of the Azores.



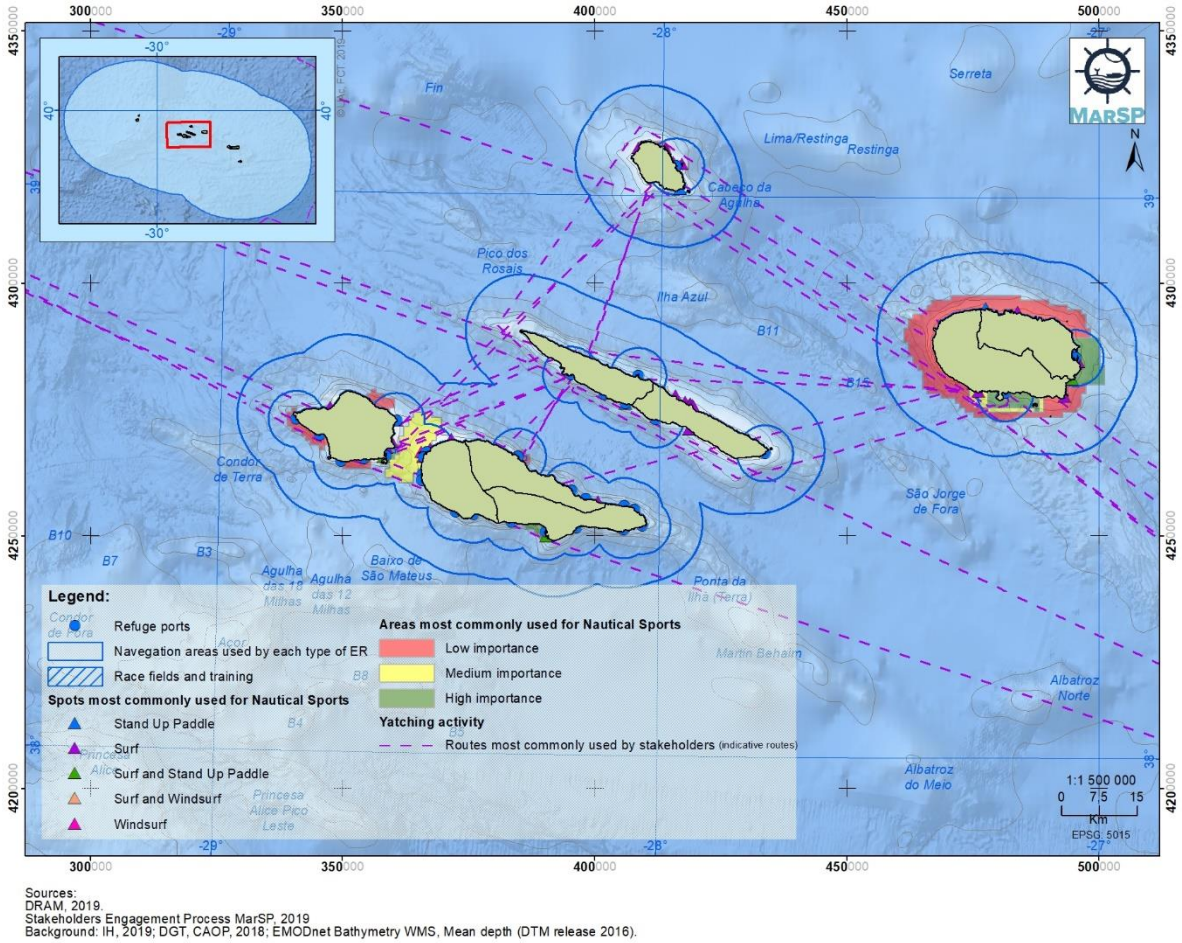
Sources:
MONICET data (2009 - 2018).
Background: IH, 2019; DGT, CAOP, 2018; EMODnet Bathymetry WMS, Mean depth (DTM release 2016).

Figure 71. MONICET cetaceans' data sightings in the Eastern Group of the Azores.



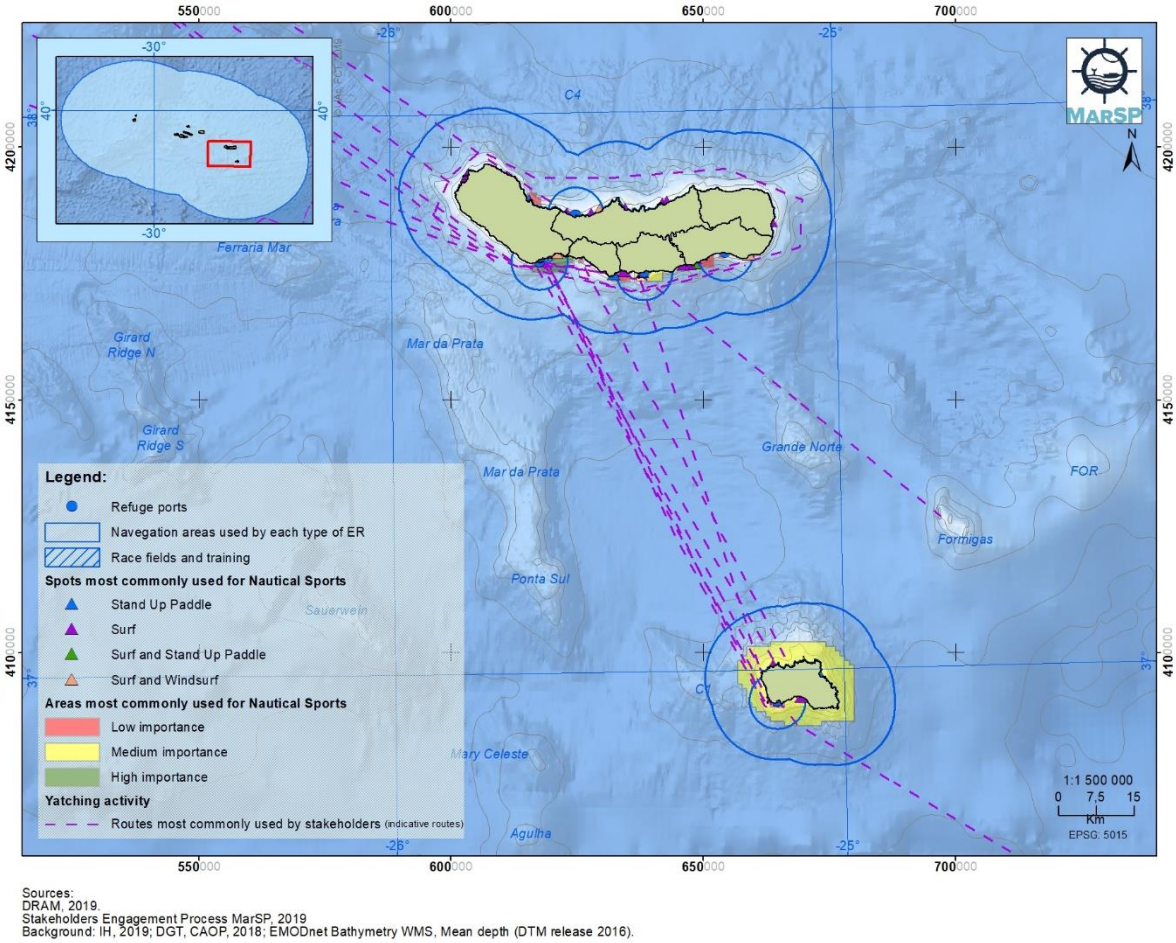
Sources:
DRAM, 2019.
Stakeholders Engagement Process MarSP, 2019
Background: IH, 2019; DGT, CAOP, 2018; EMODnet Bathymetry WMS, Mean depth (DTM release 2016).

Figure 72. Race fields and training areas and spots and areas most commonly used for the nautical sports activity, and Yachting most commonly routes used by stakeholders in the Western Group of the Azores.



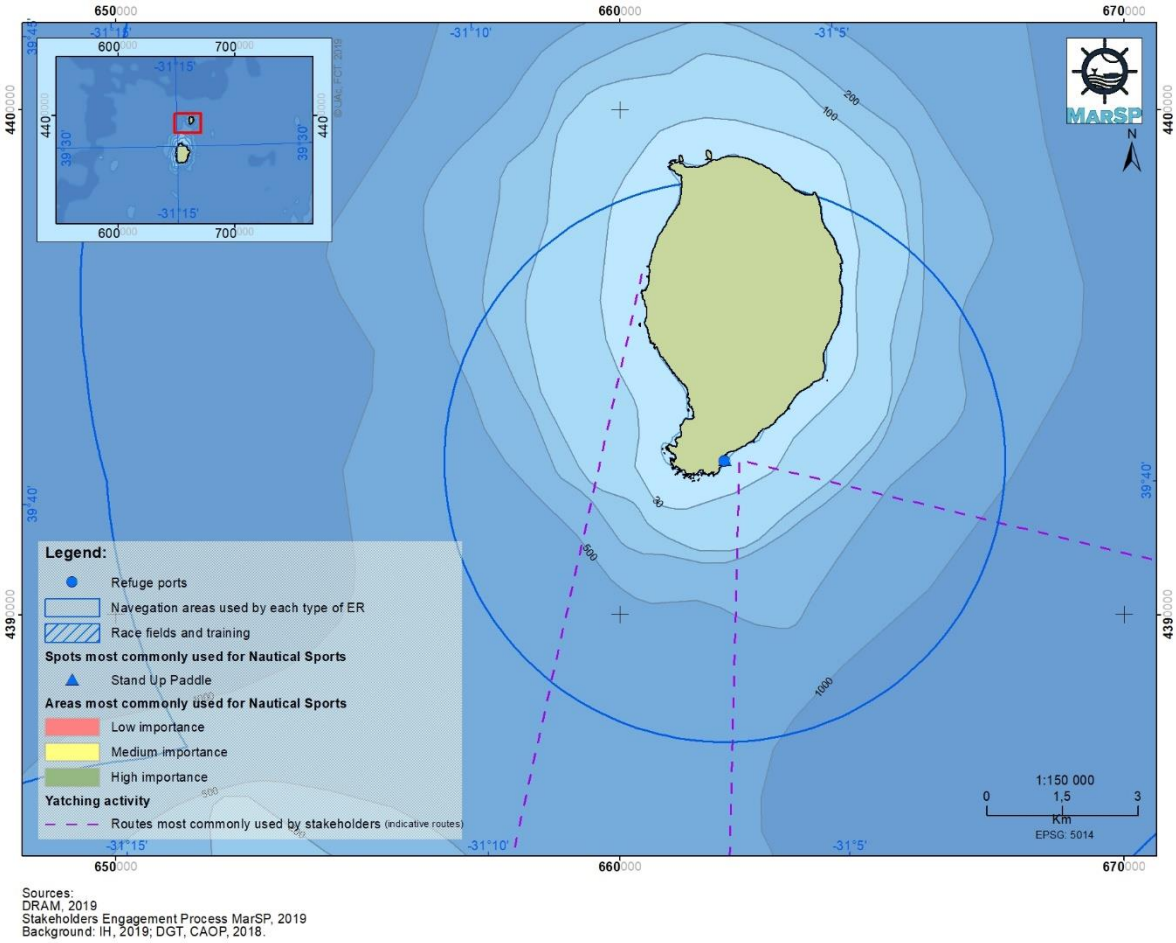
Sources:
DRAM, 2019.
Stakeholders Engagement Process MarSP, 2019
Background: IH, 2019; DGT, CAOP, 2018; EMODnet Bathymetry WMS, Mean depth (DTM release 2016).

Figure 73. Race fields and training areas and spots and areas most commonly used for the nautical sports activity, and Yachting most commonly routes used by stakeholders in Central Group of the Azores.



Sources:
DRAM, 2019.
Stakeholders Engagement Process MarSP, 2019
Background: IH, 2019; DGT, CAOP, 2018; EMODnet Bathymetry WMS, Mean depth (DTM release 2016).

Figure 74. Race fields and training areas and spots and areas most commonly used for the nautical sports activity, and Yachting most commonly routes used by stakeholders in Eastern Group of the Azores.



Sources:
DRAM, 2019
Stakeholders Engagement Process MarSP, 2019
Background: IH, 2019; DGT, CAOP, 2018.

Figure 75. Race fields and training areas and spots and areas most commonly used for the nautical sports activity, and Yachting most commonly routes used by stakeholders in Corvo Island.

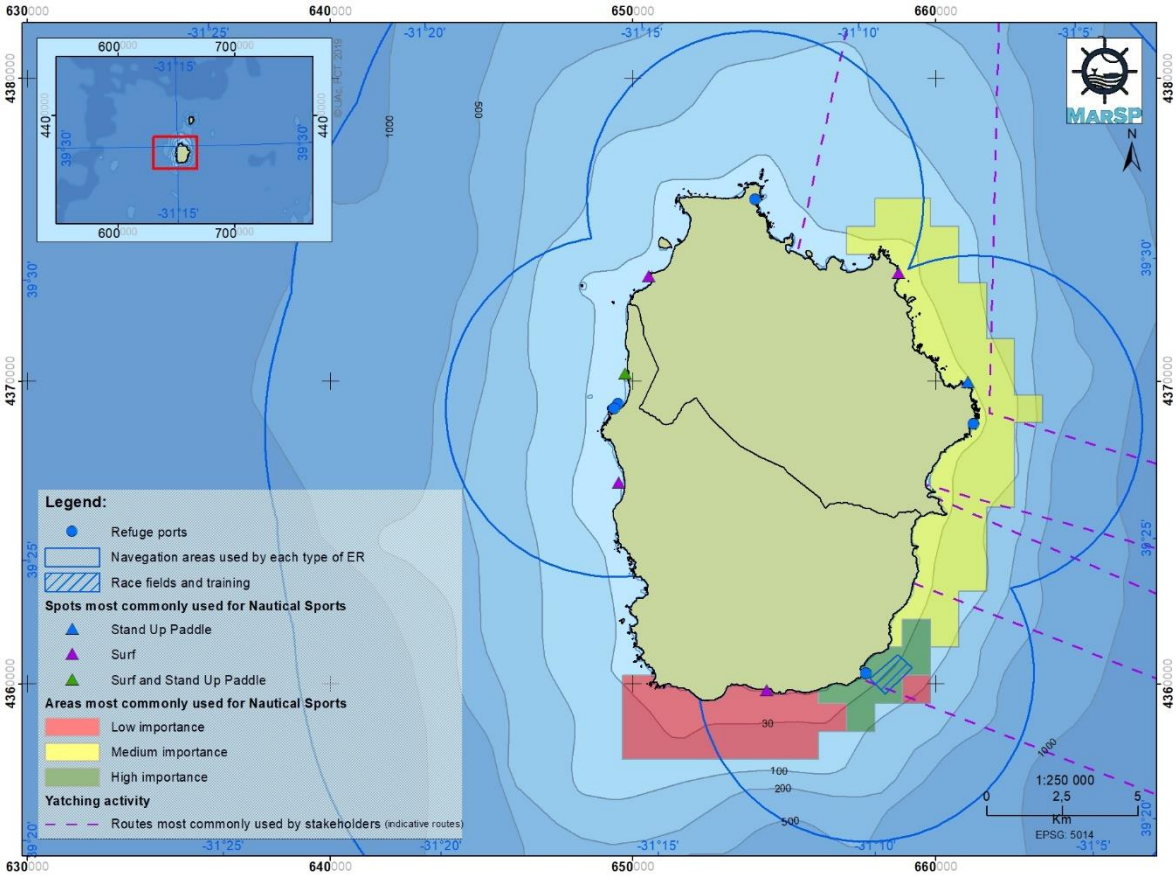
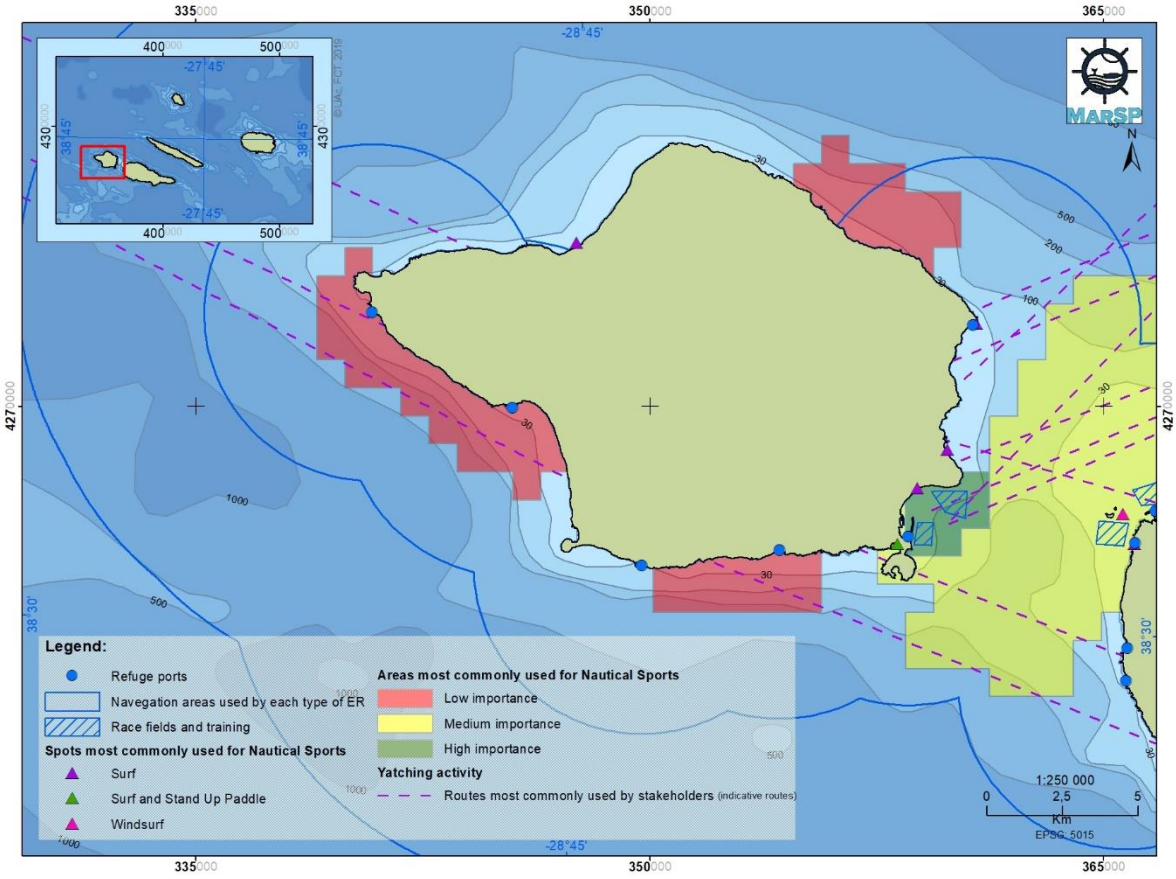
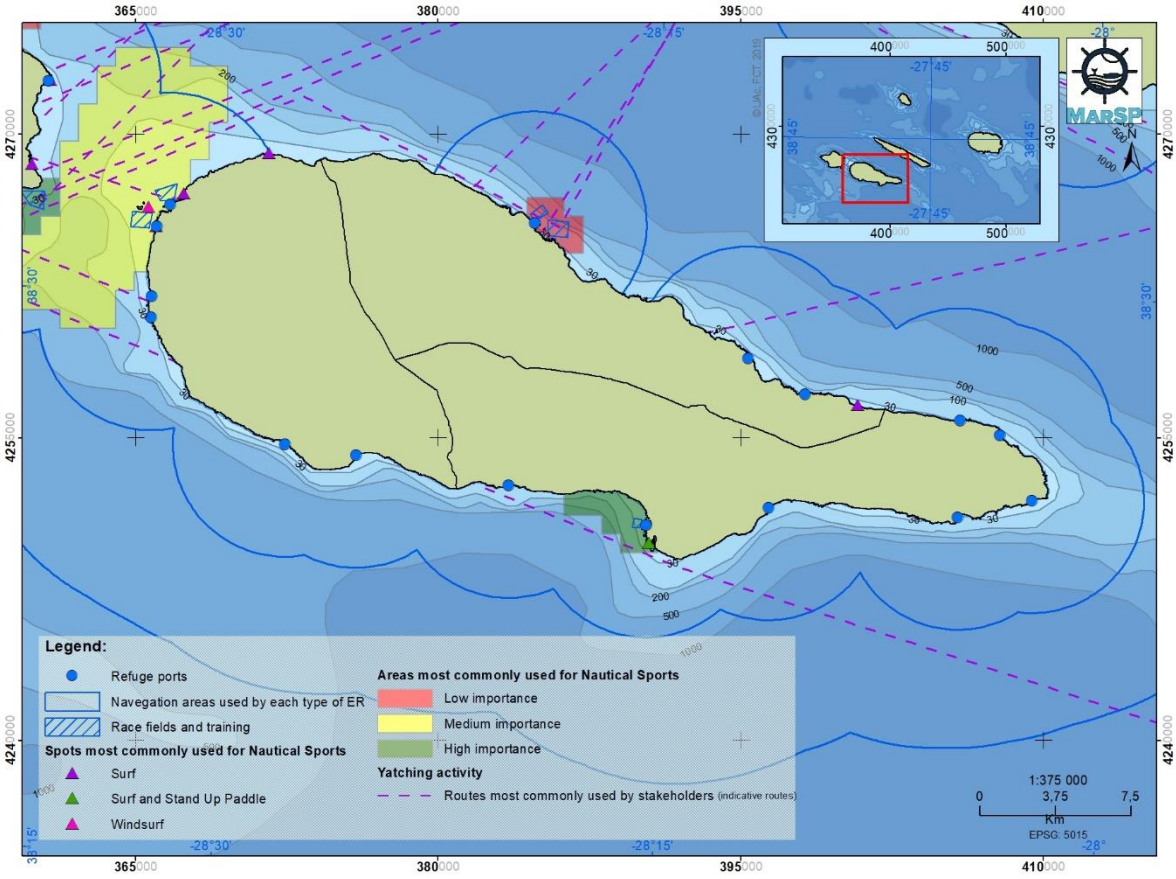


Figure 76. Race fields and training areas and spots and areas most commonly used for the nautical sports activity, and Yachting most commonly routes used by stakeholders in Flores Island.



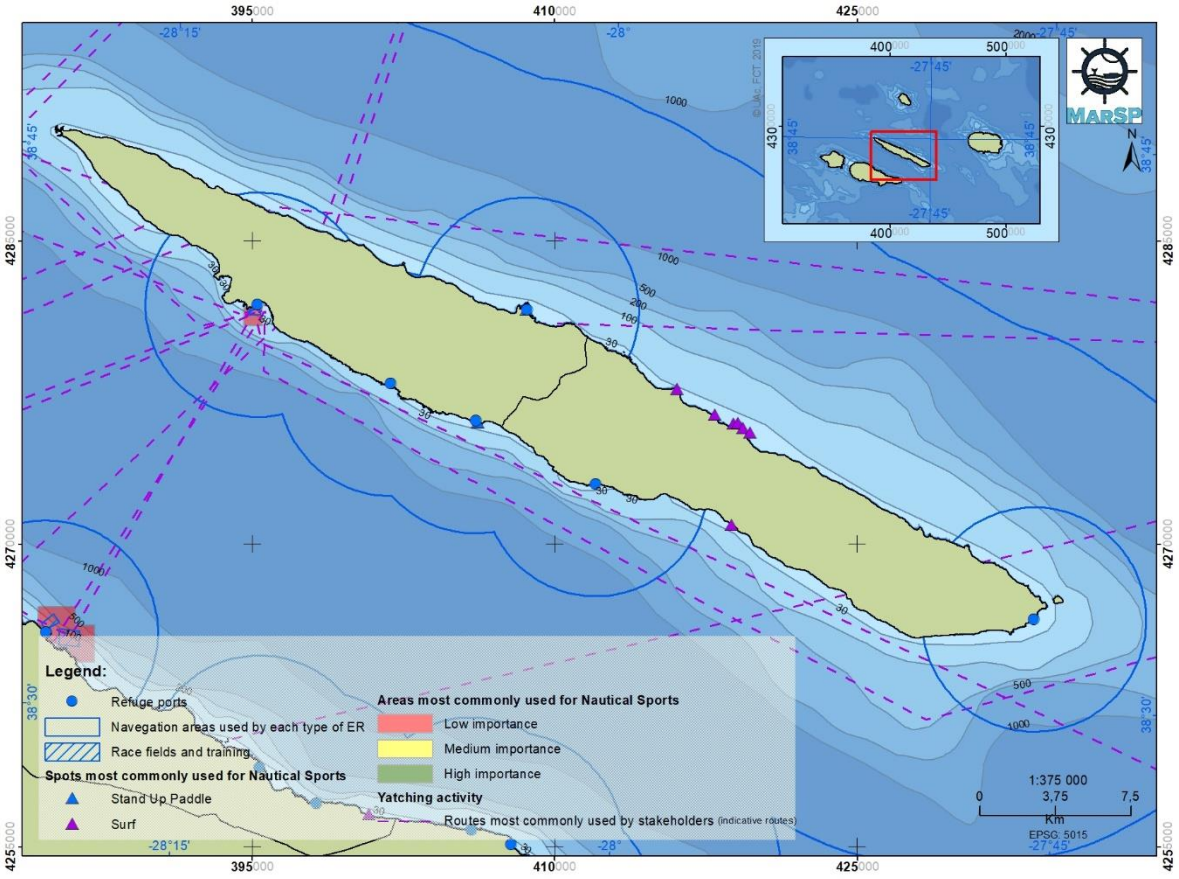
Sources:
DRAM, 2019
Stakeholders Engagement Process MarSP, 2019
Background: IH, 2019; DGT, CAOP, 2018.

Figure 77. Race fields and training areas and spots and areas most commonly used for the nautical sports activity, and Yachting most commonly routes used by stakeholders in Faial Island.



Sources:
DRAM, 2019
Stakeholders Engagement Process MarSP, 2019
Background: IH, 2019; DGT, CAOP, 2018.

Figure 78. Race fields and training areas and spots and areas most commonly used for the nautical sports activity, and Yachting most commonly routes used by stakeholders in Pico Island.



Sources:
DRAM, 2019
Stakeholders Engagement Process MarSP, 2019
Background: IH, 2019; DGT, CAOP, 2018.

Figure 79. Race fields and training areas and spots and areas most commonly used for the nautical sports activity, and Yachting most commonly routes used by stakeholders in São Jorge Island.

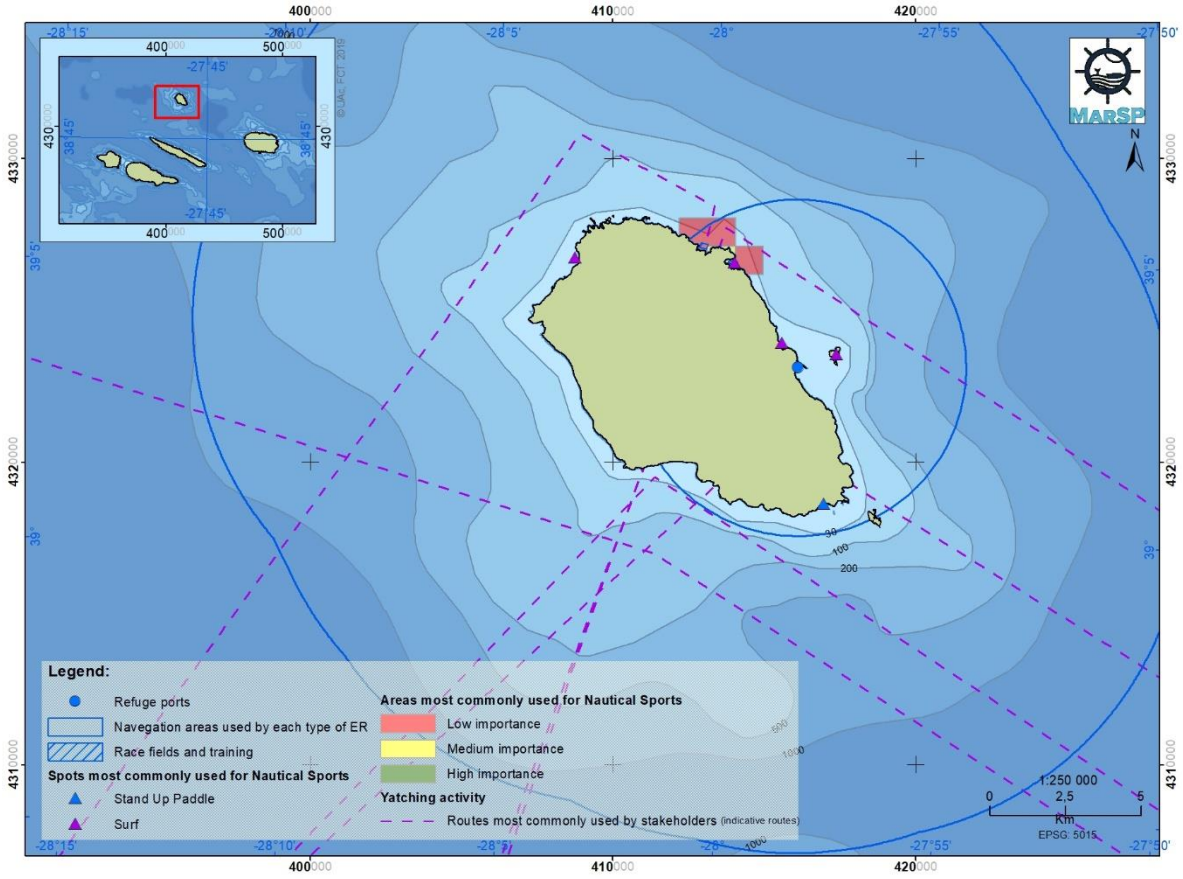
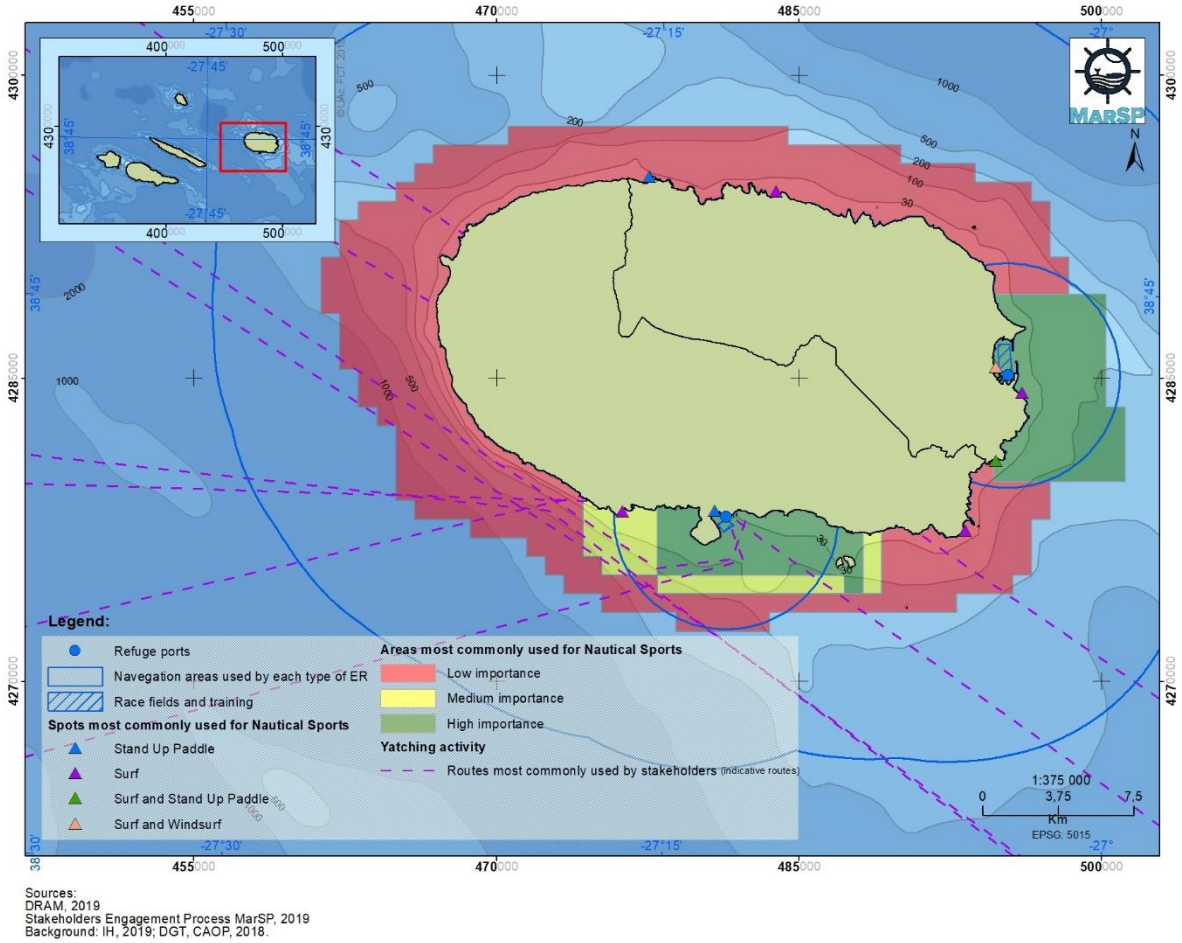
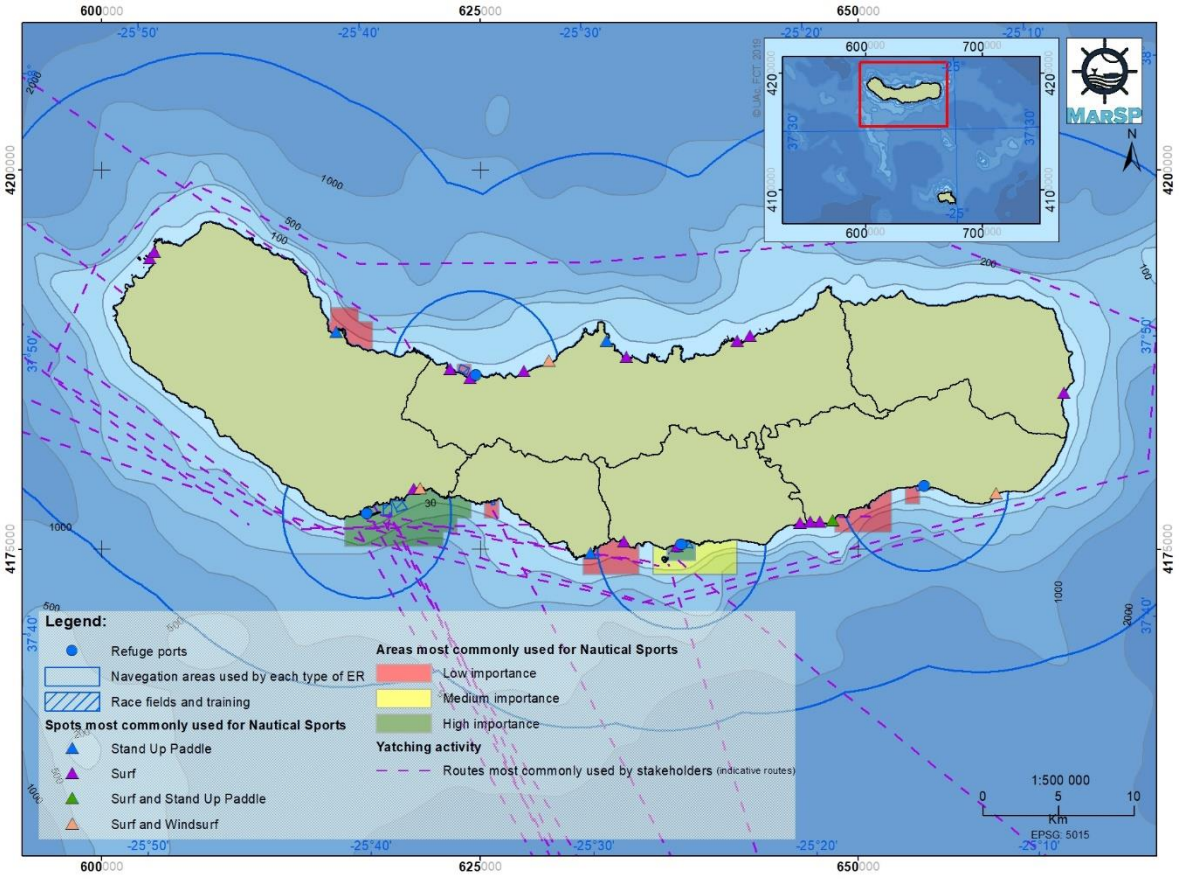


Figure 80. Race fields and training areas and spots and areas most commonly used for the nautical sports activity, and Yachting most commonly routes used by stakeholders in Graciosa Island.



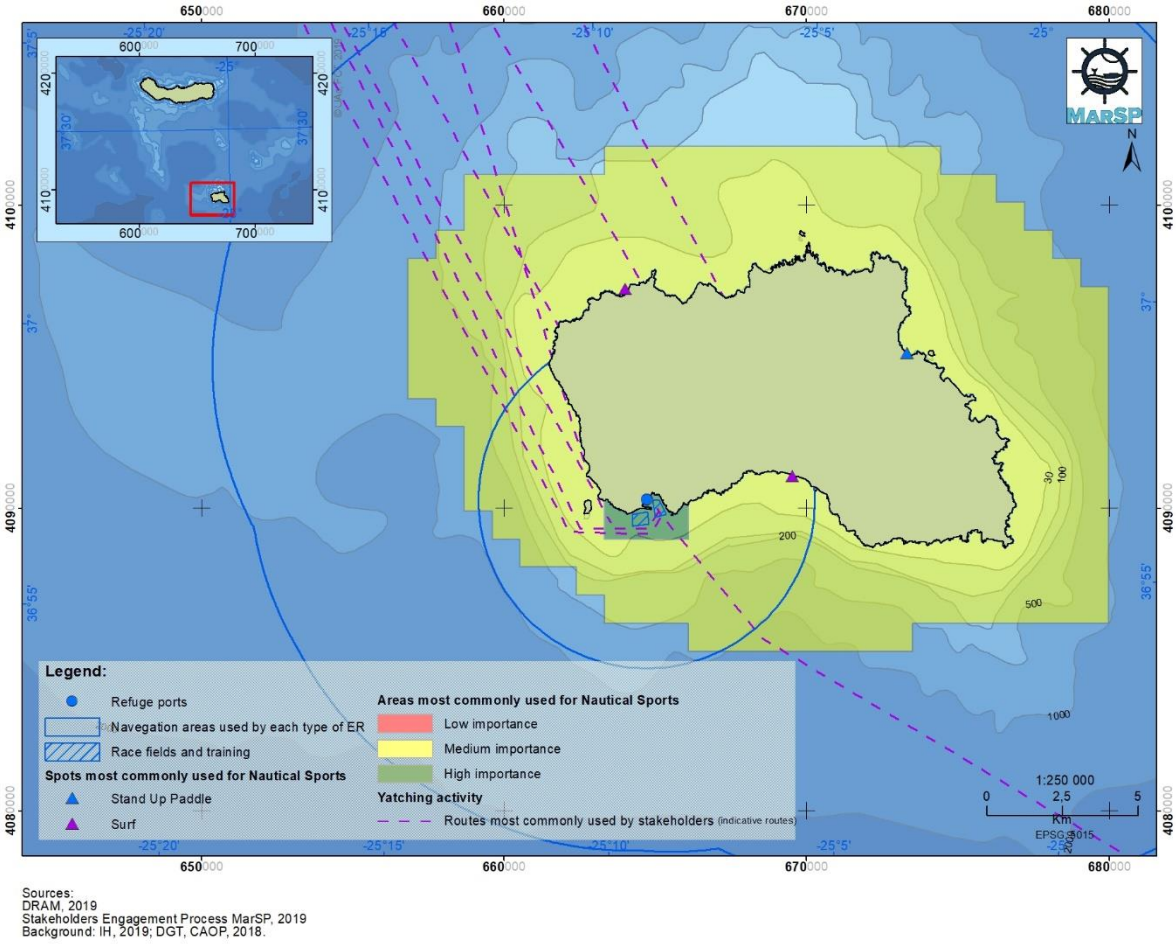
Sources:
DRAM, 2019
Stakeholders Engagement Process MarSP, 2019
Background: IH, 2019; DGT, CAOP, 2018.

Figure 81. Race fields and training areas and spots and areas most commonly used for the nautical sports activity, and Yachting most commonly routes used by stakeholders in Terceira Island.



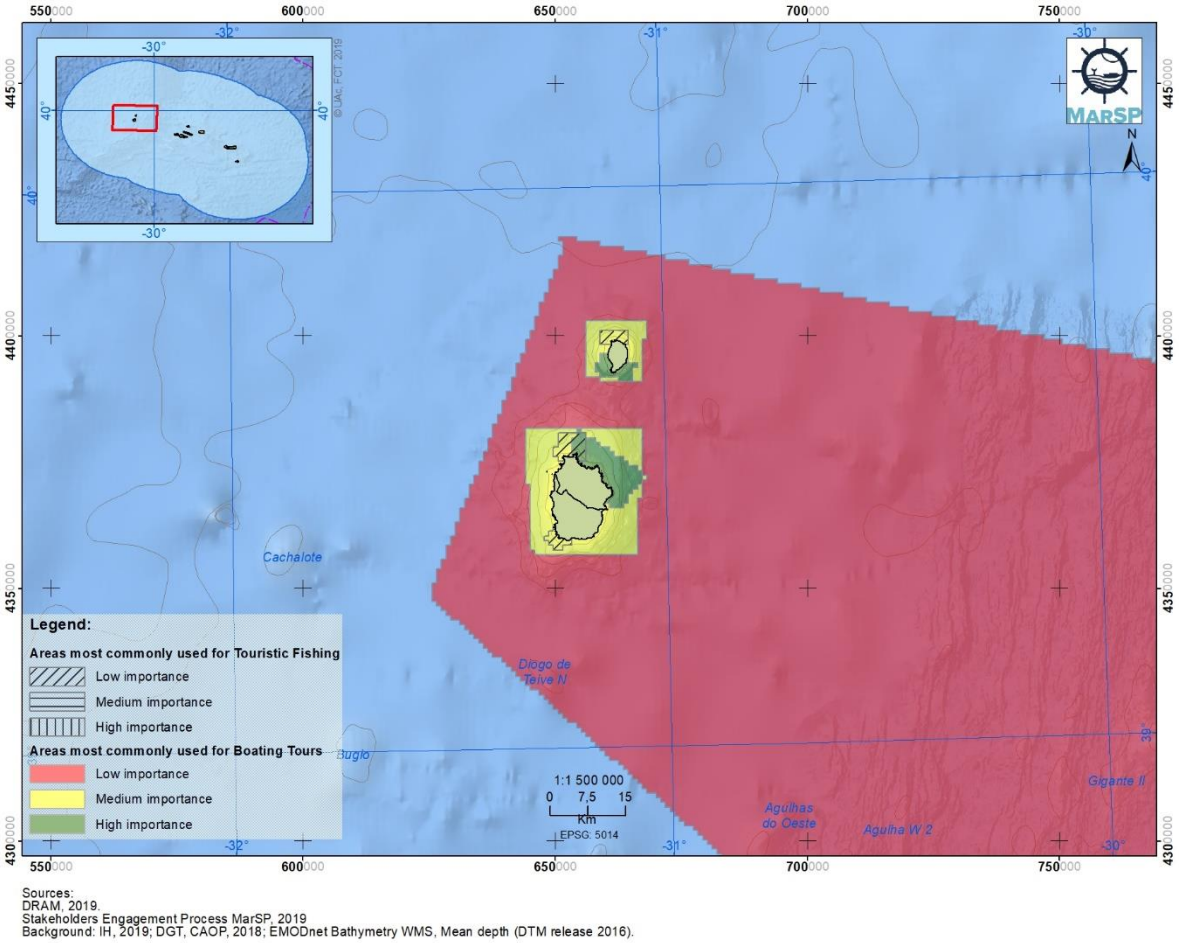
Sources:
DRAM, 2019
Stakeholders Engagement Process MarSP, 2019
Background: IH, 2019; DGT, CAOP, 2018.

Figure 82. Race fields and training areas and spots and areas most commonly used for the nautical sports activity, and Yachting most commonly routes used by stakeholders in São Miguel Island.



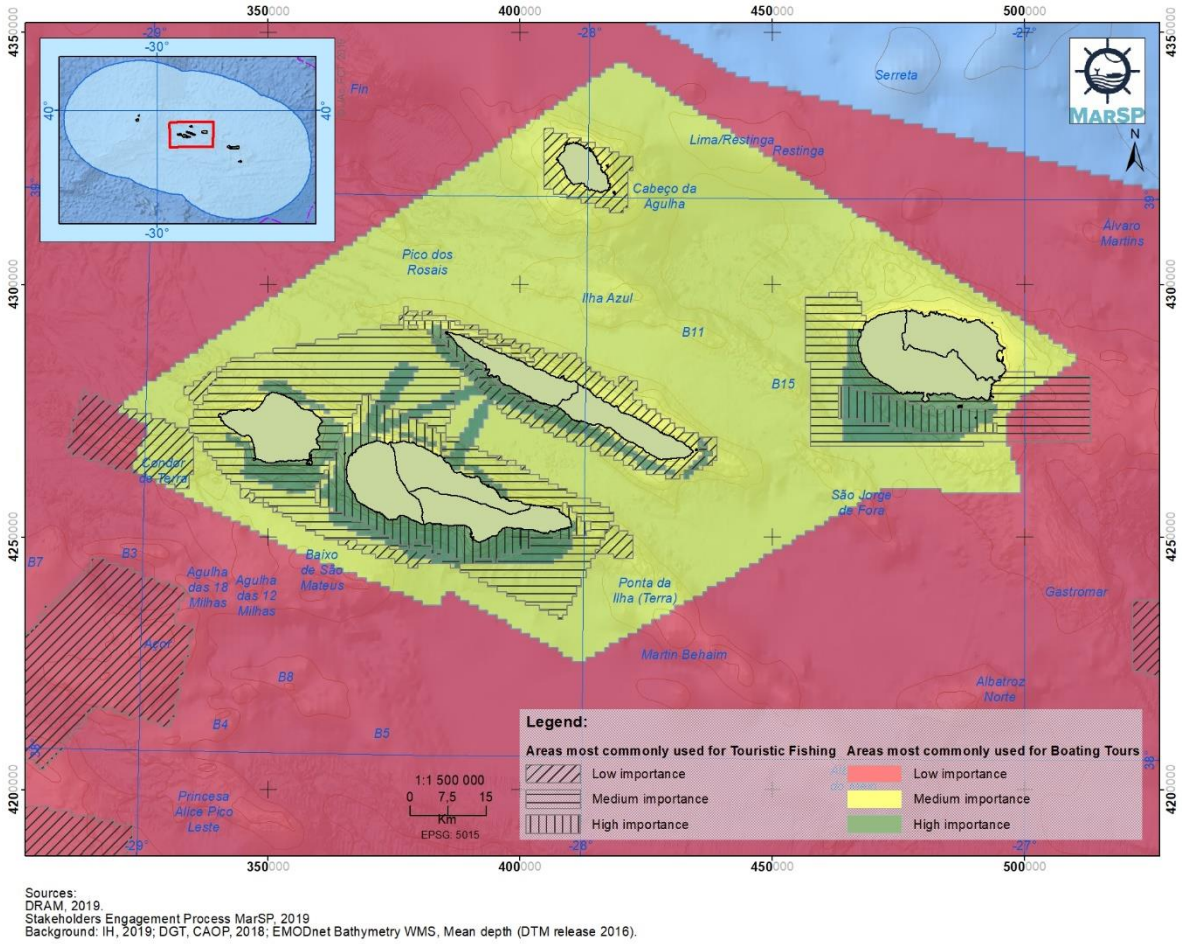
Sources:
DRAM, 2019
Stakeholders Engagement Process MarSP, 2019
Background: IH, 2019; DGT, CAOP, 2018.

Figure 83. Race fields and training areas and spots and areas most commonly used for the nautical sports activity, and Yachting most commonly routes used by stakeholders in Santa Maria Island.



Sources:
DRAM, 2019.
Stakeholders Engagement Process MarSP, 2019
Background: IH, 2019; DGT, CAOP, 2018; EMODnet Bathymetry WMS, Mean depth (DTM release 2016).

Figure 84. Areas most commonly used by stakeholders for the Touristic fishing activity and Boating tours activity in the Western Group of the Azores.



Sources:
DRAM, 2019.
Stakeholders Engagement Process MarSP, 2019
Background: IH, 2019; DGT, CAOP, 2018; EMODnet Bathymetry WMS, Mean depth (DTM release 2016).

Figure 85. Areas most commonly used by stakeholders for the Touristic fishing activity and Boating tours activity in the Central Group of the Azores.

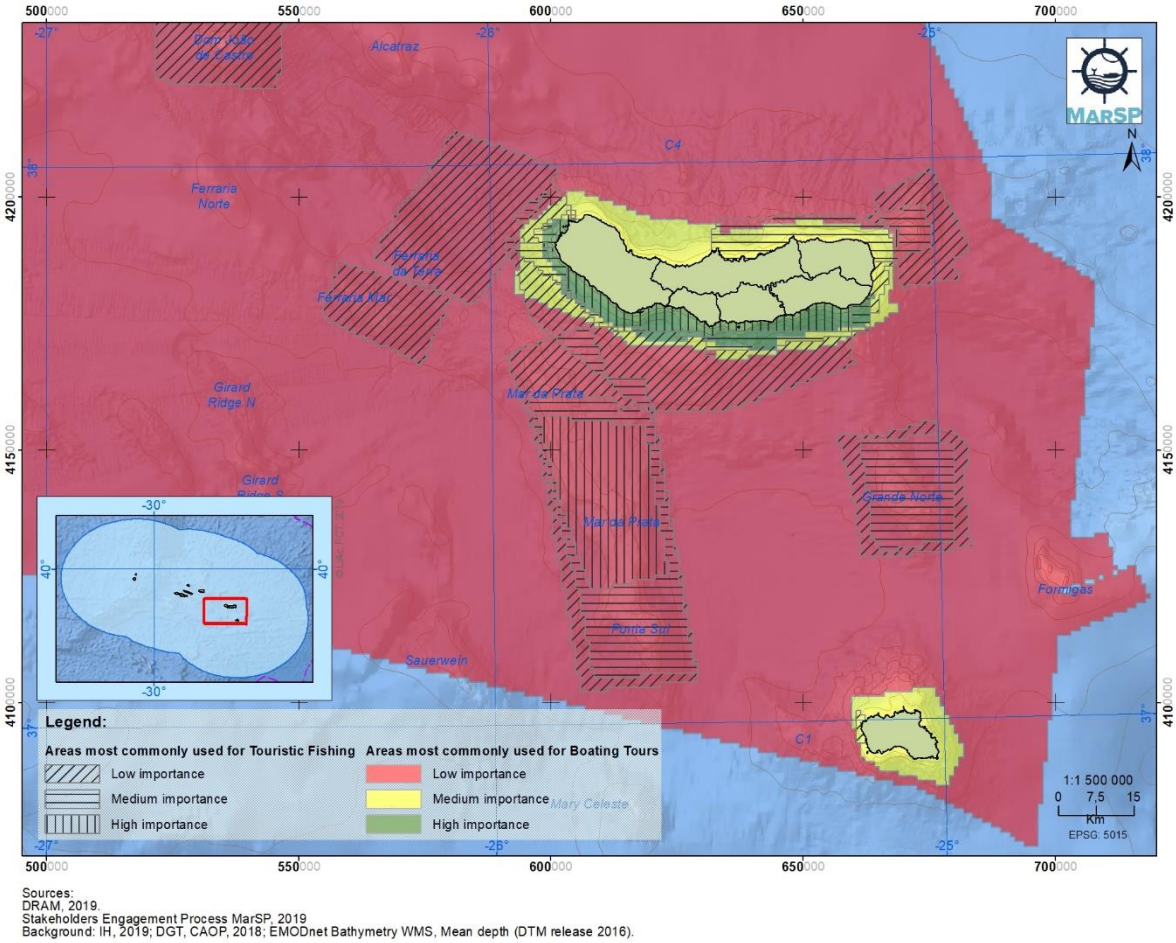


Figure 86. Areas most commonly used by stakeholders for the Touristic fishing activity and Boating tours activity in the Eastern Group of the Azores.

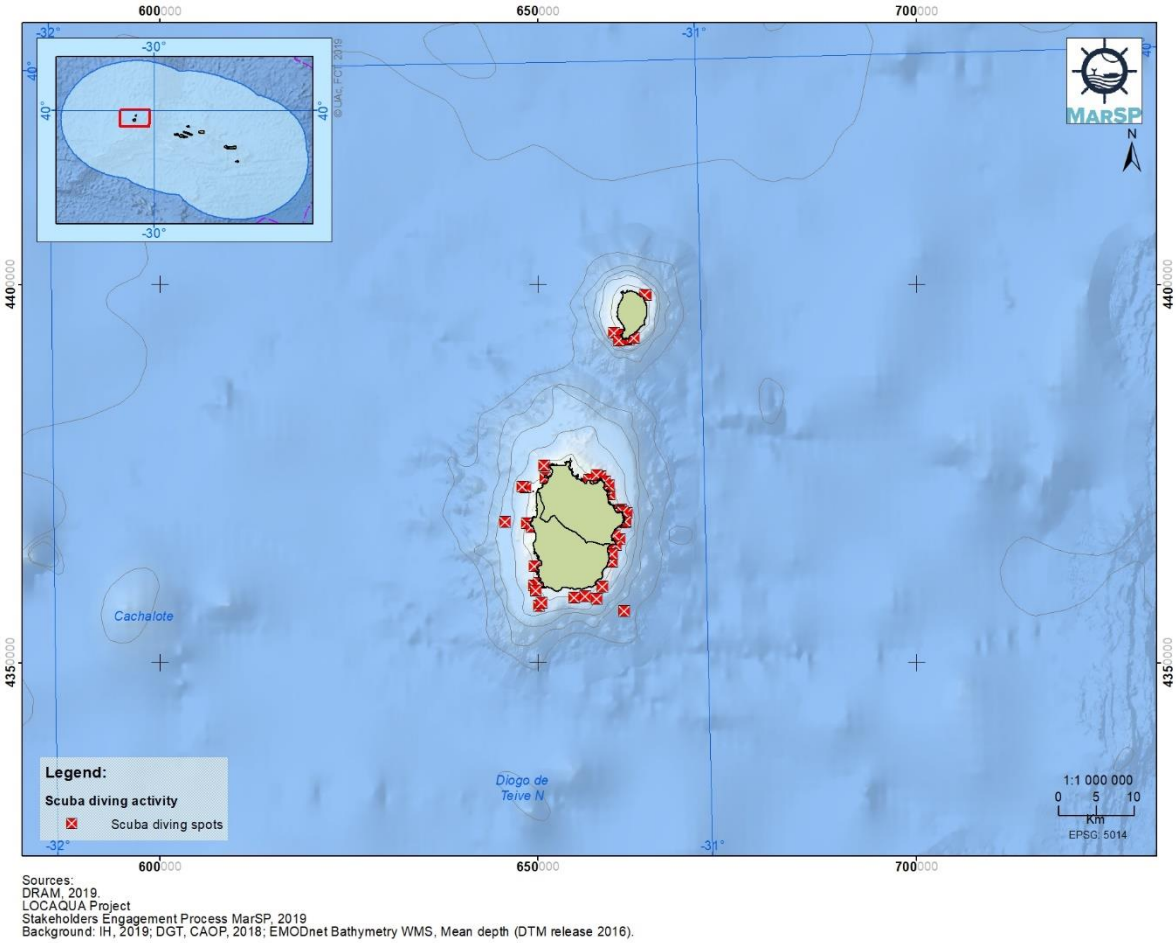
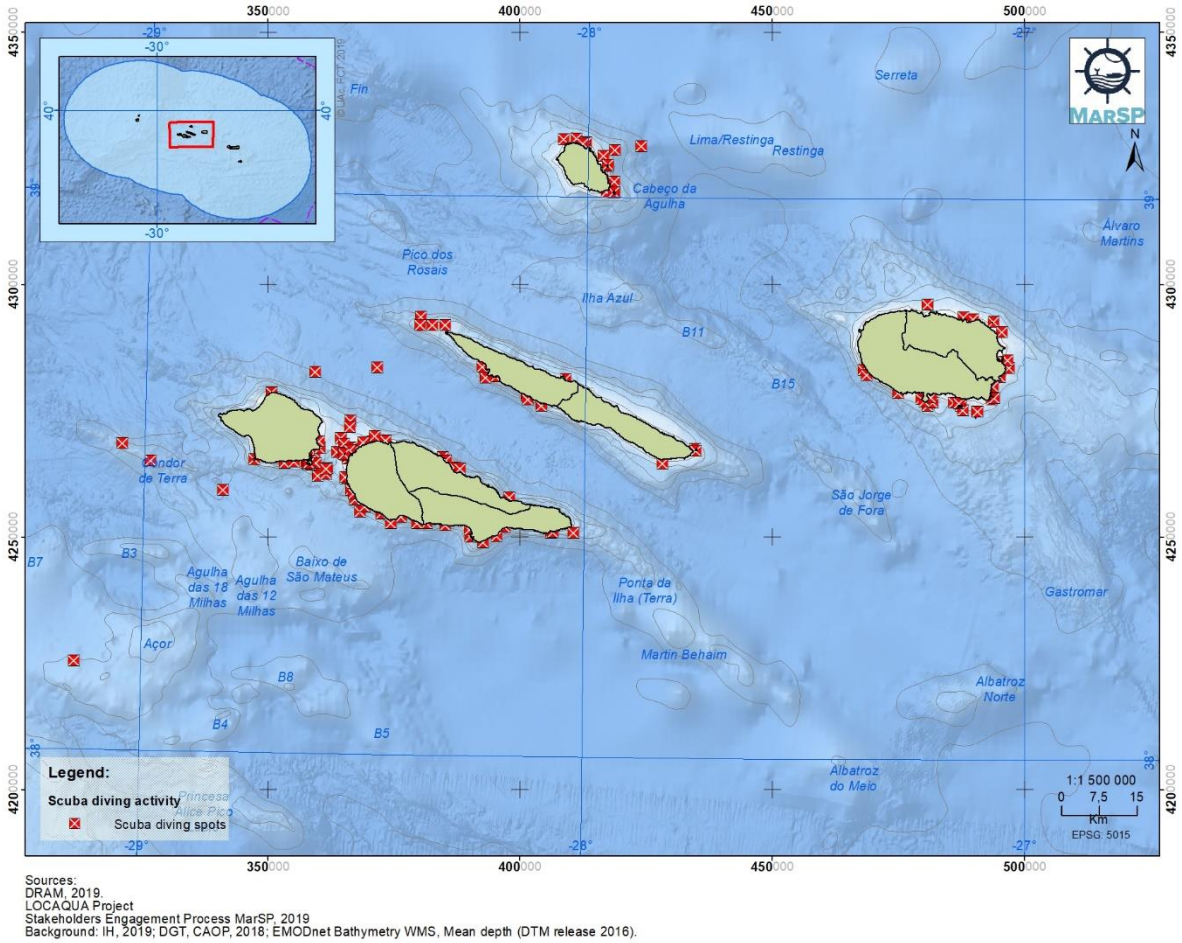
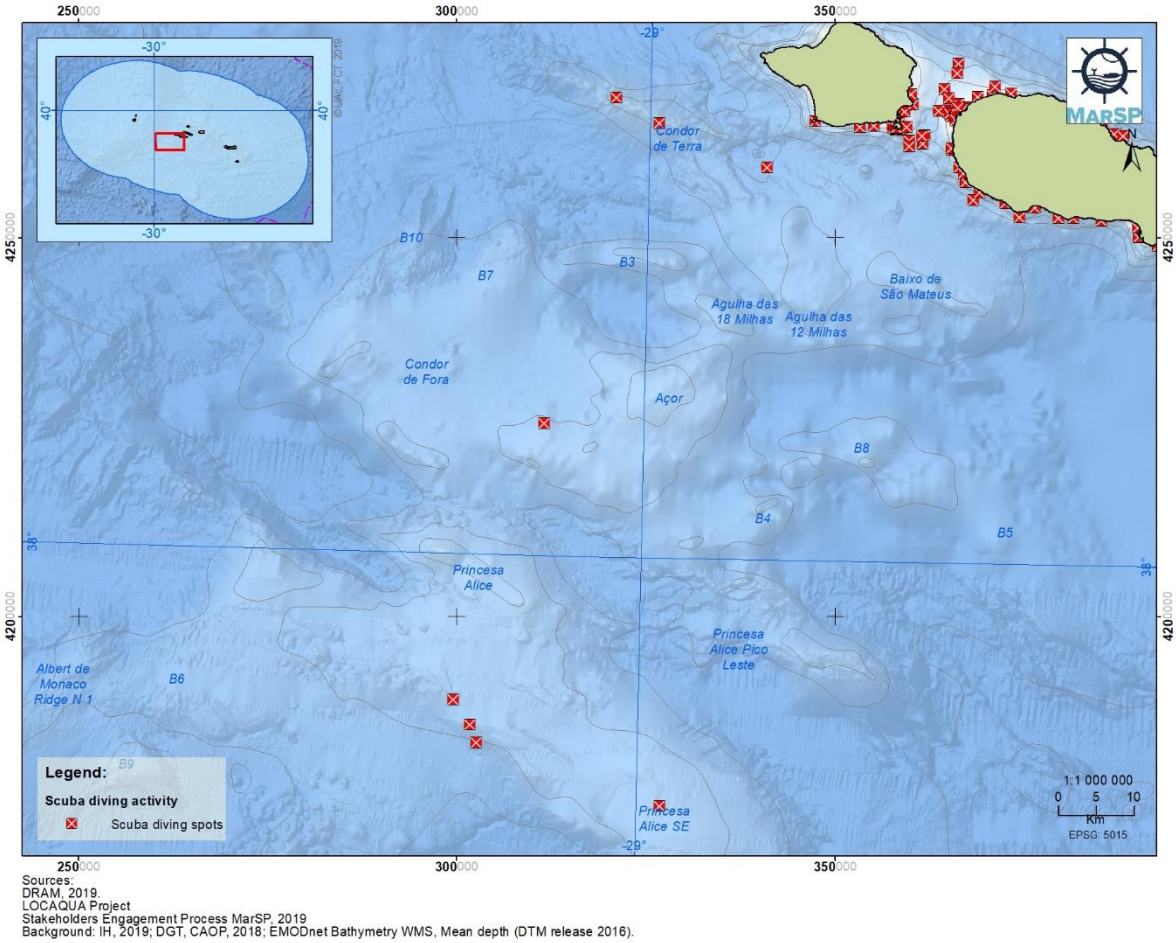


Figure 87. Scuba diving spots identified by stakeholders and from LOCAQUA Project at the Western Group of the Azores.



Sources:
DRAM, 2019.
LOCAQUA Project
Stakeholders Engagement Process MarSP, 2019
Background: IH, 2019; DGT, CAOP, 2018; EMODnet Bathymetry WMS, Mean depth (DTM release 2016).

Figure 88. Scuba diving spots identified by stakeholders and from LOCAQUA Project present at the Central Group of the Azores.



Sources:
DRAM, 2019.
LOCAQUA Project
Stakeholders Engagement Process MarSP, 2019
Background: IH, 2019; DGT, CAOP, 2018; EMODnet Bathymetry WMS, Mean depth (DTM release 2016).

Figure 89. Scuba diving spots identified by stakeholders nearby to the islands and from LOCAQUA Project presents in the Central Group of the Azores.

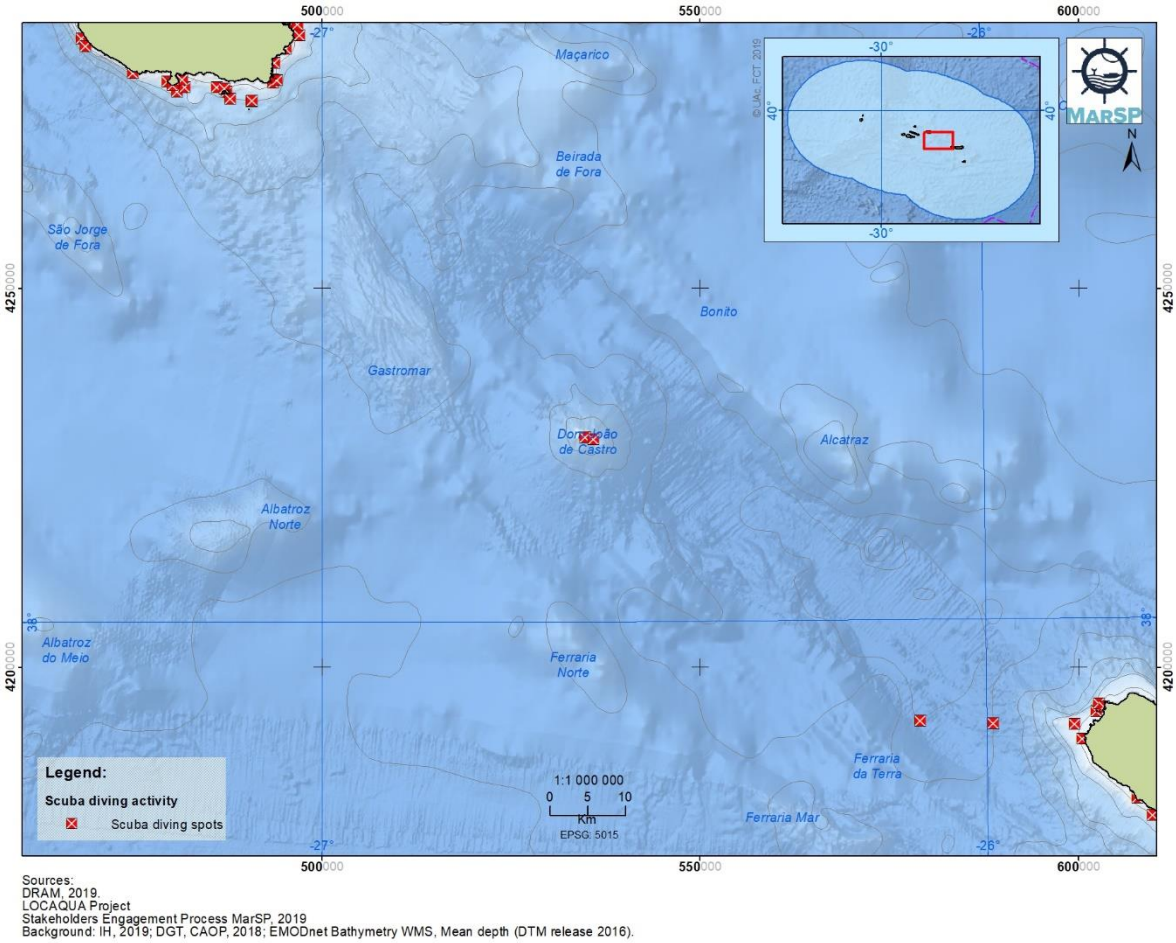
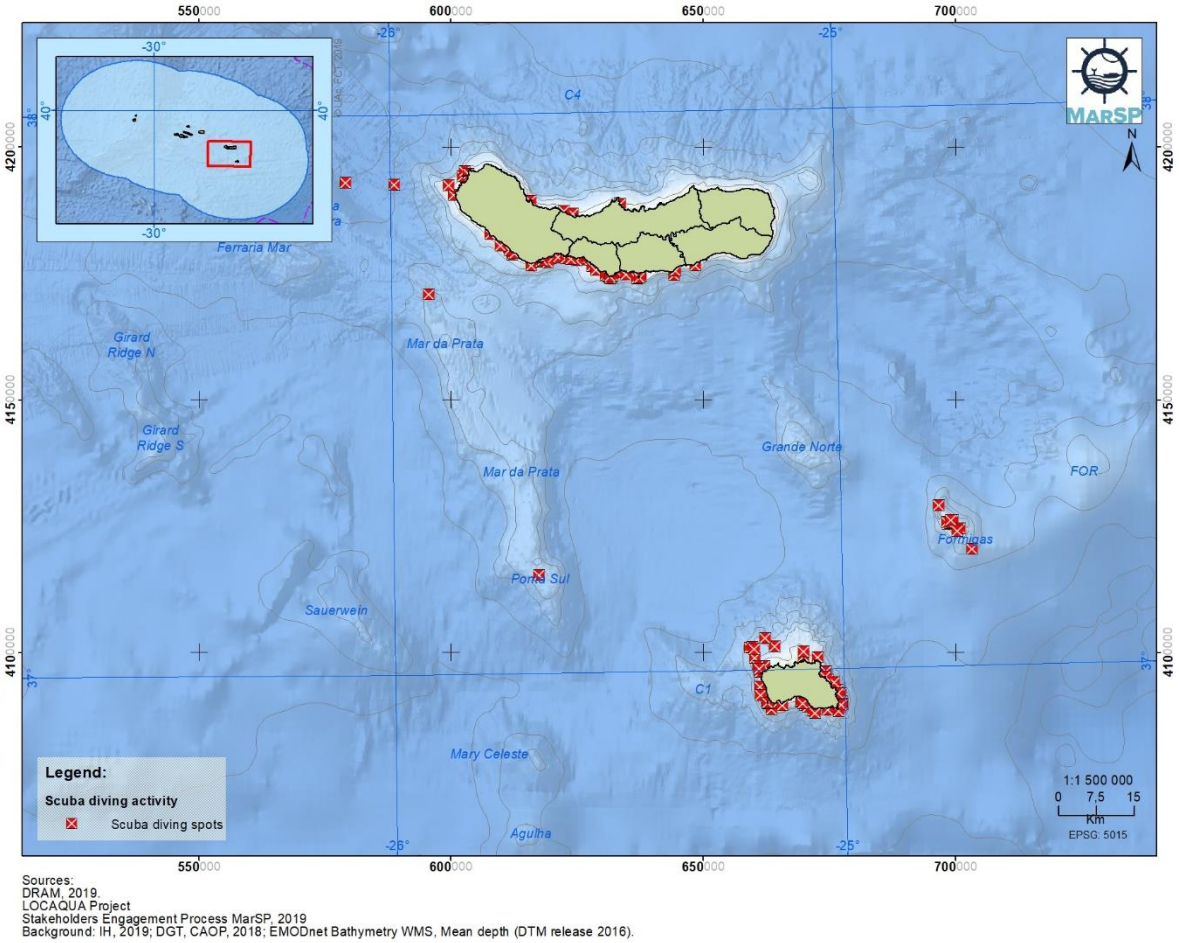
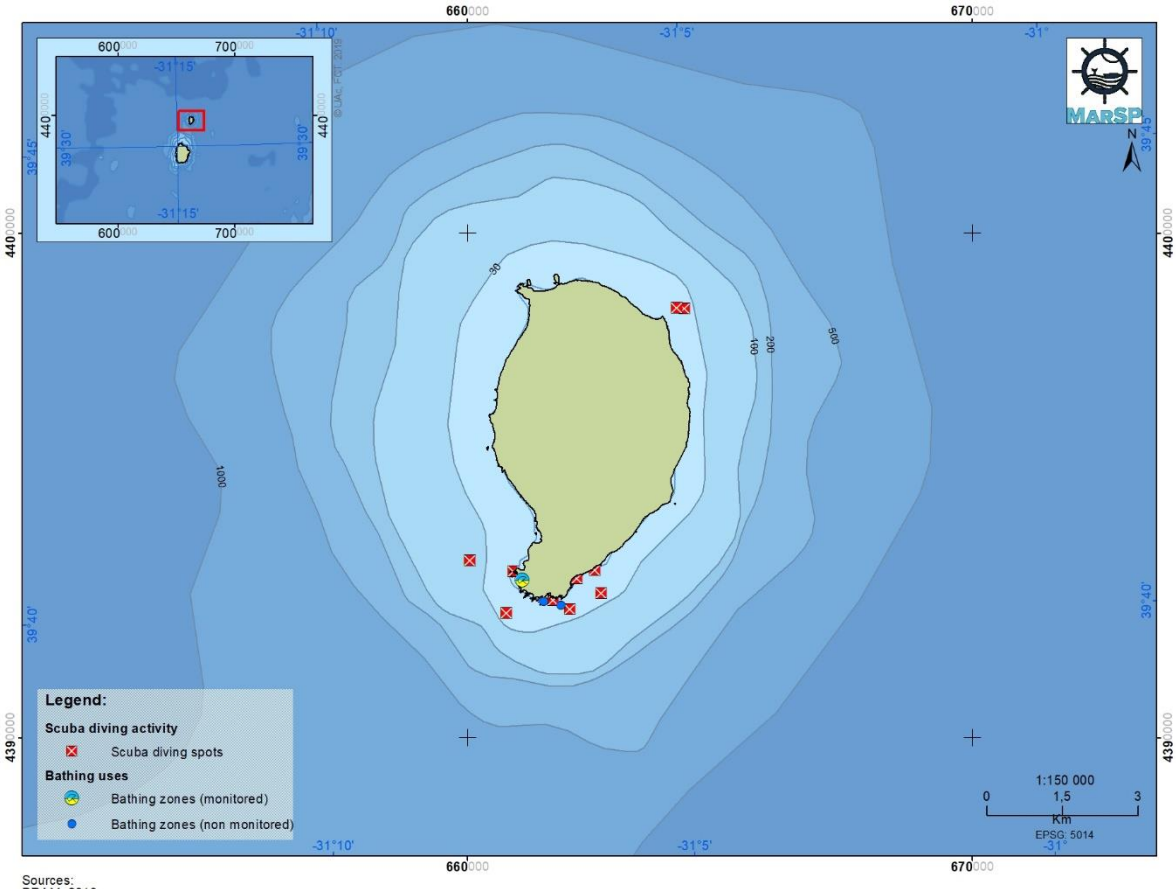


Figure 90. Scuba diving spots identified by stakeholders nearby to the islands and from LOCAQUA Project presents between the Central and the Eastern Group of the Azores.



Sources:
DRAM, 2019.
LOCAQUA Project
Stakeholders Engagement Process MarSP, 2019
Background: IH, 2019; DGT, CAOP, 2018; EMODnet Bathymetry WMS, Mean depth (DTM release 2016).

Figure 91. Scuba diving spots identified by stakeholders and from LOCAQUA Project presents in the Eastern Group of the Azores.



Sources:
DRAM, 2019
LOCAQUA Project
Stakeholders Engagement Process MarSP, 2019
Background: IH, 2019; DGT, CAOP, 2018.

Figure 92. Scuba diving spots identified by stakeholders and from LOCAQUA Project, and bathing zones monitored and non-monitored presents in Corvo Island.

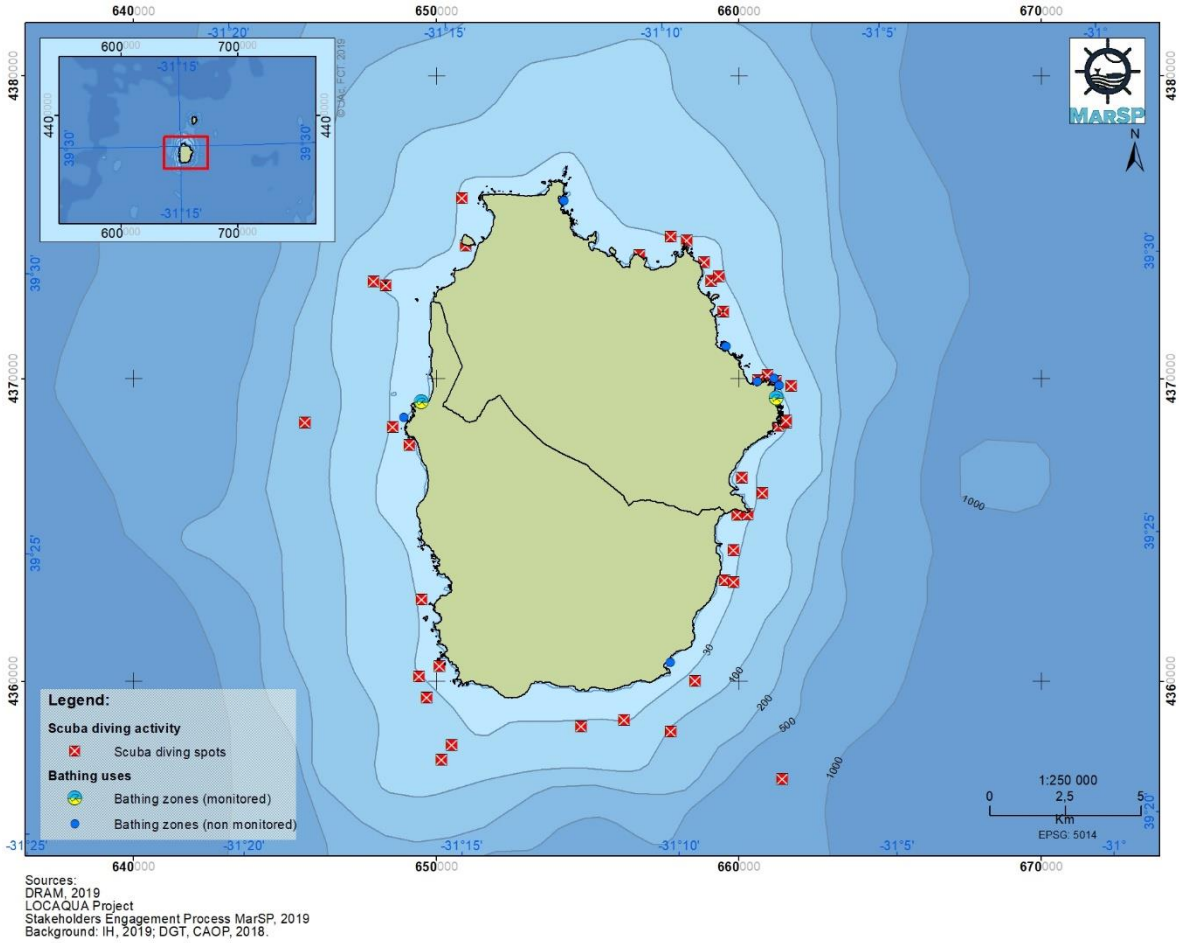


Figure 93. Scuba diving spots identified by stakeholders and from LOCAQUA Project, and bathing zones monitored and non-monitored presents in Flores Island.

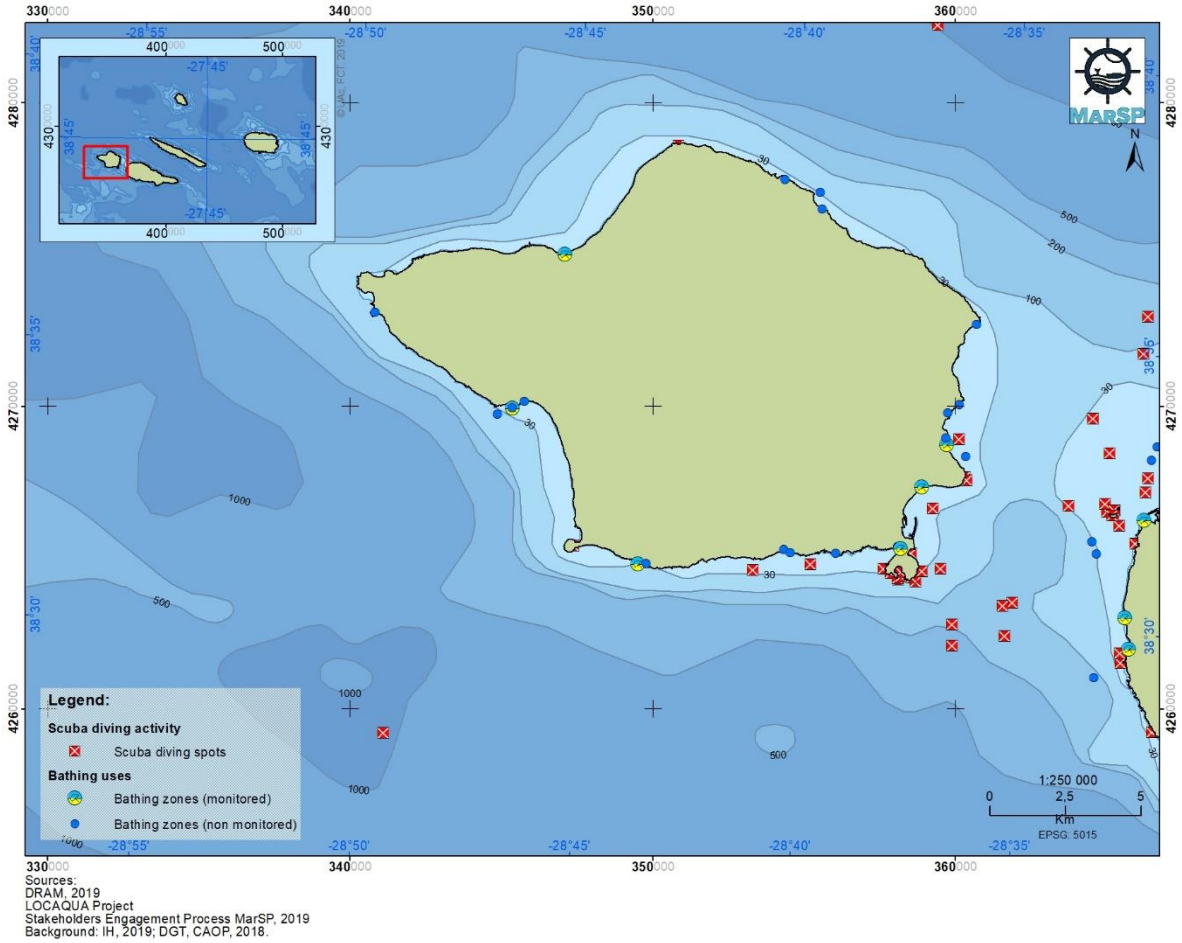


Figure 94. Scuba diving spots identified by stakeholders and from LOCAQUA Project, and bathing zones monitored and non-monitored presents in Faial Island.

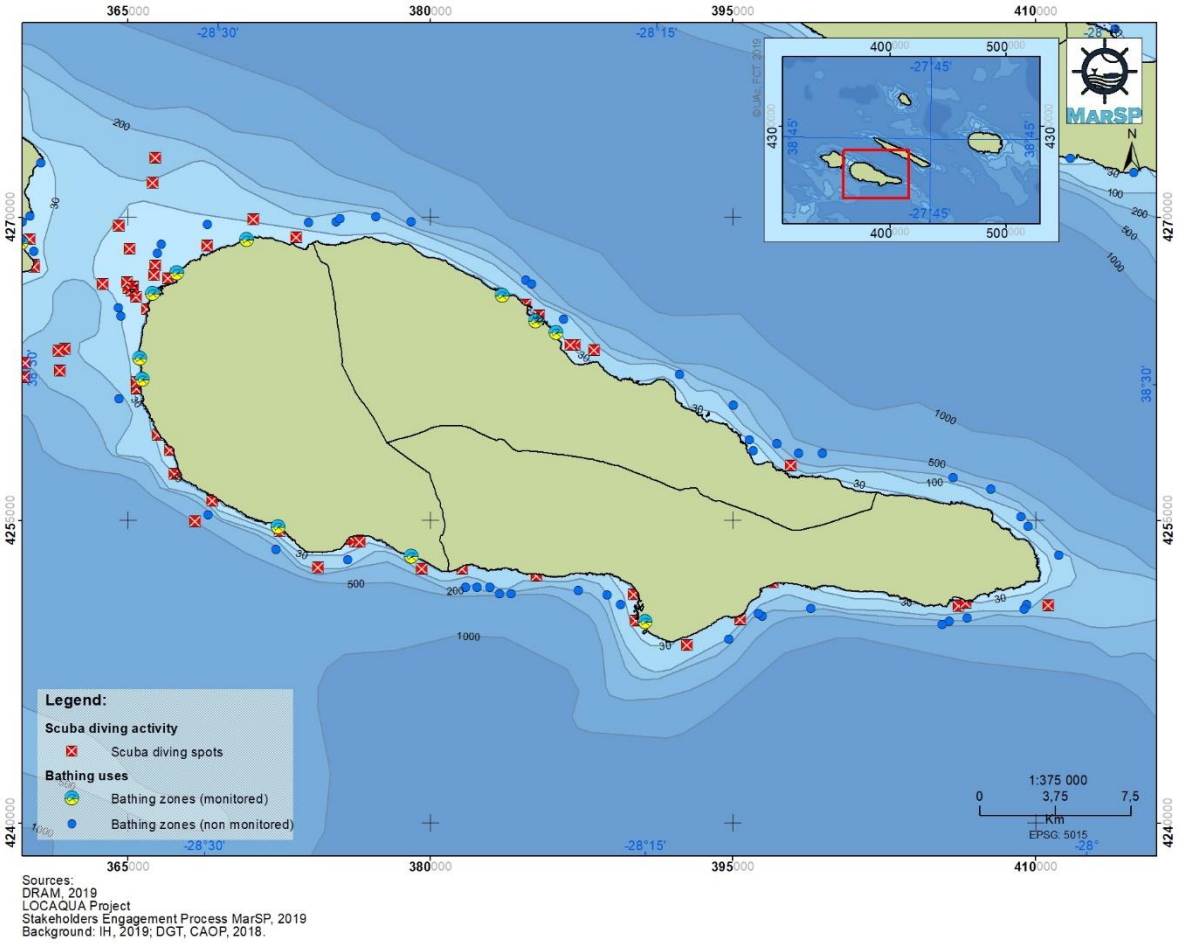


Figure 95. Scuba diving spots identified by stakeholders and from LOCAQUA Project, and bathing zones monitored and non-monitored presents in Pico Island.

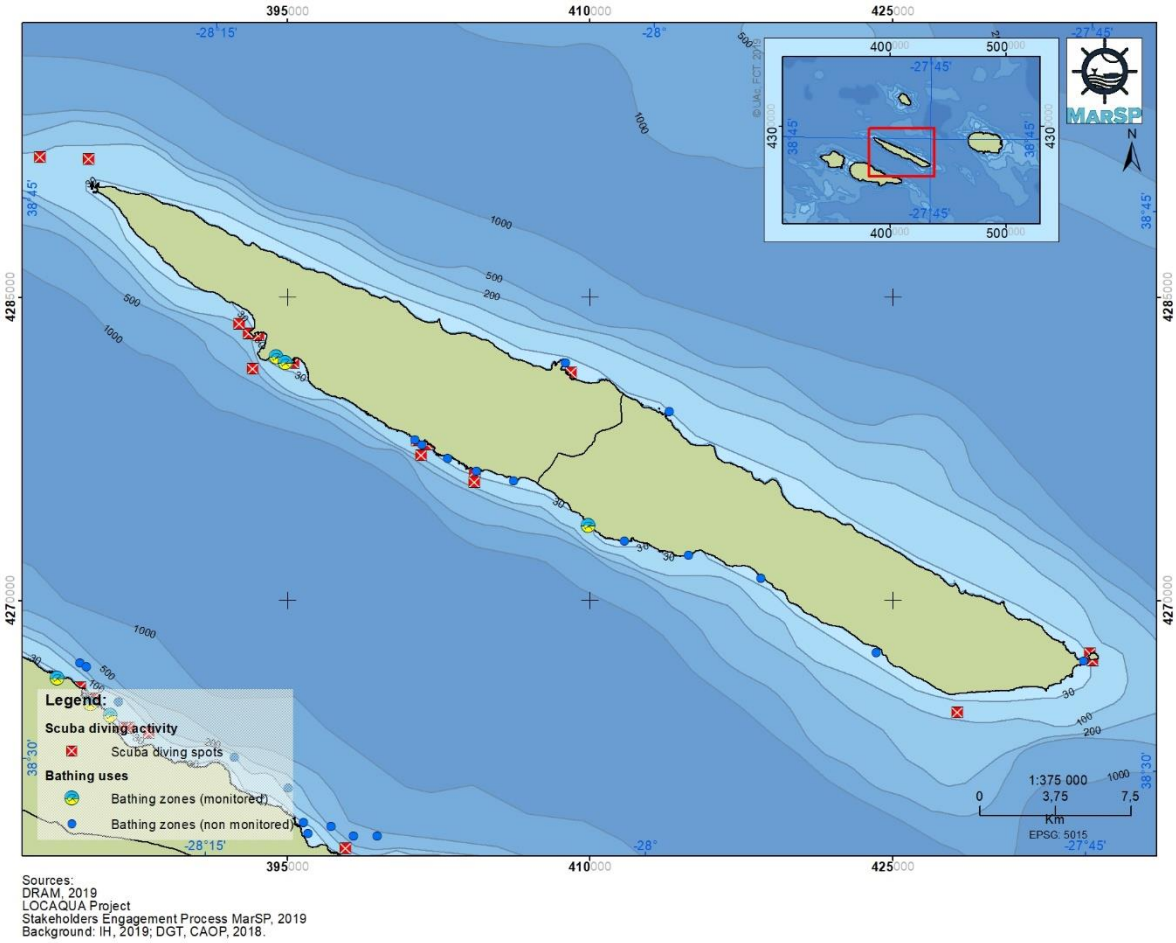


Figure 96. Scuba diving spots identified by stakeholders and from LOCAQUA Project, and bathing zones monitored and non-monitored presents in São Jorge Island.

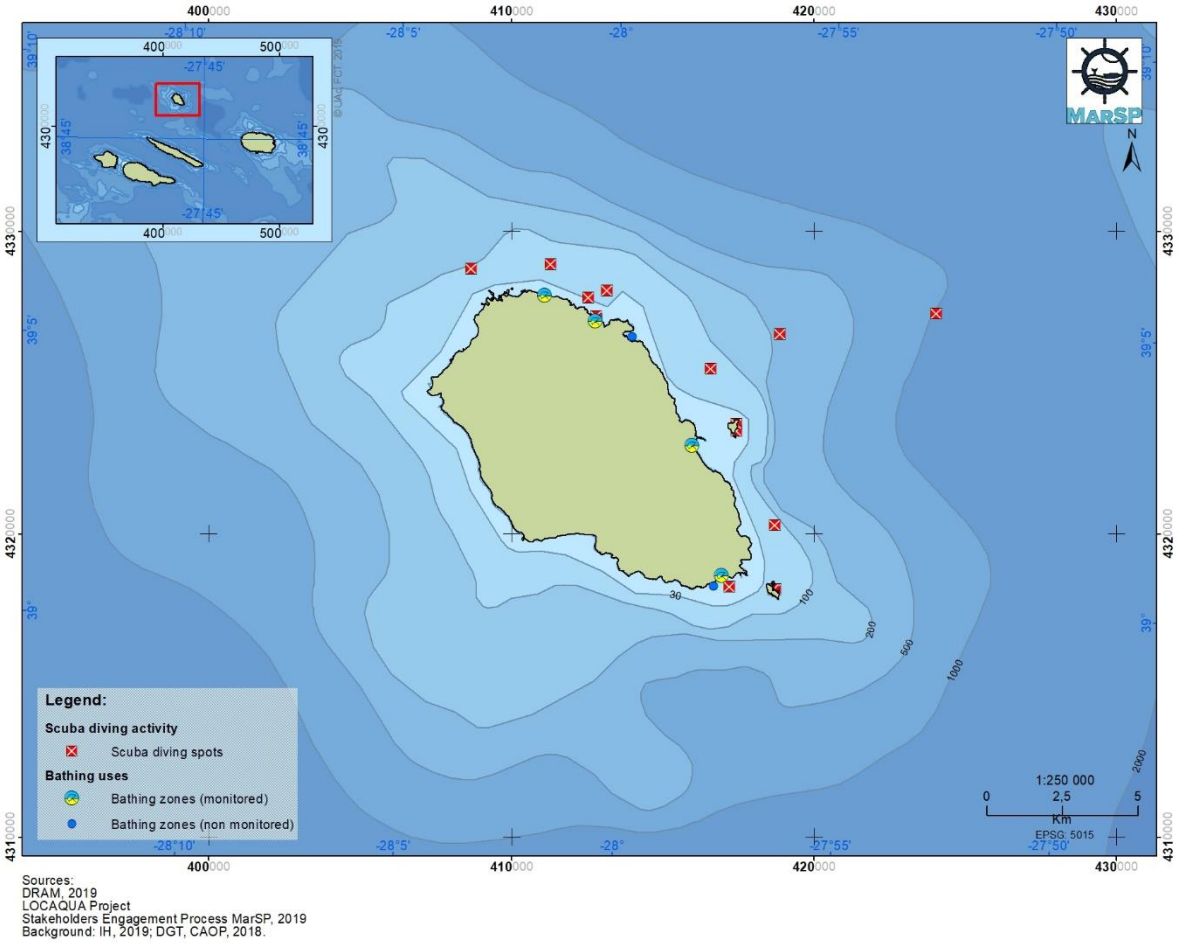


Figure 97. Scuba diving spots identified by stakeholders and from LOCAQUA Project, and bathing zones monitored and non-monitored presents in Graciosa Island.

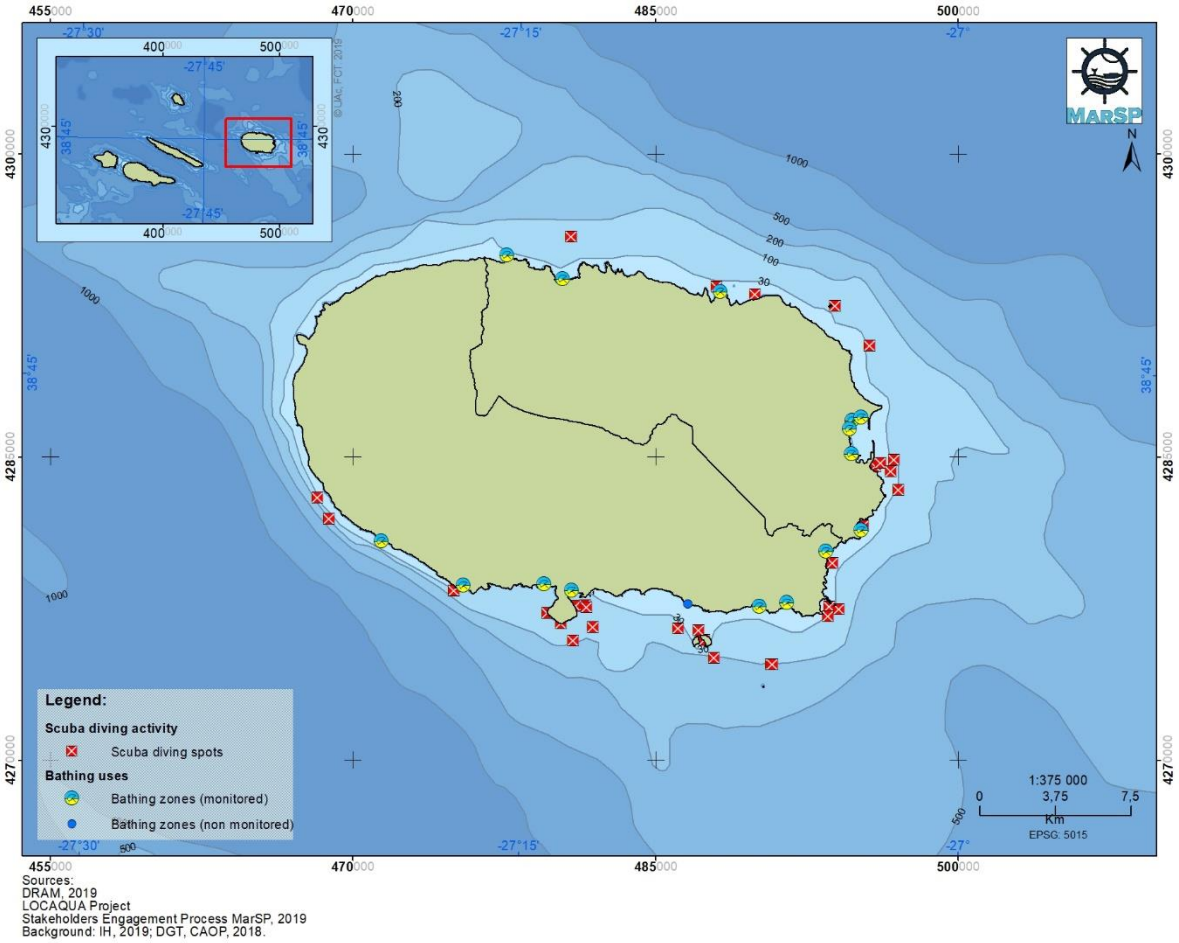


Figure 98. Scuba diving spots identified by stakeholders and from LOCAQUA Project, and bathing zones monitored and non-monitored presents in Terceira Island.

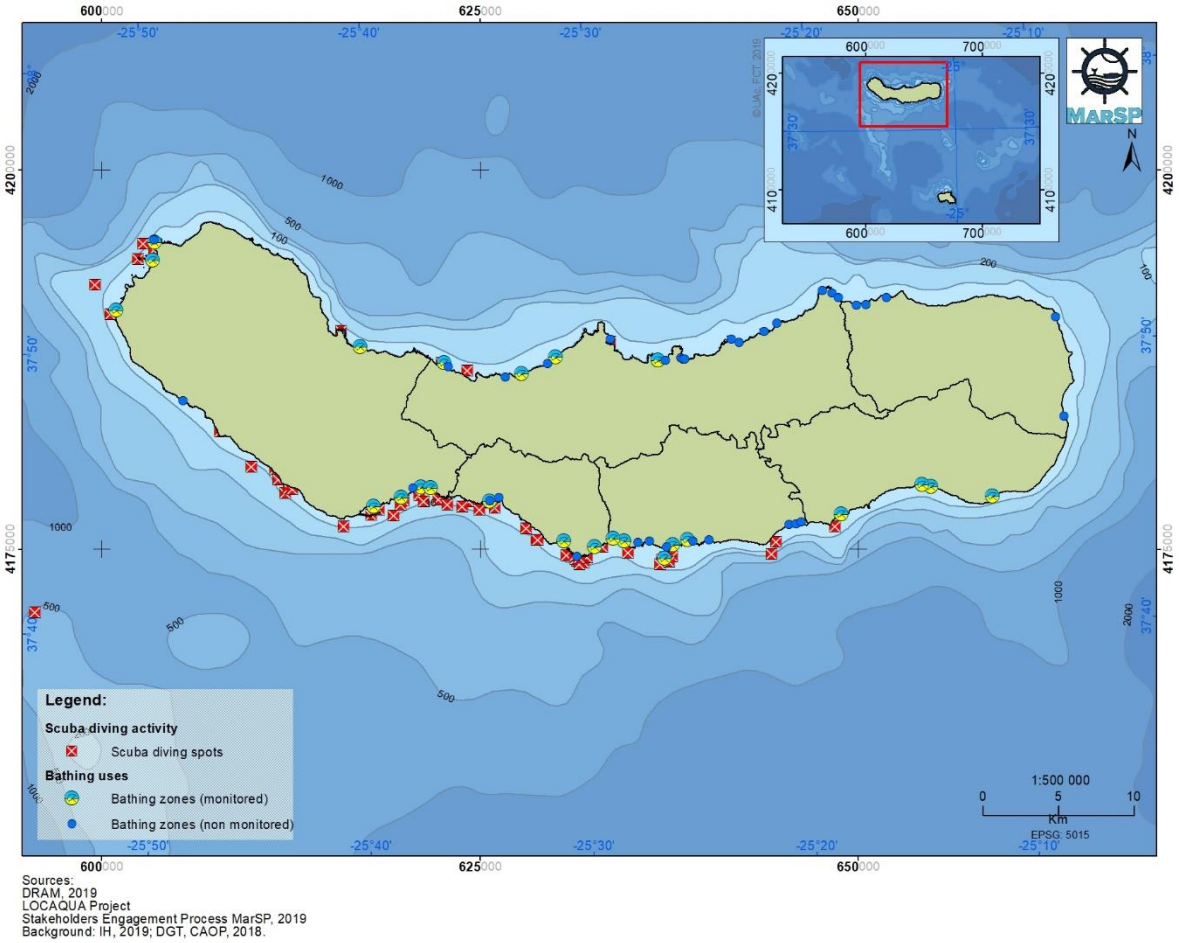


Figure 99. Scuba diving spots identified by stakeholders and from LOCAQUA Project, and bathing zones monitored and non-monitored presents in São Miguel Island.

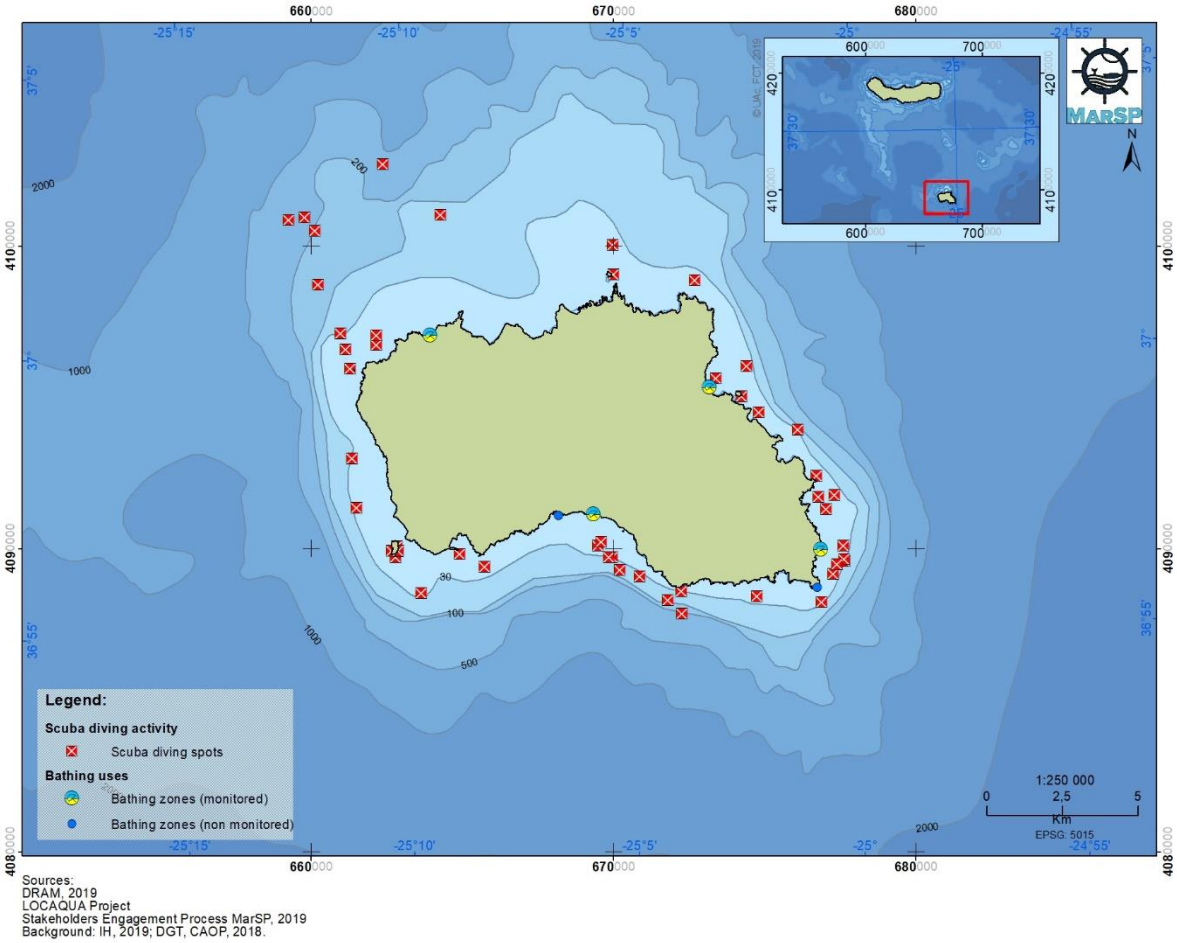


Figure 100. Scuba diving spots identified by stakeholders and from LOCAQUA Project, and bathing zones monitored and non-monitored presents in Santa Maria Island.

The following list refers to observations from stakeholders that were not possible to spatialize, but that are relevant to the characterization of the current spatial situation of the sector:

- The southeast area of Pico Island is considered as important for whale watching activity and is very often use by the OMTs of Lajes do Pico (was not identified distances);
- In Terceira Island,in Caldeira das Lajes, there is a municipal swimming pool in land (nearby coastline);
- In São Miguel Island, the area between the coastline and 6 nautical miles is considered a "relevant zone to whale watching";
- All the coastline of Santa Maria Island is considered an area relevant to whale watching activity (was not identified distances).

Sectorial Analysis

The sector diagnosis presented in this section includes a SWOT analysis and the analysis of sectoral interactions (sector-sector, land-sea interactions, sector-environment). The methodological approach for all analysis was similar and mainly based on regional stakeholders' consultation.
The first step to develop the analysis was based on sectoral representative stakeholders' consultation, through individual interviews. Stakeholders were asked to give their technical opinion on the fulfilment of each analysis for the sector they represent. For coastal and maritime tourism sector, two representative regional stakeholder accepted to participate in the individual interview. The analyses resulting from this step were reviewed during the 2nd MarSP Regional Stakeholders Workshop (developed in April 2019), which had the participation of 78 stakeholders distributed in three Azores Islands: São Miguel, Terceira and Faial. In the workshop, stakeholders were grouped according to the sectors they represent and were asked to comment on and complement the analyses for those sectors. The analysis for each sector includes consensual results from both regional stakeholders' consultation (individual interviews and the workshop) and additional topics from literature review for the sector.

SWOT Analysis

A SWOT analysis was developed for each maritime sector identified for the Azores. Stakeholders were asked to identify the strengths, weaknesses, opportunities and threats they consider as the most important for the sector they represent. The final SWOT analysis for the coastal and maritime tourism sector in the Azores is represented in **Table 32**. The SWOT analysis resulting from the sectoral interview presented few points, whereby Workshop participants complemented the analysis. Furthermore, it is important to note that topics highlighted in bold in the table below were considered by stakeholders as most important.

Table 32. SWOT analysis from regional stakeholders' consultation for coastal and maritime tourism in the Azores.

	Positive factors	Negative factors
Internal factors	**Strengths** - **The great value of tourism in the Azores lies in the endogenous resources and their biodiversity (e.g. marine biodiversity);** - **Improvement of the economy and local/regional development;** - **The security that the destination offers to the tourists (e.g. little crime, differentiator of the rest);** - **The history of the Region and its cultural offer;** - **Very close proximity policy (e.g. between different government entities);** - The way in which its terrestrial and marine resources have been conserved/preserved; - Liberalization of Azores airspace (low cost flights); - Port network (good network of port infrastructures).	**Weaknesses** - **Lack of training of/qualified human resources;** - **The communication made by the destination to promote the coastal and maritime tourism;** - **Seasonal character of tourism;** - **Regional public policy (e.g. lack of communication between government entities);** - **Constraints to transport/accessibility as it is an outermost region;** - **Impact on nature;** - **Little cooperation between the different competent authorities;** - High destination prices (includes accommodation, transport and other services); - Climate and its image in the market (e.g. the 4 seasons in a single day); - Destination sustainability, focus on maintenance; developing tourism in a sustainable way; - Insufficient means affect the development of this activity by public bodies (e.g. lack of supervision due to lack of means).
External factors	**Opportunities** - **Potential of natural resource diversity;** - **Trends in the growth of nature tourism;** - **Potential of nautical tourism;** - **Potential of cruises tourism;** - **Investing in rural tourism;** - **Destination sustainability, focus on maintenance; developing tourism in a sustainable way;** - **Selling the destination differently (e.g. possibility to see marine animals without causing too much pressure);** - Alternative activities to reduce seasonality (e.g. wave sports and winter diving).	**Threats** - **Threat of mass tourism;** - **Massification of the destination;** - **Load capacities;** - **Current public policy and public strategy (e.g. threat to the good development of the sector);** - **Competitiveness between destinations;** - **Pricing policy out of the market;** - **Redistribution of capacities through different access points;** - **Lack of ocean literacy (e.g. lack of awareness of threats to the marine environment);** - Erosion of the coastline with constructions and modernizations; - Climate change.

Analysis of interactions

The development of a certain activity in the maritime space is usually linked to interactions with the remaining uses and maritime sectors. Those interactions can be both positive or negative and can be both induced or suffered by a certain sector. In the context of the MarSP project, for each maritime sector, three types of interactions were analysed: sector-sectors interactions, land-sea interactions and interactions with the environment. The analysis intended to identify if interactions exist and the level of intensity of the interactions using the following scale: negative values for negative interactions, positive values for positive interactions and zero for absence of interactions. In the matrices, the column "C" represents the negative impacts induced or suffered by the sector, identified as conflicts, while the column "S" represents the induced or suffered positive interactions, deemed as synergies.

Sector-sectors interactions analyses whether there is any type of conflict and/or synergy between each of the maritime sectors identified and the other sectors. The resulting matrix reflects only the analysis of interactions occurring offshore, not including coastal areas within less than 30m bathymetry (the protection maritime zone of protection defined by the coastal zone spatial Plan - POOC).
Land-sea interactions analyse whether there is any type of conflict and/or synergy between each of the maritime sectors identified and coastal activities (up to the 30m bathymetry) developed in the various areas identified in the POOC.
Interactions with the environment analyses if there is any kind of negative and/or positive effect of each of the maritime sectors identified to the environment, specifically considering the descriptors of the good environmental status (GES), and respective criteria, as defined by the Marine Strategy Framework Directive (MSFD).
During the individual interviews, stakeholders were asked to identify the levels of conflicts and/or synergies of underwater cultural heritage with other sectors. The final values were calculated using the tendency of answers and represent the stakeholders' perception trend. As this first analysis is based on inputs from stakeholders representing the maritime sector, to avoid or decrease possible bias in the results, during the Workshop, stakeholders were asked to comment and, when in disagreement, to propose a different value to classify the level of conflict/synergy. The final values from the workshop were calculated using the mean of all values resulting from all discussion tables.
Literature review was also used to complement the characterization of the interactions, identifying if a conflict or a synergy exists in the Azores or on other contexts.

Interaction with other sectors

In order to analyse the interactions between coastal and maritime tourism and other uses and activities developed in the maritime space, an interaction matrix was created according to the aforementioned methodology.
The values featured on the matrix below represent the trend analysis of the stakeholders' sectoral consultation and the 2nd MarSP Stakeholder Engagement Workshop. Nonetheless, it is important to observe that the coastal and maritime tourism sector was analysed mainly based on the Stakeholders workshop sector group, considering that the participation on face to face interviews was almost null (two interviews).

Table 33. Characterization of the interactions of coastal and maritime tourism sector with the others maritime sectors in the Azores defined by stakeholders' consultation.

Sector-Sectors	Coastal and maritime tourism					
	Sectoral interviews		2nd Workshop		Literature review	
	C	S	C	S	C	S
Fisheries	-2	3	-1.2	2.4	x	x
Aquaculture	0	3	-0.2	2	x	x
Extraction of non-metallic mineral resources	-3	0	-1.8	0	x	
Energy	0	0	-0.6	0.2		
Maritime security, defence, surveillance and civil protection	0	0	-0.2	0	x	
Navigation and maritime transportation	-1	2	-0.8	2.2	x	x
Infrastructures	-1	0	-0.8	1		
Scientific research and marine biotechnology	0	3	-0.2	2.6		x
Underwater cultural heritage	0	3	-0.2	3	x	x
Environmental conservation and MPAs	0	3	-1.2	2.8	x	
Legend	**C –** Conflict; **S –** Synergy; **X –** Existent **-3 –** High conflict; **-2 –** Moderate conflict; **-1 –** Low conflict **0 –** Without conflict/synergy **1 –** Low synergy; **2 –** Moderate synergy; **3 –** High synergy **"-" –** Does not answer				Conflict scale low → high Synergy scale	

The environmental impacts of other sectors can impact coastal tourism; any maritime and land-based activity affecting environmental quality can in principle negatively affect this sector. Co-existence with other MSP sectors not only depends on direct spatial conflicts; even though space is not directly shared among tourism and other sectors, conflicts might arise due to indirect connections also linked to land-sea interactions. Coastal and maritime tourism highly depends on good environmental conditions and in particular on good water quality in particular. An example of this are ships that leak oil. This mechanism goes both ways: an example being the trash left behind by beach guests in the water, affecting the water quality
and activities depending on it (e.g. the same tourism or even aquaculture) (Linette , van der Haar, Skousen, Zonta, & Ecorys, 2018). The interaction with the coastal and maritime tourism sector with the other sectors may be justified, according Linette et al. (2018) as:

- Tourism and ports are semicompatible, as arrivals generate wealth and business opportunities but also represent a challenge for ports, reception and urban infrastructure as well as for the environment. Port efficiency for the development of connection gateways for coastal regions remains a crucial requirement for the economic development of coastal and inland areas;
- Tourism and shipping are semicompatible. While cruise shipping is an important vehicle for maritime and coastal tourism development, freight transport can be seen as a conflicting activity in terms of demand for space;
- The compatibility between tourism and fishing depends on the subsectors: when sub-sectors of fishing are considered coastal tourism, such as pesca-tourism or sports fishing, the sectors are compatible. However, for commercial fisheries these sectors can hardly be combined spatially.

- Tourism and aquaculture are semicompatible: when practiced far enough offshore, so to reduce pollution. However, finfish aquaculture along the coast can impact ecosystem health and environmental quality, which are considered essential assets for coastal and maritime tourism;
- Tourism and conservation tend to create conflicts and tensions, especially through mass tourism, as coastal tourism (likewise cruise tourism) can put high pressures on the ecosystem (mostly through waste water, water pollution, and other forms of pollution as well as trespassing). However, synergies may emerge through alternative scenarios, including eco-tourism activities and initiatives developed in collaboration with e.g. MPAs.
- Tourism and submarine cables are semi-compatible: cables may have a temporary impact on underwater cultural heritage; conflicts relating to anchoring damages between recreational boating and cables might also occur;

It is argued that tourism is compatible with all human activities and uses, except for marine and coastal protected areas - MPAs (with which they are conditionally compatible) and military uses (with which they are totally incompatible) (Gee, Kannen, Licht-Eggert, Glaeser, & Sterr, 2006; Papageorgiou, 2016). Ehler and Douvere (Ehler & Douvere, 2009) on the other hand, expand their list of sea-uses incompatible with tourism, to include also those related to resource extraction (gas platforms, off-shore renewable energy, etc.) as well as those related to scientific research. It was also identified in a study for the COEXIST EU project, incompatibilities of tourism (and especially leisure boating) with reservation sites, off-shore wind farms and aquaculture; i.e. all human activities requiring the installation of fixed infrastructures at the sea (Gramolini, Grati, Fabi, & Schulze, 2013; Papageorgiou, 2016).

Uses compatibilization and Multi-uses

Ocean multi-use (MU) is an emerging concept which responds to the increasing demand for marine resources and space. It has been defined as the intentional "joint use of resources in close geographic proximity by either a single user or multiple users. It is an umbrella term that covers a multitude of use combinations in the marine realm and represents a radical change from the concept of exclusive resource rights to the inclusive sharing of resources and space by one or more users" (*in* (Schupp, et al., 2019)).
A study has already been developed in the Azores (Vergílio, Calado, & Caña Varona, MUSES Project Case study 3B: Development of tourism and fishing in the Southern Atlantic Sea (Azores archipelago – Eastern Atlantic Sea, 2017) to identify opportunities of MU development. The study included sectoral stakeholders' consultation to ensure representatives and practitioners of the main sectors were listen and involved. Also, combine the tourism and recreation use with fisheries, UCH, environmental protection and scientific research.

The combination of Fisheries & Tourism and Recreation is associated to Pesca-tourism activity that is an opportunity to for fishers to have an alternative source of income and to divulge and maintain their culture, as well as for public awareness about the fisheries sector (Piasecki, et al., 2016). In 2008, the Azorean Regional Government published legislation focused on Fisheries & Tourism and Recreation (Regional Legislative Decree 23/2007/A, in its current wording) as one of these activities. The MU, identified in the Azores as existent, is characterized by commercial small scale fishers welcoming tourists aboard on their commercial fishing vessels, allowing them to watch, or even participate, in the traditional fishing activity. In the Azores, the activity of pesca-tourism requires an annual licence, which has to be requested from the regional authority with competence in the area of fisheries (currently the DRP). In 2015, five permits were given. In 2018, the number increased to 13 licences (DRP, 2019). This MU has several benefits, namely the increasing public awareness of

the knowledge needed to be a fishermen practicing commercial fisheries. Parallel activities that might result from the implementation of this MU, such as small fish markets and supporting projects to local elementary schools, were also highlighted (Vergílio, Calado, & Caña Varona, MUSES Project Case study 3B: Development of tourism and fishing in the Southern Atlantic Sea (Azores archipelago – Eastern Atlantic Sea, 2017). By contrast, two disadvantage are: i) the known conflict between OMTs that practice tourist fishing and Pesca-tourism, both spatial and socioeconomic and; ii) the need for part of the crew to remain on land while tourists go on-board to prevent the vessel's capacity being exceeded.

The combination of Tourism and Recreation & Underwater Cultural Heritage & Environmental Protection was identified in the Azorean region as existent. It is characterized by touristic and recreational activities in relation with UCH taking place on Underwater Archaeological Parks. UCH benefits from the conservation management measures of environmental protection areas while tourism benefits from both sectors (Vergílio, Calado, & Caña Varona, MUSES Project Case study 3B: Development of tourism and fishing in the Southern Atlantic Sea (Azores archipelago – Eastern Atlantic Sea, 2017).

The combination of Tourism and Recreation & Environmental Protection was identified by stakeholders as existent in the Azores and consists of the development of touristic activities inside designated marine protected areas, managed with the goal of preserve natural resources (Vergílio, Calado, & Caña Varona, MUSES Project Case study 3B: Development of tourism and fishing in the Southern Atlantic Sea (Azores archipelago – Eastern Atlantic Sea, 2017).

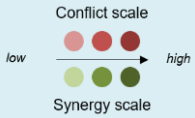
The combination of Scientific Research & Tourism was identified as existent in the Azores. A private enterprise developed this combination of uses offering both land and marine expeditions and the opportunity for tourists to experience technical research activities. The team is composed of biologists, field researchers and tourism professionals to provide a differentiated experience to those who search for their services. During sea trips, environmental data is collected, feeding regional and international monitoring and research programs. Additionally, tourists go aboard, paying for the tour and following or collaborating in the data collection. This combination reduces costs to the government and increases satisfaction for participating in a real scientific activity. A link between science and tourism is promoted, as well as a platform for researchers and sharing of knowledge making tourism environmentally more sustainable (Vergílio, Calado, & Caña Varona, MUSES Project Case study 3B: Development of tourism and fishing in the Southern Atlantic Sea (Azores archipelago – Eastern Atlantic Sea, 2017).

Land-sea interaction

Similarly, the interaction between fisheries and sectors which take place on coastal areas was analysed through a comparison matrix. Similarly, the interaction between fisheries and sectors which take place on coastal areas was analysed through a comparison matrix. This analysis assumes that activities are developed within less than 30 m in bathymetry (areas from the maritime zone of the coastal zone spatial plan - POOC). This analysis assumes that activities are developed within less than 30 m in bathymetry (areas from the maritime zone of the coastal zone spatial plan - POOC).

Table 34. Characterization of interactions of fisheries with coastal zones in the Azores resulting from stakeholders' consultation and literature review.

Land-sea		Coastal and maritime tourism					
		Sectoral interviews		2nd Workshop		Literature review	
		C	S	C	S	C	S
Critical areas for the sustainable coastal use	Natural, cultural and scenic special area	0	3	-1	2.8		
	Bathing zones	0	3	-0.5	3		X
	Edified areas in risk zones	-3	1	-3	0.8		
Environmental protection	Marine environmental protected areas	0	3	-0.8	3	X	
	Land environmental protected areas	0	2	-0.8	2.5		
Coastal protection areas	Edified areas	-1	2	-1.5	2		
	Agricultural, forestry and other uses	-3	1	-2.5	1.3		
	Touristic potential areas	0	3	0	3		
Infrastructures	Airport	-1	3	-1	3		
	Road	-1	3	-1	3		
Navigation	Ports	-1	3	-1	3	X	
	Marinas, 'portinhos'	-1	3	-1.3	3	X	
Legend	**C** – Conflict; **S** – Synergy; **X** – Existent **-3** – High conflict; **-2** – Moderate conflict; **-1** – Low conflict **0** – Without conflict/synergy **1** – Low synergy; **2** – Moderate synergy; **3** – High synergy **"-"** – Does not answer						



Interaction with the environment

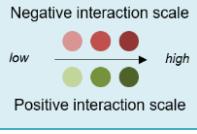
The impacts of fisheries on the environment were analysed taking into consideration the Good Environmental Status (GES) descriptors, as defined by the MSFD.)

Table 35. Characterization of impacts of fisheries in the GES descriptors defined by stakeholders' consultation.

Interactions with the environment	Coastal and maritime tourism					
	Sectoral interviews		2nd Workshop		Literature review	
	N	P	N	P	N	P
Biodiversity	-2	1	-1.5	1	x	
Non-indigenous species	-2	1	-1.8	0.8	x	
Exploited fish and shellfish	-2	1	-2.3	0.8		
Food-webs	-2	1	-2.3	0.5		
Human-induced eutrophication	-1	1	-0.8	0.5		
Sea floor integrity	-1	0	-1	0.3		
Hydrographical conditions	-1	0	-0.5	0		
Contaminants (water, sediments, biota)	-2	0	-2	0		
Contaminants in fish and seafood	-2	0	-1.8	0		
Litter	-3	0	-2.5	0.3	x	
Level of noise	-3	0	-1.8	0		

Legend

N – Negative effect; **P –** Positive effect; **X –** Existent
-3 – High negative effect; **-2 –** Moderate negative effect; **-1 –** Low negative effect
0 – Without negative/positive effect
1 – Low positive effect; **2 –** Moderate positive effect; **3 –** High positive effect
"-" – Does not answer



Additional documents and links

Action Plan 2019-2027: Sustainability of the Azores Tourist Destination, https://sustainable.azores.gov.pt/wp-content/uploads/2019/10/EC08_00PlanoAcao2019_2027.pdf;
Azores Government Portal: Bathing uses, http://www.azores.gov.pt/Gra/SRMCT-MAR/menus/secundario/Zonas+Balneares/;
Azores Government Portal: Maritime-tourism activity, http://www.azores.gov.pt/Gra/SRMCT-MAR/menus/secundario/Actividades+Mar%C3%ADtimas/;
Azores Regional Statistical Office (SREA), https://srea.azores.gov.pt/;
Azores Tourism Observatory (OTA), https://otacores.com/;
Directorate-General for Natural Resources, Safety and Maritime Services (DGRM): Recreational boating, https://www.dgrm.mm.gov.pt/nautica-de-recreio;
Marine strategy for the Azores subdivision, http://servicos-sraa.azores.gov.pt/grastore/DRAM/DQEM/DQEM_Final_Acores.pdf;
National Institute of Statistics (INE): https://www.ine.pt/xportal/xmain?xpgid=ine_main&xpid=INE&xlang=pt;
Official website of tourism of the Azores, https://www.visitazores.com/pt;
Portuguese Institute of Sea and Atmosphere, I. P. (IPMA): http://www.ipma.pt/pt/index.html;
Sea Portal, https://www.portaldomar.pt/NauticadeRecreio/index.htm;
Strategic and Marketing Plan for Tourism in the Azores (PEMTA), http://www.azores.gov.pt/PortalAzoresgov/external/portal/misc/PEM_ACORES2.pdf;
Tourism Planning Plan of the Autonomous Region of the Azores (POTRAA), http://ot.azores.gov.pt/Instrumentos-de-Gestao-Territorial-Documento.aspx?id=121;

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UNDERWATER CULTURAL HERITAGE

Introduction

For the characterization of the existing conditions in the Azorean maritime space, several maritime sectors and activities need to be considered. In the context of the MarSP project, underwater cultural heritage (UCH) is defined accordingly to the UNESCO 2001 Convention on the Protection of the Underwater Cultural Heritage[8] as any vestige of human existence of a cultural, historical or archaeological character, to have been partially or totally, periodically or continuously, submerged, for at least hundred years. It can include: a) Sites, structures, buildings, artefacts and human remains, as well as their archaeological and natural context; b) Ships, aircraft and other vehicles, or parts thereof, their cargo or other content, as well as their archaeological and natural context; c) Artefacts of prehistoric character (UNESCO, Convention on the Protection of the Underwater Cultural Heritage, 2 November 2001, in force January 2009, UNESCO Doc.31C/Resolution 24, 2002). The Azores Region is located in the North Atlantic, approximately at mid distance between Europe and North America. This geographic context contributed to the Azores archipelago being one of the centres of trade between Europe, America and India in the 16th and 17th centuries, and its ports sheltered and serviced several galleons (Azores.com, 2018). The important geostrategic position of the Azores archipelago in the framework of transatlantic relations, which persists nowadays, resulted in an intense maritime activity over the years, being in this context, common the loss of vessels by shipwreck especially at the main ports of the region (Bettencourt & Carvalho, Arqueologia marítima na baía de Angra (Angra do Heroísmo, Terceira): enquadramento e resultados preliminares do projecto PIAS, 2009). Over the centuries, the maritime culture has been infused with these misfortunes in the region. The preservation of this patrimony, which composes a mosaic of time, is crucial for the interpretation of the maritime history of mankind (Bettencourt, et al., 2017). Dispersed by the waters of the Azores, there are about a thousand documented shipwrecks, half of them occurring between the 16th and the 20th centuries (Bettencourt, Os Açores na Navegação Global: O contributo da Arqueologia Subaquática, 2017); therefore, the understanding, conservation and valorisation of the underwater cultural heritage in the Azores, is crucial to understand the history of this oceanic region, which overlap with the history of the North Atlantic.

Purpose

This sector briefing summarises the current status of the underwater cultural heritage sector in the Autonomous Region of the Azores (Portugal), under MarSP project work package 2. "Mapping the current conditions and creating a vision for the MSP in Macaronesia" and Task 2.2. "Mapping the maritime uses and activities and defining the MSP current conditions". It includes the characterization of the current situation of underwater cultural heritage in the Azores, the proposed methodology to mapping, a sector diagnosis and its main interactions with other sectors, the environment and the land-sea interactions for UCH.

[8] approved by Resolution of the Assembly of the Republic no. 51/2006, of 18 July, ratified by Decree of the President of the Republic no. 65/2006, of 18 July, and republished by Notice no. 1419 6/2012, of 26 March.

PART I

Sector characterization

The Azores archipelago is located on the junction of greatly important maritime routes that, throughout history, have connected and still connect Europe to Africa, the Americas and the East. The archipelago had a central role to Portugal in international trade since the discoveries in the late 15th and 16th centuries. Although belonging to Portugal, the archipelago was, throughout almost all its history, a free traffic and commerce territory, where all nations could sail. Without the Azores as a port of call for the great sailing enterprises, the European expansion would have been, necessarily, very different. For instance, from all the 14.450 registered crossings of the Ruta de la Plata carried out between 1546 and 1650, because of the sea conditions, 402 boats shipwrecked. Of these shipwrecks, at least 20%, lie on the Azorean seabed, the overwhelming majority in Angra do Heroísmo (Terceira Island), which is one of the main sanctuaries for UCH and is classified as a reserve since 1973, in addition to being the first underwater archaeological park of Portugal, since 2005 (Neto & Parreira, Manual de Boas-Práticas do Património Cultural subaquático dos Açores, 2018). In the 16th and 17th centuries there are still numerous shipwrecks resulting from the Cape, African and Brazilian routes, besides significant English, French, Dutch and Italian vessels. During the 18th century and the first half of 19th century, with the long-established navigation routes already widespread amongst the various European nations, the predominant wrecks are of English origin, which had the largest fleet in the world, followed by the Portuguese, French and Spanish, and occasional Dutch, Prussian, Danish and American occurrences (DRC, 2019). Between 1850 and 1918, with steam still inexorably dominating the transcontinental seas, even with significant technological advance, many English, Portuguese, French, German, Spanish, Norwegian, Italian, Austrian, Danish, Dutch and Russian vessels sank, in addition to American and Brazilian. And even afterward, despite the beginning of aviation, unfortunate accidents kept happening, in addition to the sinking of multiple warships mainly during the wars. Of this immense submerged heritage, it must also be associated old anchorages and other multiple port and defensive structures, in addition to infrastructures created by the local community. About a hundred underwater or closely related archaeological sites are identified in Azorean waters (Neto & Parreira, Manual de Boas-Práticas do Património Cultural subaquático dos Açores, 2018).

In the Archipelago the maritime activities associated directly to this sector are diving (recreational diving) and scientific research, especially in the context of nautical and underwater archaeology. Furthermore, the Azores benefit from twenty years of intense research in underwater archaeology where several environmental impact assessment studies stand out, developed as part of projects implemented in the islands of São Miguel, Santa Maria and Faial.

The History Center d'Aquém e d'Além-Mar (CHAM) is one of the most relevant entities of this sector in the Azorean region. This research unit it is linked to the Faculty of Social and Human Sciences (FCSH) of the New University of Lisbon (NOVA) and the University of the Azores (UAc) and is responsible for most part of the scientific studies carried out in the Region in the UCH context.

Underwater Archaeological Chart of the Azores

With the acknowledgement from the Autonomous Region of the Azores that the submerged heritage lying in its waters was a fundamental piece of the collective memory of its people and places, it was carried out a survey, starting in 1994. This study aimed to assess the archaeological potential at each island, as a collaboration between the Regional Directorate for Culture (DRC), the Nautical and Underwater Archaeology National Centre (CNANS) and the Institute of Nautical Archaeology/ Texas A&M University (INA) (Monteiro, 1999). The survey applied both an archaeological approach, with the shipwreck in situ then leading to its historical and archaeological contextualization and, an historical approach, in which documentary research supplied the information on the location and identification of a shipwreck (Monteiro, 1999). On the resulting Underwater Archaeological Chart of the Azores (CASA) are listed a total of 548 shipwrecks. The oldest one registered dates from 1526 and the youngest one from 1995. Most of them are Portuguese shipwrecks (29%), followed by wrecks of unknown origin (22%), Spanish (18%) and English (14%) origin. In 2019, CASA was identified by UNESCO as one of the top five examples of best practices for the protection of underwater cultural heritage at international level, along with projects in Spain, France, Mexico and Slovenia.

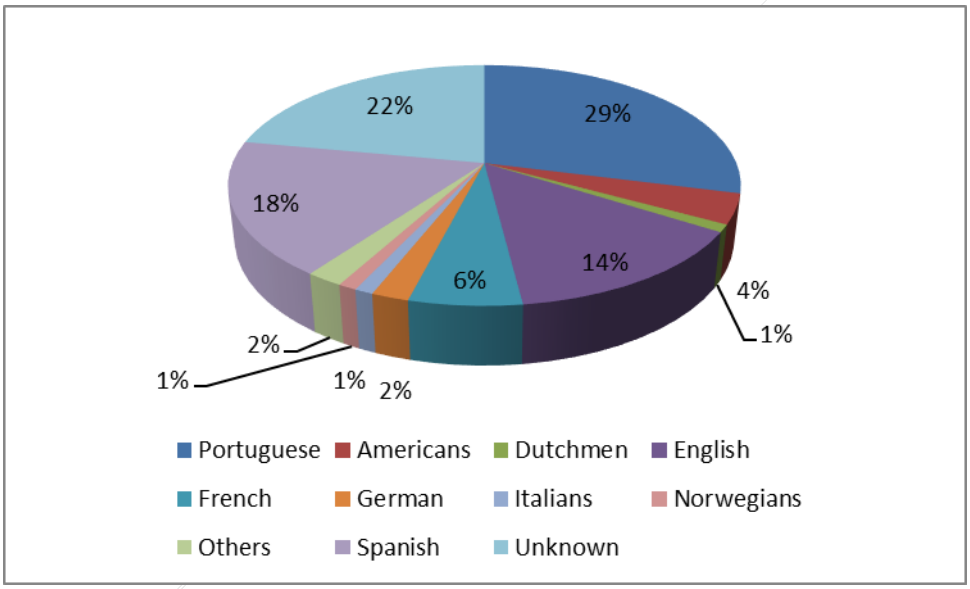


Figure 101. Shipwreck losses by nationality, per percentage (Source: Underwater Archaeological Chart of the Azores (CASA), 1999).

Around 48% of the shipwrecks listed on CASA were lost in the 19th century. In the 16th and 17th centuries, several vessels were lost (and presumably sunk) in the Azores (103 and 72 vessels were lost on total, respectively). In both centuries the greatest losses were registered in Terceira Island . In the second half of the 16th century there were a greater number of occurrences on Terceira Island, thus confirming that the Port of Angra was an important site for the Spanish Indies route and Portuguese navigation. This time is therefore marked by several shipwrecks in the bay, mainly Spanish, but also Portuguese (Monteiro, 1999). In the 18th and 19th centuries (49 and 266 vessels lost on total, respectively) the biggest number of losses were in São Miguel Island. In the 20th century, were lost 59 vessels on total, most of them sank off São Miguel Island.

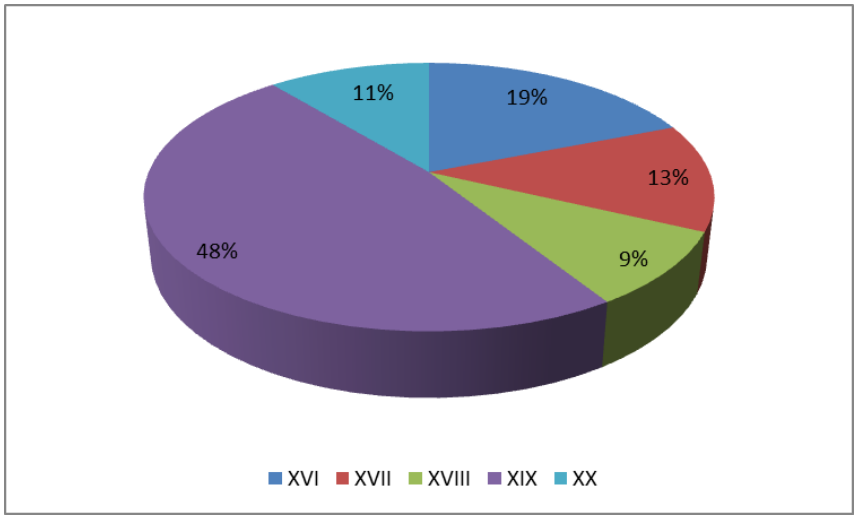


Figure 102. Shipwreck losses by century, per percentage (Source: Underwater Archaeological Chart of the Azores (CASA), 1999).

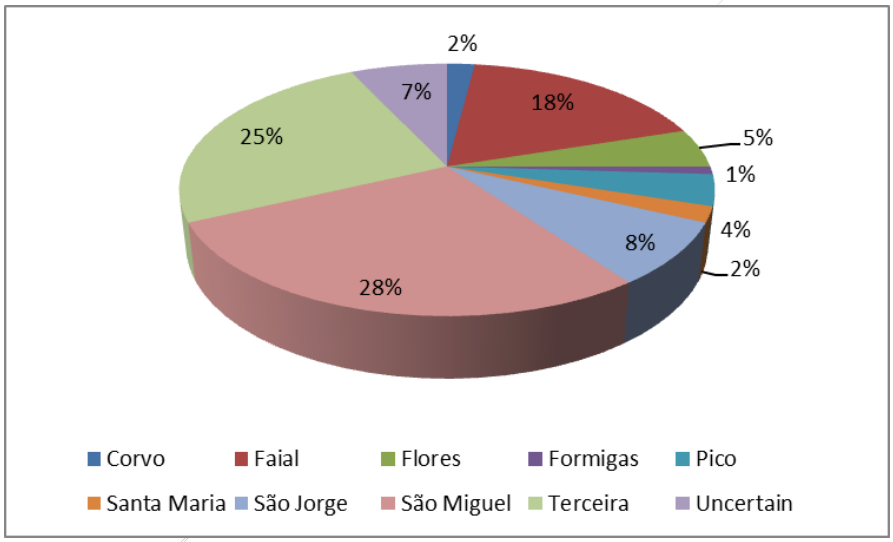


Figure 103. Shipwreck losses by location, per percentage (Source: Underwater Archaeological Chart of the Azores (CASA), 1999).

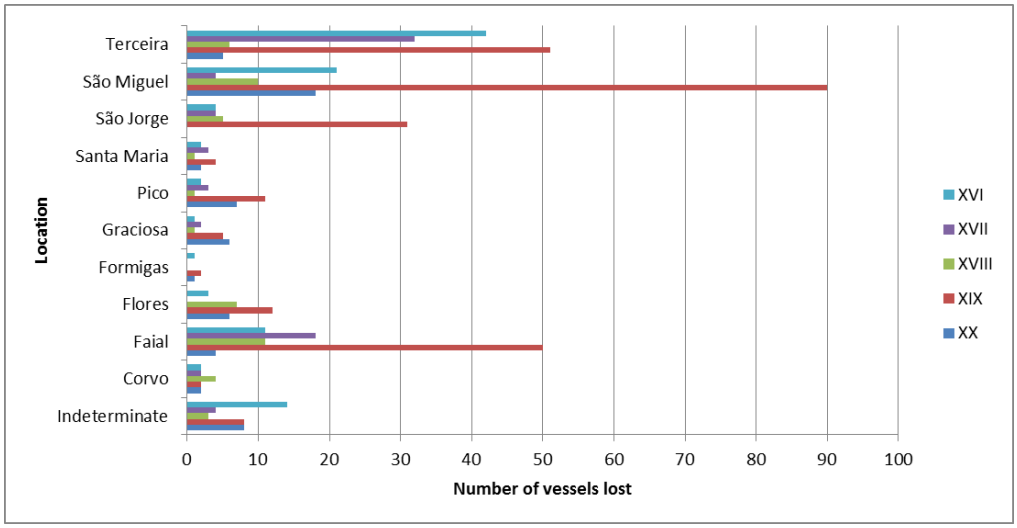


Figure 104. Number of vessels lost by location and by century in the Azores (Source: Underwater Archaeological Chart of the Azores (CASA), 1999).

In 2017, Bettencourt J. (Bettencourt, Os Açores na Navegação Global: O contributo da Arqueologia Subaquática, 2017) carried out a review of the distribution of shipwrecks occurring in the islands of Faial, Pico and Flores during the same period (1500-1900). Despite a general trend towards increased shipwrecks on all islands in comparison to CASA, there is a decrease in the number of occurrences on Terceira Island from the first half of the 17th century and an increase in Faial and São Miguel along the second half of the 18th century, with its maximum expression, as previously announced, in the 19th century. The greater number of occurrences in São Miguel Island is due to its larger economy, the main one of the Azores archipelago (Monteiro, 1999). The increasing number of shipwrecks registered in Faial island for the second half of the 17th century, but especially in the 19th century, can be related to the growing importance of the Port of Horta in supporting navigation in the Atlantic, especially British in an initial phase (Costa, 2005).

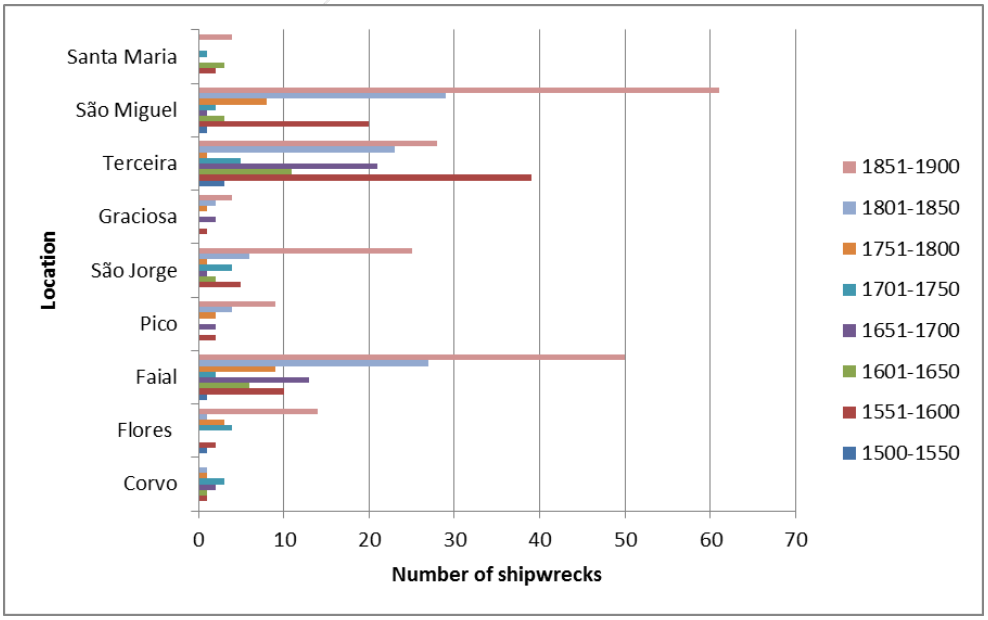


Figure 105. Distribution of shipwrecks occurring in the Archipelago of the Azores recorded in historical documents, for periods of fifty years, between 1500 and 1900 (database in Monteiro, 1999, revised for the Faial, Pico and Flores islands, based on other sources) (Source: (Bettencourt, Os Açores na Navegação Global: O contributo da Arqueologia Subaquática, 2017)

30 Sites of the UCH of the Azores

In 2017, based on the work developed in the last fifteen years by underwater archaeologists in the Azores archipelago, the "Guide of the Underwater Cultural Heritage of the Azores" was published as a result of a collaboration between Turismo dos Açores and the Regional Directorate for Culture (DRC). The document identifies twenty-five sites accessible to scuba diving, distributed by the archipelago, besides from the already classified five underwater archaeological parks, namely Angra do Heroísmo Bay, Dori, Caroline, Slavonia and Canarias (see section "Legal framework and constraints"). The guide has information about the patrimony, namely historical contextualization, list of sites visited by scuba diving and specific information about the sites.

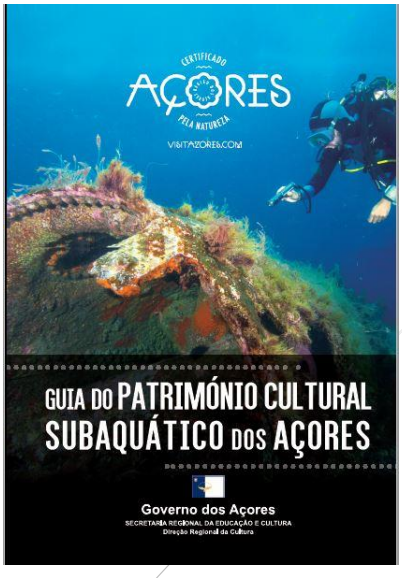


Figure 106. Guide of the Underwater Cultural Heritage of the Azores (published by (Bettencourt, et al., 2017)**).**

A "Manual of good diving practices in the Underwater Cultural Heritage", published in 4 languages, was created in the Azores, as a result of a protocol established between the Regional Government and the scuba dive operators. The document was inspired by the norms recommended by UNESCO, namely its Code of Ethics for Diving, and it states the best practices for the enjoyment and safeguarding of underwater cultural heritage.

Figure 107. Manual of Good Practices of the Underwater Archaeological Cultural Heritage of the Azores (Published by (Neto & Parreira, Manual de Boas-Práticas do Património Cultural subaquático dos Açores, 2018)**).**

From a total of 30 sites of registered patrimony accessible to scuba divers, some require a low level of scuba diving certification while others demand an advanced level of scuba diving experience (Neto & Parreira, Manual de Boas-Práticas do Património Cultural subaquático dos Açores, 2018). They are distributed by eight islands of the Archipelago, predominantly occurring in the islands of Santa Maria and Terceira.

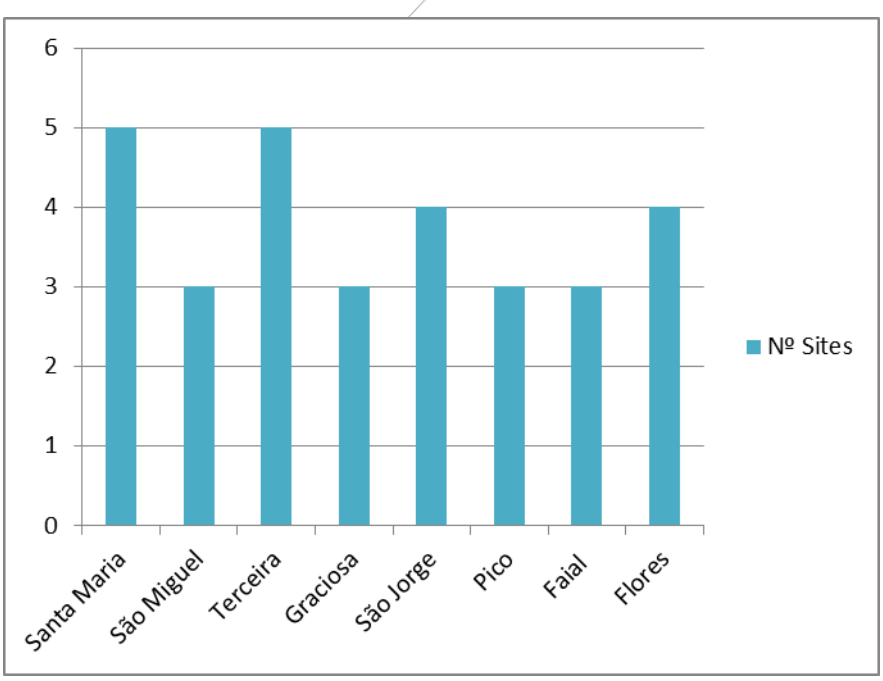


Figure 108. Number of underwater cultural heritage sites accessible by scuba diving in the Azores, per island (Source: (Neto & Parreira, Manual de Boas-Práticas do Património Cultural subaquático dos Açores, 2018)**).**

The following table concerns the list of underwater cultural heritage sites, accessible to visit by scuba diving.

Table 36. List of the 30 sites accessible to scuba diving of the underwater cultural heritage of the Azores, per island (Source: (Neto & Parreira, Manual de Boas-Práticas do Património Cultural subaquático dos Açores, 2018) **and** (Bettencourt, et al., 2017)**).**

Island	Site name/ Coordinates (WGS 1984)	Category	Depth	Observations
Santa Maria	Olympia 37° 16' 20,000" N 24° 46' 57,000" W	Wreck	Ranging from -15 to -50 meters	Built in 1896 in Scotland, this teel screw steamer was named "Glenlochy" and joined the "Glen Line" that ensured the Tea Route, linking Britain to India and China until 1919, when it was sold to Greek ship owners D. Anghelatos, being renamed "Olympia". Leaving Newport, U.S.A., towards Haifa in the Palestine, it wrecked on the Formigas islet on June 17th, 1921.
	Arnel 37° 00' 22.06" N 25° 09' 33,265" W	Wreck	Around -4 meters	On September 19, 1958, it left from Vila do Porto, Santa Maria, having the city of Ponta Delgada as destination. It belonged to the company Empresa Insulana de Navegação. Carrying 133 passengers, in addition to twenty-five members of the crew, it was led by Captain José Rodrigues Bernardes. Storms forced the Captain to alter the course and it wrecked at Anjos, in one of the most dramatic naval accidents of the Azores.
	Velma 36° 56' 24,680" N 25° 08' 31,482" W	Wreck	-6 meters	It was a Norwegian tanker chartered by Mobil, to load in Central America a shipment of eleven million litters of aeroplane oil, for Santa Maria airport, and it wrecked on February 1st, 1961, on Ponta do Marvão, in Vila do Porto.
	Canarias 36° 56' 57,540" N 25° 05' 55,680" W	Wreck	-3 meters	It was a steamship belonging to the controversial Antonio López y Compañía, engaged in the transport of Spanish military forces during the first Cuban war of independence, the bloody "Ten Years' War". Built in 1855, in Amsterdam, to the Société Belge des Bateaux a Vapeur Transatlantiques, it received the name of "Constitution". It sank on November 19th, 1871, under the suspicion of a criminal act by the Captain, something that often happened in maritime accidents of this company's ships. The historical, archaeological and documental importance of this wreck is so

				relevant that it ranks as the fifth archaeological park of the Autonomous Region of the Azores.
São Miguel	Maria Amélia 37° 43' 27,400" N 25° 19' 48,703" W	Wreck	Around -7 meters	On March 2nd, 1905, at 1:00 p.m., the small steamship "Maria Amélia" sank in "baixa do Tufo", between Vila Franca and Ribeira Quente, where it was picking up cargo for Povoação and load wood in Tufo. The "Maria Amélia" ensured navigations among the ports of São Miguel Island.
	Cemitério das Âncoras do Ilhéu de Vila Franca do Campo 37° 42' 24,000" N 25° 26' 12,000" W	Archaeological artifact (Anchors)	Ranging from -19 to -20 meters	It consists of seven anchors of various types, which date from between the 16th and 19th centuries. These are concentrated, not due to shipwrecks, but because of adverse weather conditions which swept the boats away to the "anchors' shallow". Under such circumstances, the only option was to cut the moorings that attached them to the vessels, under the threat of sinking.
	Luso 37° 44' 22,622" N 25° 34' 39,248" W	Wreck	Around -14 meters	In July 26th, 1883, this Portuguese liner wrecked at Carneiros' port, in Lagoa town. It was coming from Lisbon, having stopped over in Madeira and Santa Maria, with cargo and passengers. It belonged to the navigation company Empresa Insulana de Navegação. Built in 1875, in Liverpool, it had the capacity for 134 passengers.
	Dori 37° 44' 36,108" N 25° 37' 41,662" W	Wreck	-25 meters	This is the most visited shipwreck of the archipelago. This boat sank off the coast of Ponta Delgada, in 1964. It originally joined the well-known American "Liberty Ships" fleet, built between 1941 and 1945, during World War II, having been part of the war effort and of D-Day. The historical, archaeological and documental importance of this wreck is so relevant that it ranks as the second archaeological park of the Autonomous Region of the Azores.
Terceira	Lidador 38° 39' 0,440" N 27° 13' 16,580" W	Wreck	Around -7 meters	Integrated in the Archaeological Park of Angra do Heroísmo Bay, and built in London in1873, the "Lidador" belonged to the company Companhia Transatlântica de Navegação. Registered at Rio de Janeiro port, it ensured the transport of Azorean emigrants to Brazil. It sank in Angra do Heroísmo Bay on February 6th, 1878. It is part of the first Portuguese underwater archaeological park.

	Cemitério de Âncoras Between 38° 38' 43,260" N 27° 13' 2,280" W and 38° 38' 48,960" N 27° 12' 58,560" W	Archaeological artifact (Anchors)	Ranging from -15 to -50 meters	Integrated in the Archaeological Park of Angra do Heroísmo Bay, the Anchors' Cemetery consists of an agglomerate of more than forty anchors deposited along the eastern coast of Mount Brazil, in a cluster of impressive array. These anchors range from the 16th to the 20th centuries, and lie there due to a number of distinct causes, although all inseparable from the importance of Angra's port in intercontinental voyages.
	USS Landing Ship Tanker 228 38° 39' 8,278" N 27° 11' 58,284" W	Wreck	-12 meters	Located near the Archaeological Park of Angra do Heroísmo Bay, it was a ship for the transport of troops and materials. Its construction was finished on September 25th 1942, in the shipyards of Seneca, in Chicago, United States of America. On January 19th 1943, the "LST-228" moored at Angra do Heroísmo Bay, where it had unloaded American personnel for the construction of Lajes'Airfield, and was carrying the "LCT (6)-582", to be transported to the European theatre of war. Foul weather led it against the rocks, where it still rests.
	União 38° 40' 30,250" N 27° 19' 41,240" W	Wreck	-8 meters	This is a ship wrecked in Cinco Ribeira's shallows, on June 26th, 1911. On that day, this steamer of likely French origin was fulfilling the tasks of loading fish caught off Terceira's coast and carrying it to Angra do Heroísmo. It had a crew of 38 sailors and its Captain was Armando Athay de Moreira Bettencourt. Registered in Peniche, it weighed about 227 tons.
Graciosa	Mazzini 39° 05' 3,940" N 28° 03' 17,900" W	Wreck	Around -7 meters	It was a steamship built in 1913 by A. G. Weser (Aktien-Gesellschaft Weser), in Bremen, on Weser River's docks. Named "Spitzfels SS", this cargo ship was commissioned by the Deutsche Dampfschifffahrts Gesellschaft HansaCompany, based in Bremen. In 1916, the Italian government acquired it, to aid in the war effort, and renamed it as "Brescia SS". By the end of the war, it was sold, in 1920, to the Societá Anonima Cooperativa Di Navigazione Garibaldi, based in Genoa, and renamed "Mazzini". It sank in northern Graciosa's coast on March 31st 1925.
	Terceirense 39° 02' 59,428" N	Wreck	Around -22 meters	Owned by the company Empresa Insulana de Navegação, it sunk in front of Praia da Graciosa on January 17th, 1969. The

	27° 57' 43,006" W			construction of "Terceirense", awarded by Empresa Insulanade Navegação, dates from 1949. Built on the Grange mouth Dockyard Co Ltd. shipyards, in England, where "Gorgulho" had already been commissioned for the same company, that same year, on July 20th, its maiden voyage to the Azores took place, captained by Francisco dos Santos Franco. It measured about 76 metres in length, weighed 1295 tons, was able to reach 12 miles of speed, and could carry 28 passengers and about 3000 cubic meters of cargo in its bilges.
	Corvo 39° 03' 10,552" N 27° 57' 18,769" W	Wreck	Ranging from -5 to -17 meters	A container ship owned by the company Mutualista Açoriana, it ran aground on December 16th 2000, on Praia islet, in Graciosa Island. "Corvo" was built in 1980, in Rensdburg, a German city close to the Danish border, being later registered in Ponta Delgada, and becoming part of the Mutualista fleet. This container ship had 89 metres of length, was manned by 11sailors and was captained by Isaías Silva on the day it ran aground off Graciosa.
	Cemitério das Âncoras da Praia da Graciosa 39° 02' 55,179" N 27° 57' 41,121" W	Archaeological artifact (Anchors)	Ranging from -21 to -24 meters	This is a rocky shallow in the sandy sea bottom of the ancient anchorage of Vila da Praia, where ships of bigger draught moored. Strong winds or adverse sudden weather changes dragged ships here, and forced them to release their anchors, to avoid sinking. The number of anchors is not fully charted yet, as this is a recent discovery.
São Jorge	Her Majesty Ship Pallas 38° 37' 50,000" N 28° 05' 43,000" W	Wreck	Ranging from -5 to -20 meters	This was a frigate belonging to a pioneer type of warships, the "Pallas" class, with 36 artillery pieces, that stood out for its experimental building, with a copper coating of the hull and the use of iron as ballast. Built in 1757, it took part in several geopolitical conflicts as part of the British fleet, and sank on February 10th 1783, nearby Calheta bay in São Jorge Island. It was one of the first shipwrecks to be subject to archaeological excavation in the Azores, in 2000. Its spoils are visible at the local museum and the frigate, with two artillery pieces still, worth visiting through a dive in Calheta bay.
	Mont-Ferran 38° 35' 59,000" N	Wreck	-12 meters	In the beginning of May 1864, sunk in Calheta bay, São Jorge Island, a boat with a load of flaxseed that caused great

	28° 00' 31,000" W			commotion in the local population. It was, in fact, slave ships, whose wrecks were acquired by the militia captain, and can still be partially visited today. In the second half of the 19th century, most of the great European powers had abolished slave traffic. However, there are various accounts of ships sailing from Europe to the African coast, and then to the Americas, selling slaves and loading, in there turn trip, legitimate produce to deceive the authorities patrolling the seas. "Mont-Ferran" is one of the last illegal slave ships known in the world.
	Her Majesty Ship Eriskay 38° 36' 4,000" N 28° 00' 33,000" W	Wreck	Ranging from -4 to -12 meters	A British Royal Navy warship built in 1942, the "HMS Eriskay" entered the Second World War scenario as soon as it was launched. According to its naval class, the so-called "Faial" Class, it might have participated in the patrolling of ports and underwater mine prospection missions. After 1943, it enters the Portuguese fleet with the acronym "P8", returning to the services of the British forces in 1945. That same year, on November 12th, it was passing through the Azores towards the Mediterranean, when its succumbed to a strong storm, sinking nearby Fajã do Negro, parish of Manadas in the municipality of Velas, São Jorge Island.
	Porto da Urzelina 38° 38' 33,000" N 28° 07' 38,000" W	Archaeological artifact (Anchors)	Ranging from -18 to -25 meters	By this anchorage, in Velas municipality in São Jorge Island, there lies an agglomerate of submerged anchors, which tell the tale of this harbour, built in 1647, relatively exposed to southeast winds. There are several accounts of vessels caught here by sudden weather changes, having to cut anchor and flee, aiming to save ship and crew. As such, this set is regarded as an anchors' graveyard, generically datable between the 17th and 20th centuries.
Pico	Caroline 38° 31' 53,220" N 28° 32' 25,200" W	Wreck	-10 meters	The third archaeological underwater park, this is the wreck of a sailboat built in the shipyards of La Loire, Nantes, in 1895, sunk off the coast of the village of Madalena on September 3rd 1901. The cargo consisted of potassium saltpeter, popularly called Chile's nitrate, a natural fertilizer destined to the long worn out soils of Europe. The historical, archaeological and documental importance

				of this shipwreck is so relevant that it ranks as the third archaeological park in the Azores Autonomous Region.
	Lakeside Bridge 38° 25' 23,000" N 28° 24' 58,800" W	Wreck	-8 meters	An American steamship of 3200 tons and a crew of 29 sailors, it sank on December 27th 1920 off Costa do Pão, Pico Island. Built in shipyard number 83 from June 20th 1919 on, the EFC 817 hull's keel was laid down on the 26th of that same month. Originally destined to be "Kahnah", the steamer received the name of "Lakeside Bridge", and launched on October 31st 1919. Delivered to the Shipping Board on December 22nd 1919, the "Lakeside Bridge" – with 3545 tons – became part of the trade route between the U.S.A. and France, under the pavilion of the ship-owner Alexander Sprunt & Son.
Faial	Pontão 16 38° 33' 12,899" N 28° 35' 55,980" W	Sinking (Ship)	-26 meters	A ship that reached the end of its useful life and was deliberately sunken. Its original name was "Pontoon 16". Although being apparently recent and having no records on its construction, it has some historical relevance, as it helped on the construction of Madalena's port in the 80's. The ship was property of the company Tecnovia Açores that decided to sink it, since it lacked sailing conditions.
	Viana 38° 31' 2,307" N 28° 39' 22,298" W	Sinking (Fishing vessel)	-46 meters	A codfish ship belonging to the company Sociedade de Pescas de Aveiro that docked in Horta's port in April 1994. It suffered a fire that disabled it and sunk on November 21st of the same year.
	Núcleo dos Canhões 38° 31' 24,860" N 28° 37' 21,020" W	Archaeological artifact (Artillery pieces)	Ranging from -15 to -20 meters	Gathered in the context of the archaeological works in Horta's port, it is underwater museum storage available for visits. Its larger guns, mainly various artillery pieces, were already found. It is located in Entre-os-Montes bay, at a depth of 18 metres, encompassing artillery pieces dated between the 18th and 19th centuries, belonging to several ships detected and excavated during the harbour's construction.
	Main 38° 31' 26,360" N 28° 37' 34,900" W	Wreck	Around -5 meters	A steamship built in 1868 by Caird & Company Greenlock with 1805 tons, 101.2 metres of length and 12.2 metres of maximum deck, which entered Horta's port on November 23rd 1892, with a fire on board, while sailing from New Orleans, U.S.A., to Liverpool, England. The next day it ran

				aground in Porto Pim, where it still lies today.
Flores	Bidart 39° 26' 56,992" N 31° 16' 0,983" W	Wreck	-8 meters	The boat "Bidart" was sailing from Thio's port, in New Caledonia, to Glasgow, Scotland, when it sank on May 25th 1915, off the coast of Flores, carrying a load of nickel ore valued in 500 thousand francs. Built in 1901, in Nantes.
	Papadiamantis 39° 27' 15,989" N 31° 16' 10,032" W	Wreck	Ranging from -25 to -45 meters	Initially named "Renoir", it was a T2 tanker from the Second World War, which supplied the war in the Pacific. Sold to the French Republic in 1948, it was renamed "Ardashir" and participated in the Indochina War that led to the independence of Vietnam. When it sank off Fajã Grande, Flores Island, in 1965, its name was already "Papadiamantis".
	Batelão da Praia da Calheta das Lajes 39° 22' 49,730" N 31° 10' 10,970" W	Wreck	Ranging from -3 to -6 meters	In the creational port of the village of Lajes, Flores Island, there lie the submerged remains, still in good condition, of a barge that sank there, between 1993 and 1994, due of a fracture on its central area, caused by the strain expended during the construction of that port's structure.
	Slavonia 39° 23' 0,997" N 31° 15' 19,991" W	Wreck	-15 meters	Finished on June 20th 1903, and after brief service at the British Indian Steam Navigation Ltd., it was sold to Cunard Steam Ship Co. Ltd., and assigned to the North Atlantic route. It carried to America European emigrants in search of the American dream and, in the return trip, wealthy New Yorkers to Liverpool. It sunk, due to a captain's error, in the coast of Lajedo, Flores Island, in 1909. The historical, archaeological and documental importance of this wreck is of such relevance that it ranks as the fourth archaeological park in the Azores Autonomous Region.

Legal framework and constraints

This section integrates information coming from MarSP Deliverable D.6.5. (MSP Governance Analysis of the Macaronesia) (Pallero, Cordero, García-Onetti, García-Sanabria, & Andrés, 2019).

Normative basis

Considering the existing international legal framework, both the UNESCO 2001 Convention and the United Nations Convention on the Law of the Sea (UNCLOS) contain provisions concerning underwater cultural heritage. There is a complementary relationship between them, with both of them underlining the obligation to protect such heritage. UNCLOS contains only two general articles on underwater cultural heritage, namely Articles 149 and 303. The first one stipulates the

protection of underwater cultural heritage in the "Area", that is, "the seabed, the sea bottoms and its subsoil beyond the limits of national jurisdiction". In order to control traffic in such objects, the coastal State may, in applying article 33 (Contiguous zone), presume that their removal from the seabed in the zone referred to in that article without its approval would result in an infringement within its territory or territorial sea of the laws and regulations referred to in that article. However, it gives them only effective protective powers up to the limits of the Contiguous Zone, i.e. up to 24 miles from the coast and not beyond. Thus, underwater cultural heritage existing in the Exclusive Economic Zone (EEZ) and the Continental Shelf would be mostly unprotected by UNCLOS. The UNESCO Convention of 2001 seeks to address this "legal vacuum" and explicitly prohibits commercial exploitation, particularly activities aimed at the sale, acquisition and exchange of underwater cultural heritage elements in all maritime zones, significantly increasing the legal protection of submerged sites (UNESCO, Comments on the question of the harmony of the UNESCO 2001 Convention on the Protection of the Underwater Cultural Heritage with the UN Convention on the Law of the Sea, 2001b). This provision is not to be understood as preventing archaeological research or tourist access. The Convention also promotes public fruition, as it establishes that responsible non-intrusive access to observe or document in situ UCH shall be encouraged to create public awareness, appreciation, and protection of the heritage, except where such access is incompatible with its protection and management (article 2 (10)). According to the Convention, each State Party shall use the best practicable means at its disposal to prevent or mitigate any adverse effects that might arise from activities under its jurisdiction incidentally affecting underwater cultural heritage (article 6). In situ preservation is the first option before allowing or engaging in any activities directed at this heritage (article 2 (5)).

Besides from the UNESCO 2001 Convention, ratified by the Portuguese Republic in 2006, at national level, the legal framework concerning underwater cultural heritage is established by Law no. 107/2001, of 8 September, laying the basis for the policy and regime underpinning the protection and valorisation of cultural heritage, and Decree-Law no. 164/97, of 27 June, which establishes the regulations concerning underwater cultural heritage. The regulatory provisions on archaeological work are set by Decree-Law no. 164/2014, of 4 November, and those concerning the use of metal detectors are stated on Law no. 121/99, of 20 August. With the publication of Law no. 19/2000, of 10 August, the power to deal with all matters related to the management of the regional archaeological heritage were transferred to the Autonomous Region of the Azores. Adding to the definition of UCH set by the Convention, Decree-Law no. 164/97, of 27 June states that UCH consists of all movable or immovable property and its surrounding areas, which is a testimony of human presence and has historical, artistic, scientific or archaeological value, whether wholly or partly situated underwater, soaked or damp, found at the seabed or thrown to the shore by the sea. The diploma also establishes that when this property is without a known owner (not recovered by the owner within five years of the date on which it was lost, abandoned or separated in any way) it constitutes state property.

Considering that protecting and maintaining the underwater cultural heritage in the Azores is an expressed concern for the Regional Government, a proper body of legislation was created, starting with the Regional Legislative Decree no. 27/2004/A, of 24 August, which establishes the normative framework for the management of archaeological heritage, in order to prevent, rescue and investigate movable and immovable archaeological objects (altered by Regional Legislative Decree no. 8/2006/A, of 10 March and by Regional Legislative Decree no. 6/2018/A, of 16 May). That diploma set the basis for underwater cultural heritage management and was followed by the legal documents creating the underwater parks, with the aim of ensuring their integrity and their preservation, while also promoting its public enjoyment.

The first underwater archaeological park created was "Angra do Heroísmo Bay", in Terceira island, created in 2005, followed by "Dori", in São Miguel island, created in 2012 and "Caroline", classified in 2014, situated in Pico island. The most recent parks were both created in 2015, "Slavonia", in Flores island and "Canarias", in Santa Maria. The areas corresponding to underwater archaeological parks enjoy special protection measures, as a wide variety of economic and recreational activities is forbidden or restricted in order to safeguard the integrity of the protected assets. The parks were created with the purpose of making the areas available for public enjoyment, namely for tourism, compatible with educational purposes and the pursuit of scientific research. The 25 other sites identified at the Guide of the Underwater Cultural Heritage of the Azores, are equally under protection, with a view to its valorisation and enjoyment, being applied the provisions of the above mentioned legislation on archaeological sites.

The management of these sites is the result of the functions and tasks assigned to DRC, responsible for coordinating, managing, protecting and safeguarding the archaeological heritage of the Azores, resulting from Law no. 19/2000 of August 10, Regional Legislative Decree no. 6/2018/A of May 16, 2018 and Regional Regulatory Decree no. 8/2013/A, of July 17. In Portugal, the protection of underwater cultural resources is also of the responsibility of the national maritime authority which has to ensure the compliance of the law[9] in the scope of internal laws and international rights. This provision is further reinforced by the powers of the port authority[10], namely the duty to supervise and promote precautionary measures to ensure the preservation and defence of the underwater cultural heritage (PSOEM, 2018).

Table 37. Main legal documents ruling the underwater cultural heritage in the Azores.

Law	Observations
Competent authority	
Regional Regulatory Decree no. 8/2013/A, of July 17	Approves the organization of the Regional Directorate for Culture.
Regional Regulatory Decree no. 9/2016/A, of November 21	Approves the organization of the 12th Regional Government of the Azores.
Law-Decree no. 44/2002, of March 2	Organic Law of the National Maritime Authority.
Law-Decree no. 43/2002, of March 2	Creates the maritime authority system (SAM), establishes its scope and assignments and defines its structure.
Edict no. 340/2018, of March 26	Edict of the Captaincy of Porto da Horta.
Edict no. 554/2018, of June 4	Edict of the Captaincy of the Port of Santa Cruz das Flores.
Edict no. 419/2018, of April 24	Edict of the Captaincy of the Port of Angra do Heroísmo.
Edict no. 327/2018, of March 23	Edict of the Captaincy of the Port of Praia da Vitória.
Edict no. 813/2017, of October 17	Edict of the Captaincy of the Port of Ponta Delgada.
Edict no. 420/2018, of April 26	Edict of the Captaincy of the Port of Vila do Porto.
Archaeological heritage	
Regional Legislative Decree no. 27/2004/A, of 24 August. Altered by Regional Legislative Decree no. 8/2006/A, of 10 March, altered and republished by Regional	Approves the Legal Regime for the Management of Archaeological Heritage, in accordance with the provisions of Law no. 19/2000, of August 10, which transfers the skills in the area of archaeological heritage to the Autonomous Regions. The DRC of the Azores, in accordance with its organizational structure, becomes the body that

[9] pursuant to Point 2 (c) of article no. 6 of the Law-Decree n.º 43/2002, of March 2

[10] pursuant to Point 8 (d) of article no. 13 of the Law-Decree n.º 44/2002, of 2 March

Legislative Decree no. 6/2018/A, of 16 May	oversees this area, thus being obliged to coordinate, manage, protect and safeguard the archaeological heritage of the Azores.
Regional Legislative Decree no. 30/2010/A, of November 15	Establishes the legal framework for environmental impact assessment and licensing.
Law no. 107/2001, 8 September	Laying the basis for the policy and regime underpinning the protection and valorisation of cultural heritage.
UNESCO 2001 Convention on the Protection of the Underwater Cultural Heritage	Convention on the Protection of the Underwater Cultural Heritage, approved by Resolution of the Assembly of the Republic no. 51/2006, of 18 July, ratified by Decree of the President of the Republic no. 65/2006, of 18 July, and republished by Notice no. 1419 6/2012, of 26 March.
Decree-Law no. 164/2014, of 4 November	Setting the regime for archaeological work.
Decree-Law no. 164/97, of June 27	Establishes the regulations concerning underwater cultural heritage, aiming to harmonize the legislation governing the archaeological activity in underwater environment with that applicable to archaeological activity in the terrestrial environment.
Law no. 121/99, of 20 August	Establishes the regime for the use of metal detectors.
Law no. 19/2000, of 10 August	Which assigns the power to deal with all matters related to the management of the regional archaeological heritage to the Autonomous Region of the Azores.
Law-Decree no. 12/94, of January 15	Approves the regulation of professional diving.
Order Decree no. 6/2014, of January 13	Regulates recreational diving experiences.
Law no. 24/2013, of March 20	Which approves the legal regime applicable to recreational diving throughout the national territory.
Law no. 70/2014, of September 1	Which approves the legal regime applicable to professional diving throughout the national territory
Underwater Archaeological Parks	
Regional Regulatory Decree no. 12/2012/A, of May 8	Dori Underwater Archaeological Park (São Miguel Island).
Regional Regulatory Decree no. 15/2014/A, of August 8	Caroline Underwater Archaeological Park (Pico Island).
Regional Regulatory Decree no. 17/2015/A, of September 29	Slavonia Underwater Archaeological Park (Flores Island).
Regional Regulatory Decree no. 20/2005/A, of October 12. Altered and republished by Regional Regulatory Decree no. 19/2015/A, of October 27	Underwater Archaeological Park of Angra Bay (Terceira Island).
Regional Regulatory Decree no. 24/2015/A, of October 29	Canarias Underwater Archaeological Park (Santa Maria Island).

Administrative constraints and restrictions

The national legislation applicable to the UCH, namely Law no. 107/2001, of 8 September, is guided by the principles of coordination, articulation and compatibility of cultural heritage with other policies that address related public and private interests, such as those concerning spatial planning, the environment, cultural creation and tourism. The article 7 of the diploma states public enjoyment of the cultural heritage values and goods shall have to abide by the requirements of their

functionality, safety, preservation and conservation. The enjoyment by third parties of cultural goods which are object of private property relies on concertation between the administration of cultural heritage and the owners. Specifically, in what regards UCH with archaeological value, it is applied from the outset the principle of conservation via scientific record. This means that, whenever there is indication of any traces, goods or other archaeological evidence, a surrounding protection area may be established on a preventive and temporary basis to ensure that emergency work is conducted.

According to Decree-Law no. 164/97, of 27 June, archaeological work cannot occur in the following areas:

a) natural reserves
b) temporary or permanently restricted military zones
c) delimited fishing zones
d) areas with submarine cables
e) oil and gas pipelines and marine outfalls
f) areas of oil or other mineral exploitation
g) warships sunk during World War II
h) sunken ships containing explosives, oils or other materials which may endanger the ecological balance;
i) areas where the safety of navigation or port operations may be affected.

Adequate prevention and safety measures must be taken on sites where archaeological work is occurring, namely regarding navigation and fishing, being strictly forbidden the exercise of commercial fishing.
The Regional Legislative Decree no. 27/2004/A, of 24 August, in its current version, reinforces the fact that archaeological activity in the Azores is considered a strictly scientific undertaking (pending on licencing). Thus, all destructive or intrusive practices that may damage underwater cultural heritage and their surrounding areas are prohibited.

The Regional Legislative Decree no. 27/2004/A, of 24 August, in its updated version, also sets the provisions regarding the creation of archaeological parks and the applicable restrictions, establishing that an archaeological park consists of any monument, site or set of archaeological sites of relevant interest, integrated in a demarcated area. The spatial planning and management of these areas are determined by the need to ensure both the preservation and enjoyment of the site. Thus, archaeological parks are intended to protect, conserve and disseminate archaeological heritage, to allow the development of actions to safeguard the existing cultural and natural values and to promote their study and enjoyment.

Within the area of underwater archaeological parks, it is strictly prohibited the deposition of scrap, sand, debris or other solid waste that can pollute and cause a negative visual impact. It also not allowed, unless authorized by the competent authorities:

a) the collection of any material falling under the definition of underwater cultural heritage (except in case of licenced archaeological research)
b) the execution of construction work that may have intrusive and disturbing effects on the vestiges and their surroundings (excavation, dredging and embankment, deposition of sediment)
c) the collection of geologic material and its exploitation
d) the practice of motorized sports activities
e) the practice of spearfishing

f) boat mooring
g) the installation of buoys or any other infrastructures.

All the existing archaeological parks in the Azores are freely accessible to scuba divers, including amateur divers, except in the case of "Angra do Heroísmo Bay", only accessible to those with appropriate diving credentials. All five archaeological parks prohibit the practice of any sort of fishing activity within the area, except in the case of "Dori", where only trolling is allowed, by professional fishing vessels, in case the area is not marked for diving.

Access to sites with identified UCH for recreational purposes, namely scuba diving, should abide by Law no. 24/2013, of 20 March, which approves the legal regime applied to recreational diving, as well as by Ordinance no. 6/2014, of 13 January, regulating the activity. Professional divers must take into account the provisions set by Law no. 70/2014, of 1 September, establishing the legal regime applied to professional diving, adding to Law-decree no. 12/94, of 15 January, approving the regulations for the activity.

For the intends and purposes of maritime spatial planning, pursuant to Law no. 17/2014 of 10 April, and Decree-law no. 38/2015, of 12 March, the known sites with underwater cultural heritage constitute areas of administrative easement. Hence, the activities and uses developed within those areas, whether for private or common use purposes, must be compatible so as not to compromise existing underwater cultural heritage. These may or may not be subject to space allocation, the latter case pending on the prior obtaining of a Title of Private Use of the National Maritime Space (TUPEM)[11].

For the installation of new uses or activities within areas with identified underwater cultural heritage, it is necessary to carry out updated archaeology work in a timely manner[12]. In case archaeological remains are found during the installation of an activity in the national maritime space, it is mandatory to immediately stop work and report the occurrence to the local authority and the competent entity, in the terms of Decree-Law no. 164/97, of 27 June.

In the context of scientific research in the field of underwater cultural heritage, projects that do not require a sea space allocation remain under the legal framework of UNCLOS. The remaining projects of this nature that fall within the scope of Article 57 of Decree-Law no. 38/2015, of March 12 and require the issuance of a TUPEM.

The activities aimed at carrying out archaeological work must comply with the provisions of the regime for archaeological work (Decree-Law no. 164/2014, of November 4, no. 2 of Article 7) and the Regional Legislative Decree no. 27/2004/A, of 24 August, in its current version.

The stakeholders' consultation developed in the context of the MarSP project allowed the gathering of information based on stakeholder's perceptions about the Azorean legislative context. Selected stakeholders include representatives of the regional and/or local administration (e.g. DRC) and research centres (e.g. and CHAM - Humanities Center). The consultation was performed through individual interviews. Stakeholders were asked if they agreed with the legislative context for underwater cultural heritage and what type of changes would they recommend. In a general way, stakeholders did not identify the need for great changes in the legal framework in the Azores for this maritime sector. It was referred that the existing legislation is enough and is deemed as adequate.

[11] Article 52 of Decree-Law n.º 38/2015, of March 12
[12] Decree-Law n.º 164/97 of June 27 and Decree-Law n.º 164/2014 of November 4

It was mentioned also by stakeholders in the 2nd workshop of MarSP that, in what regards maritime touristic activities, the term "ecoturism" is quite ambiguous and is frequently applied very freely by the promoters, even though there is no legal definition to the term, no specifications on sustainable tourism practices associated to it and no concrete ways to control the activity. Hence, there is a need to address this legal "void" on the sectoral legislation, including provisions on sustainable tourism practices linked to UCH.

PART II

Methodology for mapping the activity

Current spatial distribution

Scientific literature, baseline studies, legislation and various stakeholders, namely governmental entities (e.g. DRC), research centres (e.g. and CHAM - Humanities Center), maritime tourism operators were consulted for mapping the current situation concerning underwater cultural heritage in the Azores. Several scientific documents were made available by the governmental entity with competence in the area of underwater cultural heritage, namely the Regional Directorate of Culture (DRC) of the Azores (e.g. (Bettencourt, et al., 2017)).

The following diagram represents an outline of the methodology used to characterize the current underwater cultural heritage sector in the Azores.

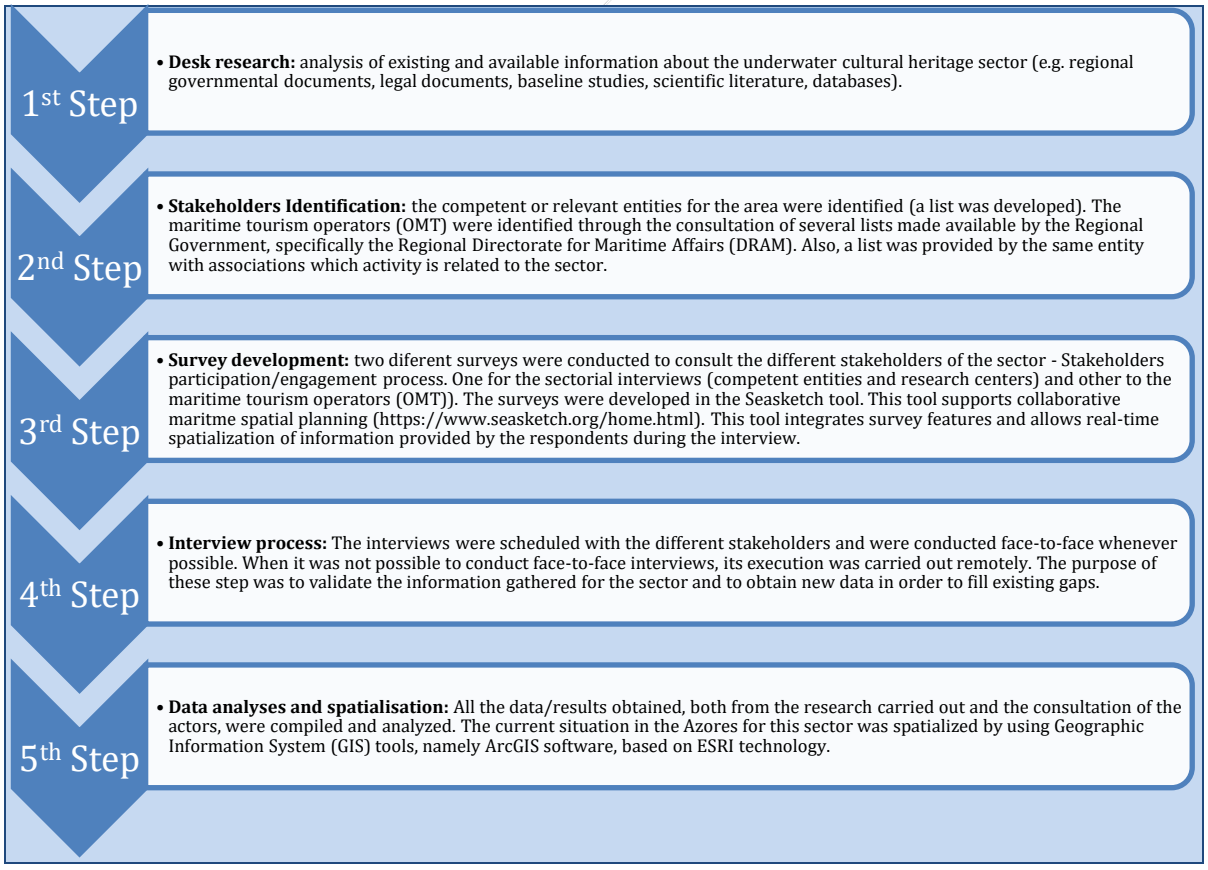


Figure 109. Methodological scheme for the characterization of the existing situation of the underwater cultural heritage sector in the Azores.

During individual interviews, maritime tourism operators (OMT) were not specifically interviewed for this sector, they were interviewed within the coastal and maritime tourism sector. However, coastal and maritime tourism in the Azores is intrinsically linked with UCH sector and OMT provided relevant information on this sector, which was incorporated into the analysis presented.

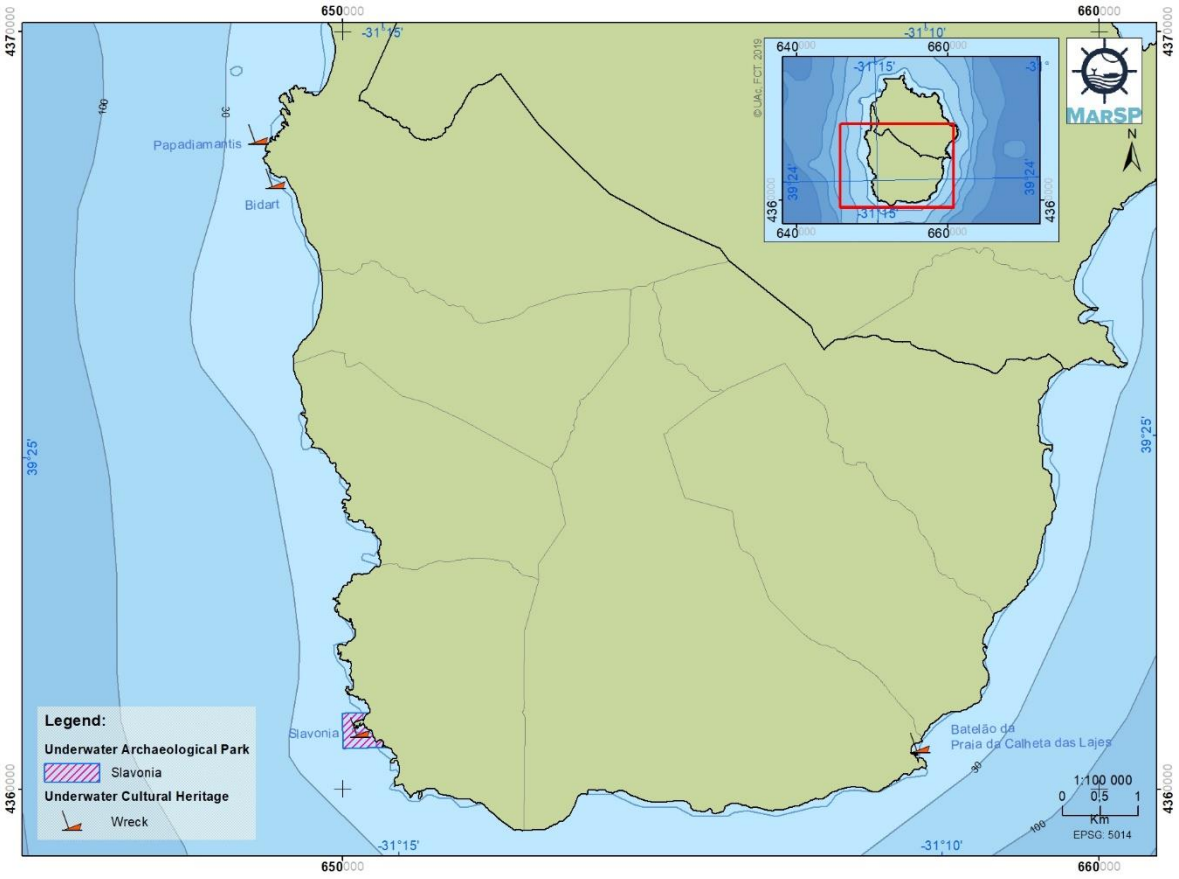
Sectoral stakeholders were asked if they agreed with the methodology proposed to characterize the current spatial distribution of the underwater cultural heritage and what type of changes would they recommend. In a general way, stakeholders did not identify the need for changes in the methodology. It was referred that the spatialized data should not be publicly available, being made available with restrictions, as a preventive measure against the destruction of sites by treasure hunters intent on pillaging and commercial exploiting underwater cultural heritage sites. It has also been suggested that it is important to consider in the methodology the underwater cultural heritage known that is not target of activities related to the sector, such as tourism and research (this heritage tends to focus on areas with great pressure, that other activities may have impact).

The current spatial distribution of known/registered underwater cultural heritage sites in the maritime space surrounding the Azores archipelago, at depths that allow access by scuba divers, include the following:

- All the visits sites by scuba diving listed in the Guide of the Underwater Cultural Heritage of the Azores (sites identified in the figures below);
- Slavonia Underwater Archaeological Park, Flores Island (**Figure 110**);
- Caroline Underwater Archaeological Park, Pico Island (**Figure 112**);
- Underwater Archaeological Park of Angra do Heroísmo Bay, Terceira Island (**Figure 115**);
- Dori Underwater Archaeological Park, São Miguel Island (**Figure 116**);
- Canarias Underwater Archaeological Park, Santa Maria Island (**Figure 117**).

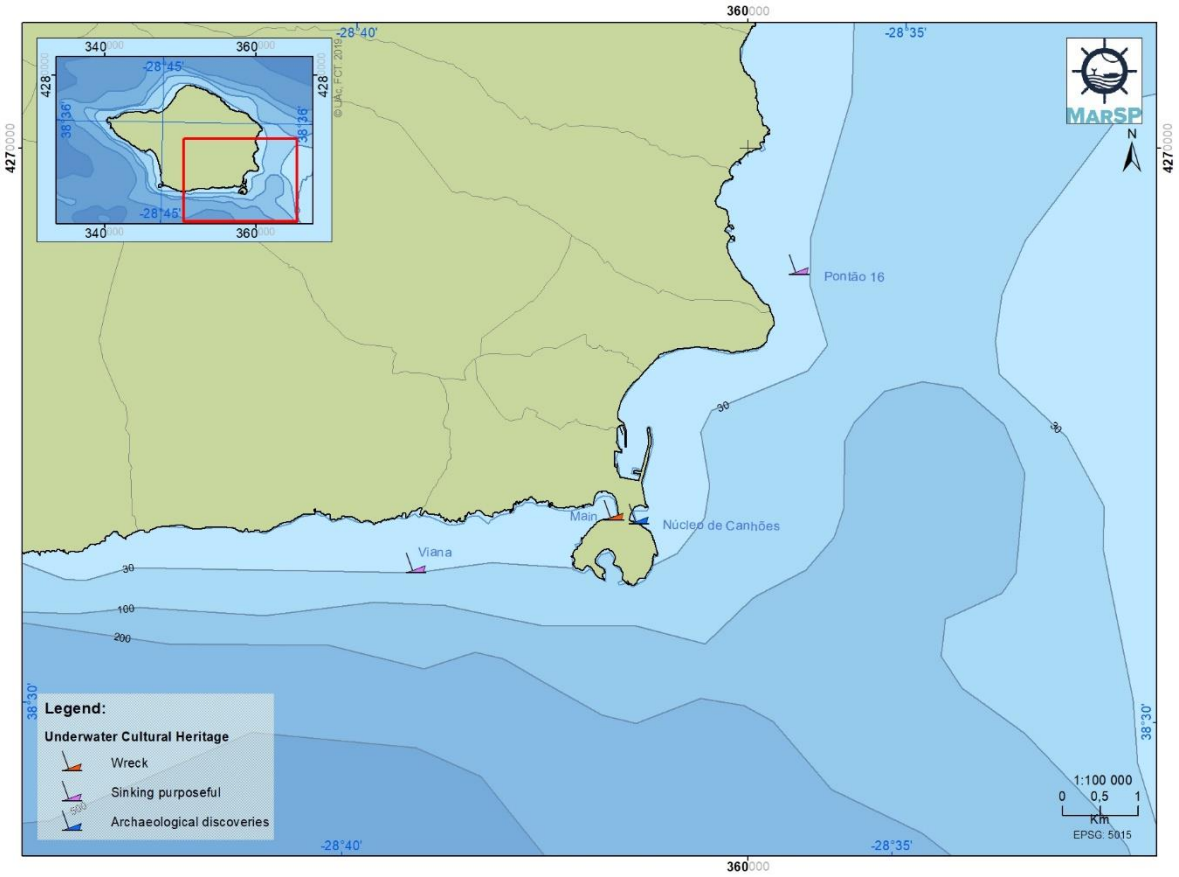
Furthermore, stakeholders interviewed and consulted in the MarSP workshops, beside the sites presented above, identified other UCH places (unregistered/perceived), **Figure 116** and **Figure 117**:

- A place in front of Rosto de Cão (Livramento), São Miguel Island;
- A place in front of Lagoa, São Miguel Island;
- A shipwreck situated at Viteleiro, São Miguel Island;
- A wreck called "Beija Flor" situated at Almagreira, Santa Maria Island.



Sources:
DRAM, 2019
Background: IH, 2019; DGT, CAOP, 2018.

Figure 110. UCH sites accessible for scuba diving listed in the Guide of the Underwater Cultural Heritage of the Azores in Flores Island and the Slavonia Underwater Archaeological Park (Source: Direção Regional dos Assuntos do Mar/Direção Regional da Cultural, adapted from Bettencourt, et al. (2017)).



Sources:
DRAM, 2019
Background: IH, 2019; DGT, CAOP, 2018.

Figure 111. UCH sites accessible for scuba diving listed in the Guide of the Underwater Cultural Heritage of the Azores in Faial Island (Source: Direção Regional dos Assuntos do Mar/Direção Regional da Cultural, adapted from Bettencourt, et al. (2017)).

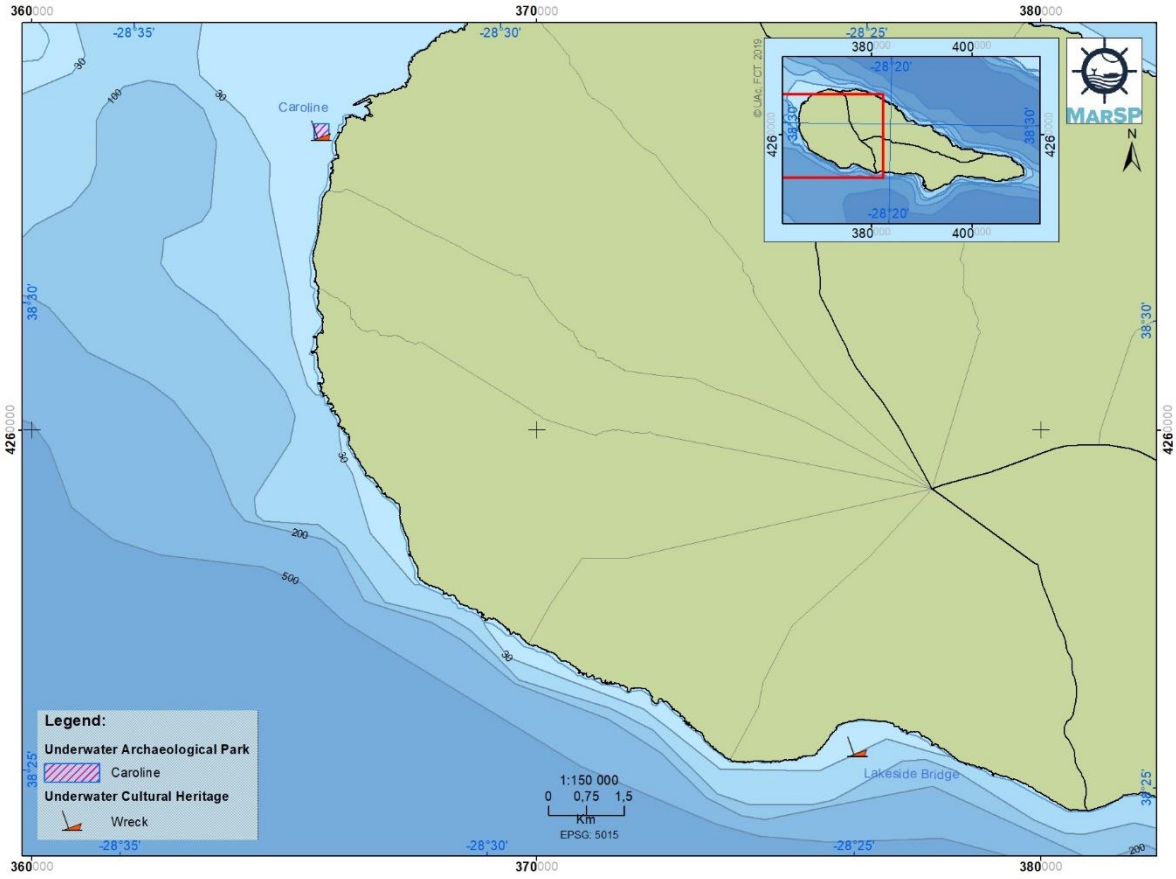
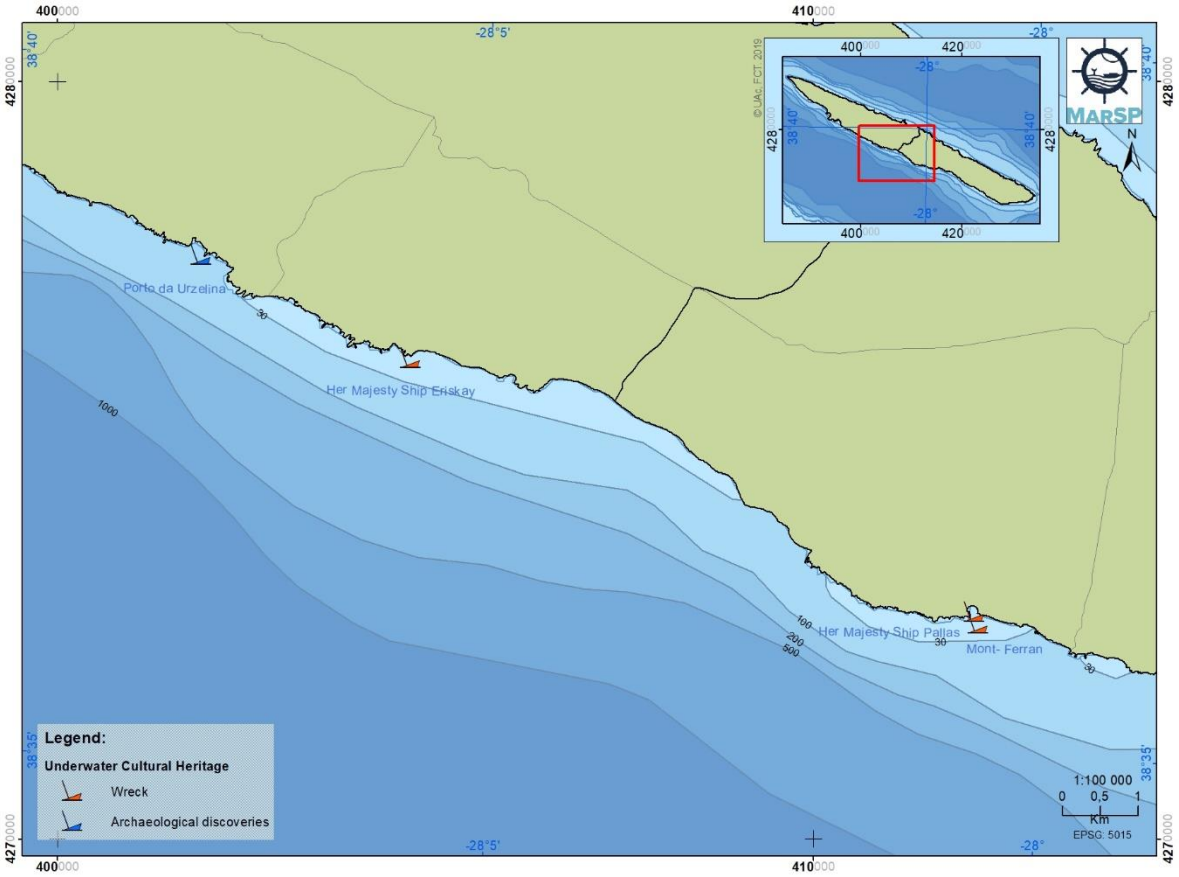


Figure 112. UCH sites accessible for scuba diving listed in the Guide of the Underwater Cultural Heritage of the Azores in Pico Island and the Caroline Underwater Archaeological Park (Source: Direção Regional dos Assuntos do Mar/Direção Regional da Cultural, adapted from Bettencourt, et al. (2017).



Sources:
DRAM, 2019
Background: IH, 2019; DGT, CAOP, 2018.

Figure 113. UCH sites accessible for scuba diving listed in the Guide of the Underwater Cultural Heritage of the Azores in São Jorge Island (Source: Direção Regional dos Assuntos do Mar/Direção Regional da Cultural, adapted from Bettencourt, et al. (2017)).

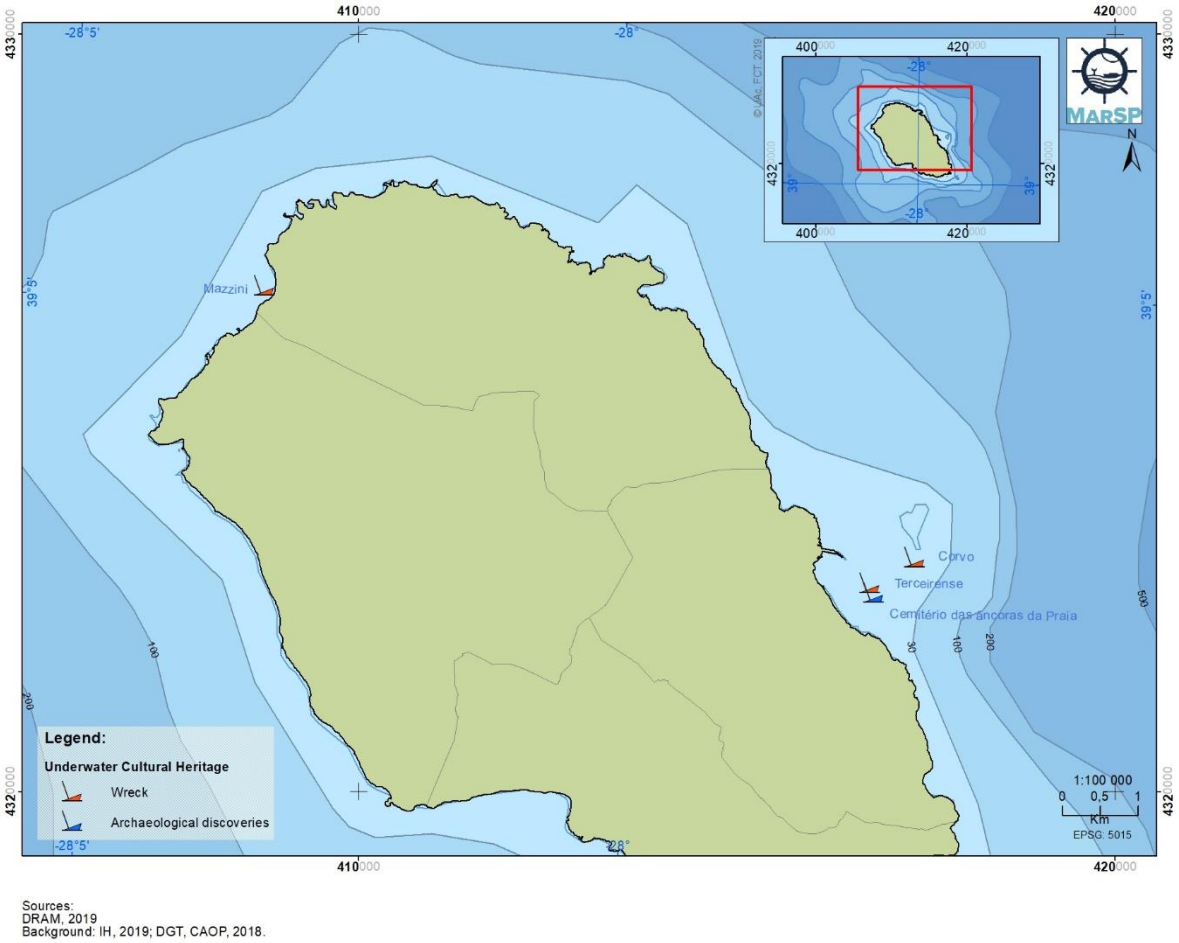
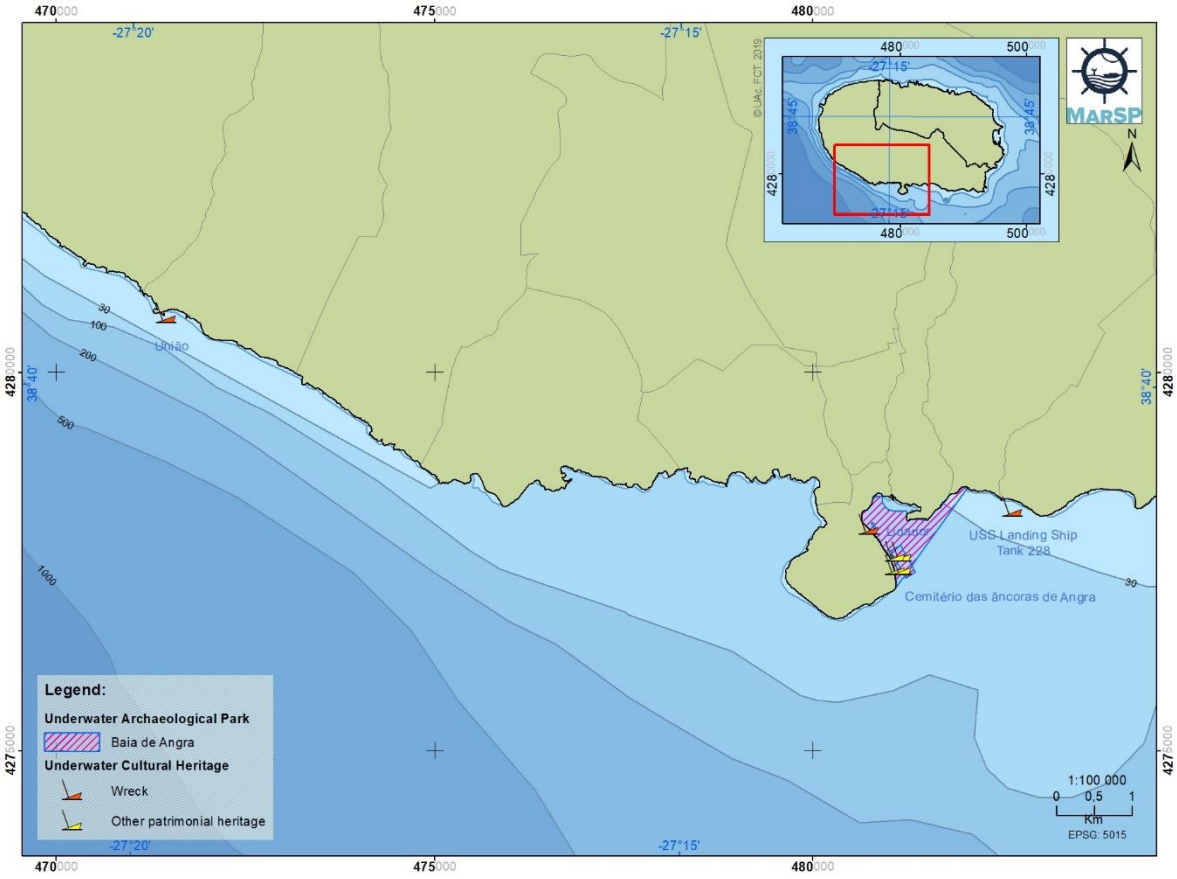
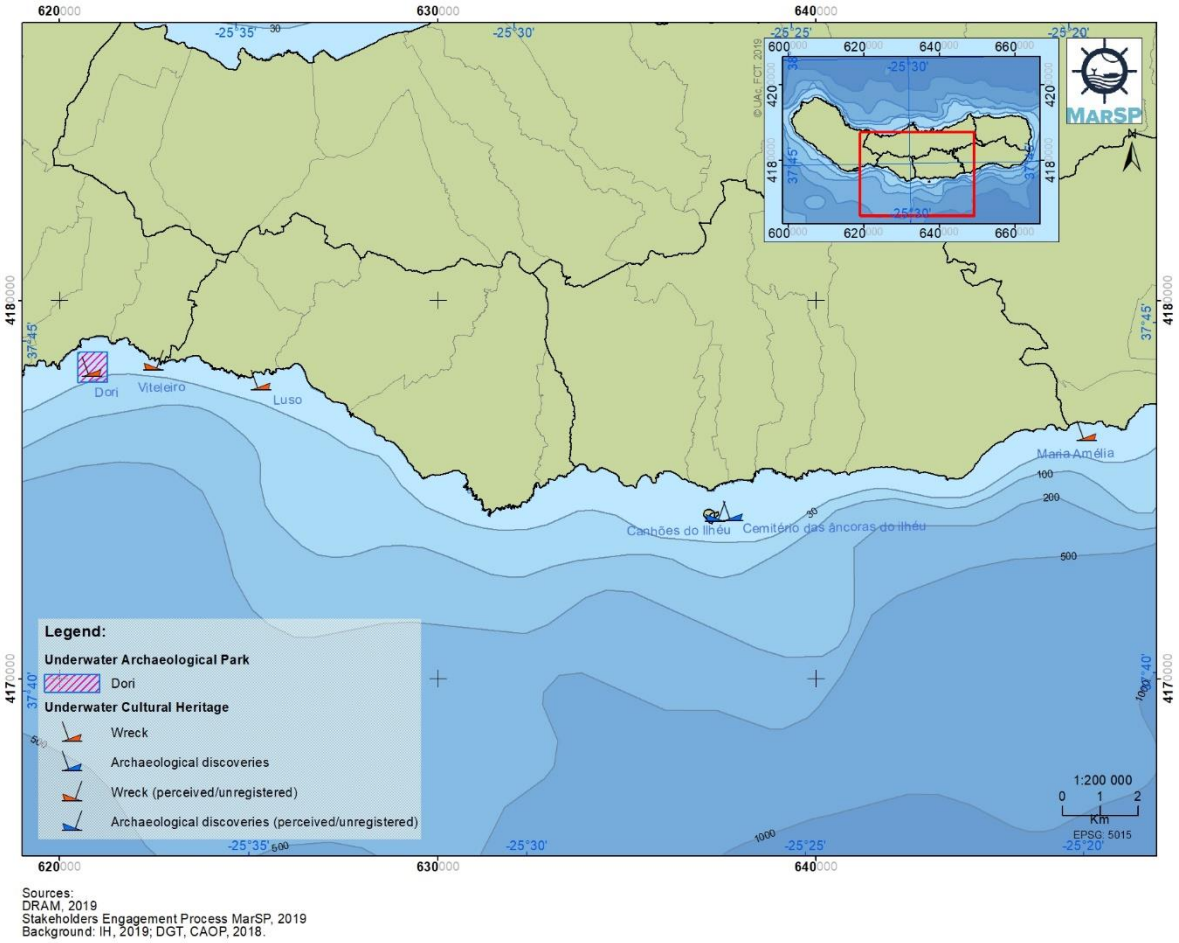


Figure 114. UCH sites accessible for scuba diving listed in the Guide of the Underwater Cultural Heritage of the Azores in Graciosa Island (Source: Direção Regional dos Assuntos do Mar/Direção Regional da Cultural, adapted from Bettencourt, et al. (2017)).



Sources:
DRAM, 2019.
Background: IH, 2019; DGT, CAOP, 2018.

Figure 115. UCH sites accessible for scuba diving listed in the Guide of the Underwater Cultural Heritage of the Azores in Terceira Island and the Underwater Archaeological Park of Angra do Heroísmo Bay (Source: Direção Regional dos Assuntos do Mar/Direção Regional da Cultural, adapted from Bettencourt, et al. (2017)).



Sources:
DRAM, 2019
Stakeholders Engagement Process MarSP, 2019
Background: IH, 2019; DGT, CAOP, 2018.

Figure 116. UCH sites accessible for scuba diving listed in the Guide of the Underwater Cultural Heritage of the Azores in São Miguel Island and the Dori Underwater Archaeological Park (Source: Direção Regional dos Assuntos do Mar/ Direção Regional da Cultural, adapted from Bettencourt, et al. (2017)).

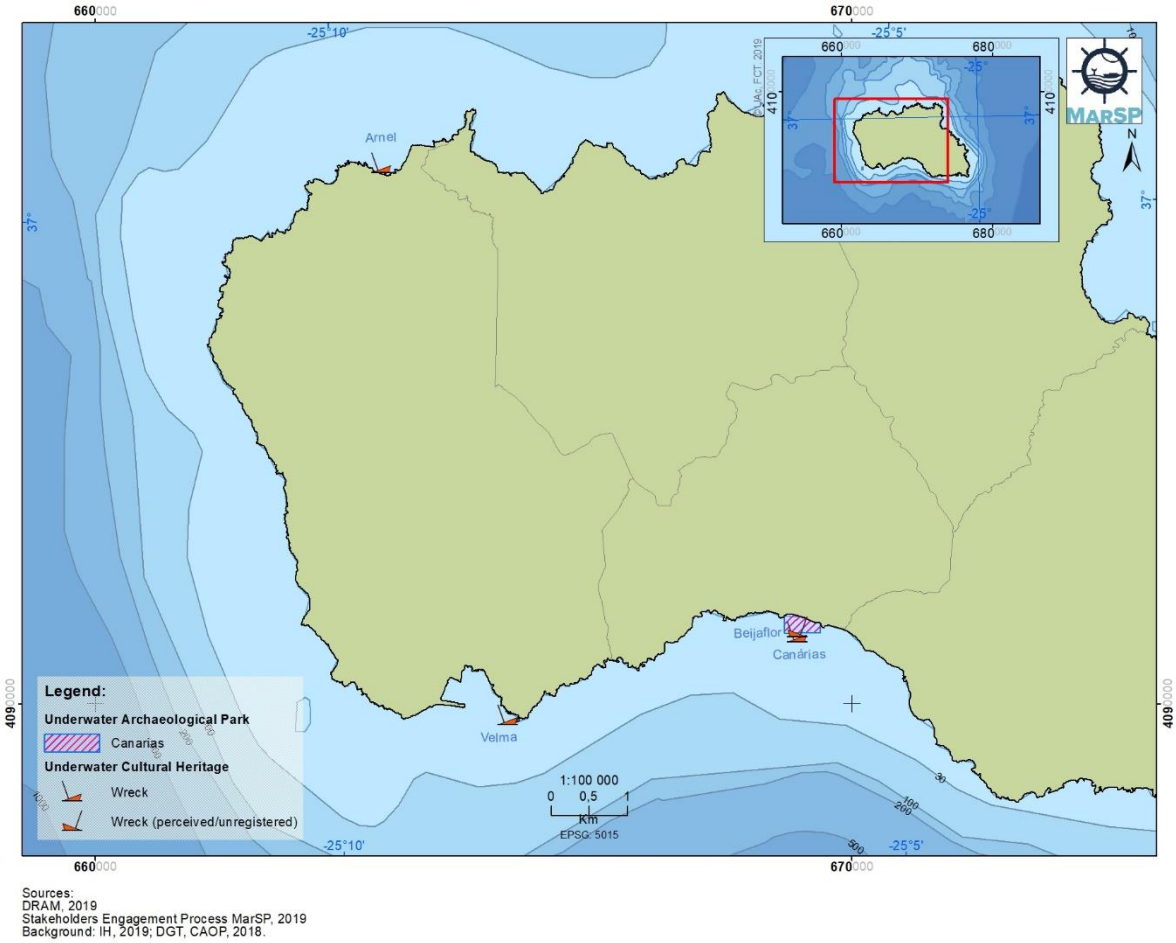


Figure 117. UCH sites accessible for scuba diving listed in the Guide of the Underwater Cultural Heritage of the Azores in Santa Maria Island and the Canarias Underwater Archaeological Park (Source: Direção Regional dos Assuntos do Mar/Direção Regional da Cultural, adapted from Bettencourt, et al. (2017)).

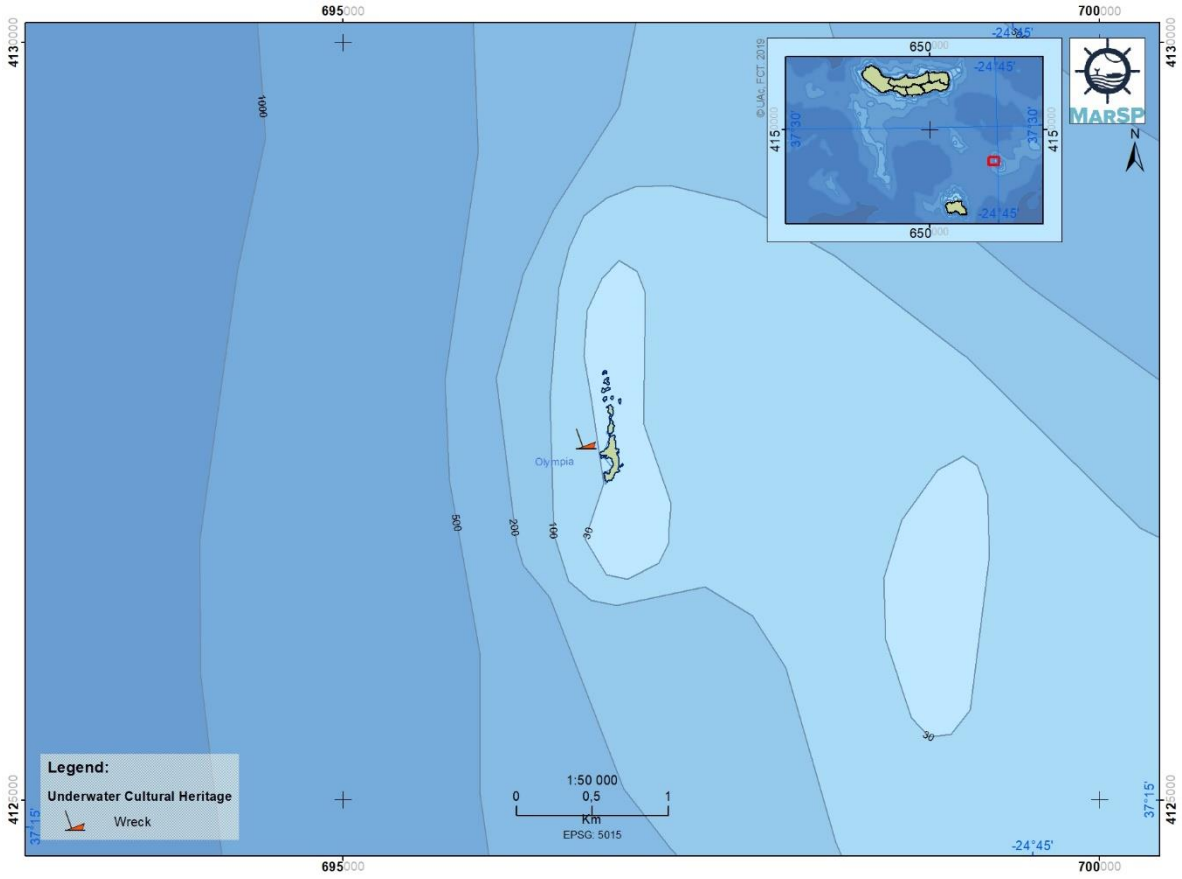
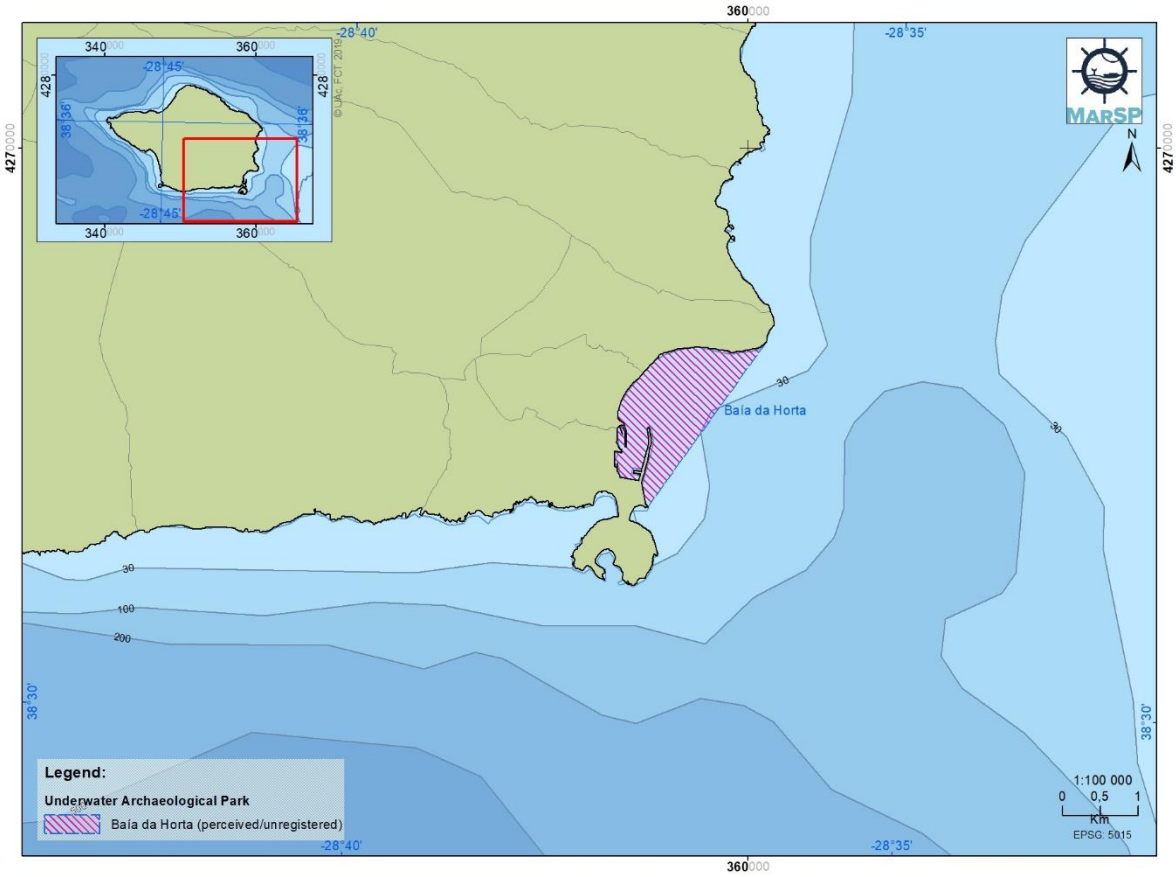


Figure 118. UCH sites accessible for scuba diving listed in the Guide of the Underwater Cultural Heritage of the Azores in Formigas Islets (Source: Direção Regional dos Assuntos do Mar/Direção Regional da Cultural, adapted from Bettencourt, et al. (2017)).

Although the information presented below result from the stakeholders' consultation to the identification of the potential UCH areas in the Azores, these were considerate complementary info to the characterization of the current spatial distribution of UCH sector. The data collected and presented next is based on stakeholders' perception and it is unregistered.

Potential areas identified in Faial and Pico islands by stakeholders (**Figure 119** and **Figure 120**):

- Horta Bay as a potential Underwater Archaeological Park in Faial Island;
- A site near to coastline in front of São Mateus parish in Pico Island (this site has been named as São Mateus).



Sources:
Stakeholders Engagement Process MarSP, 2019
Background: IH, 2019; DGT, CAOP, 2018.

Figure 119. Horta Bay as a potential Underwater Archaeological Park in Faial Island.

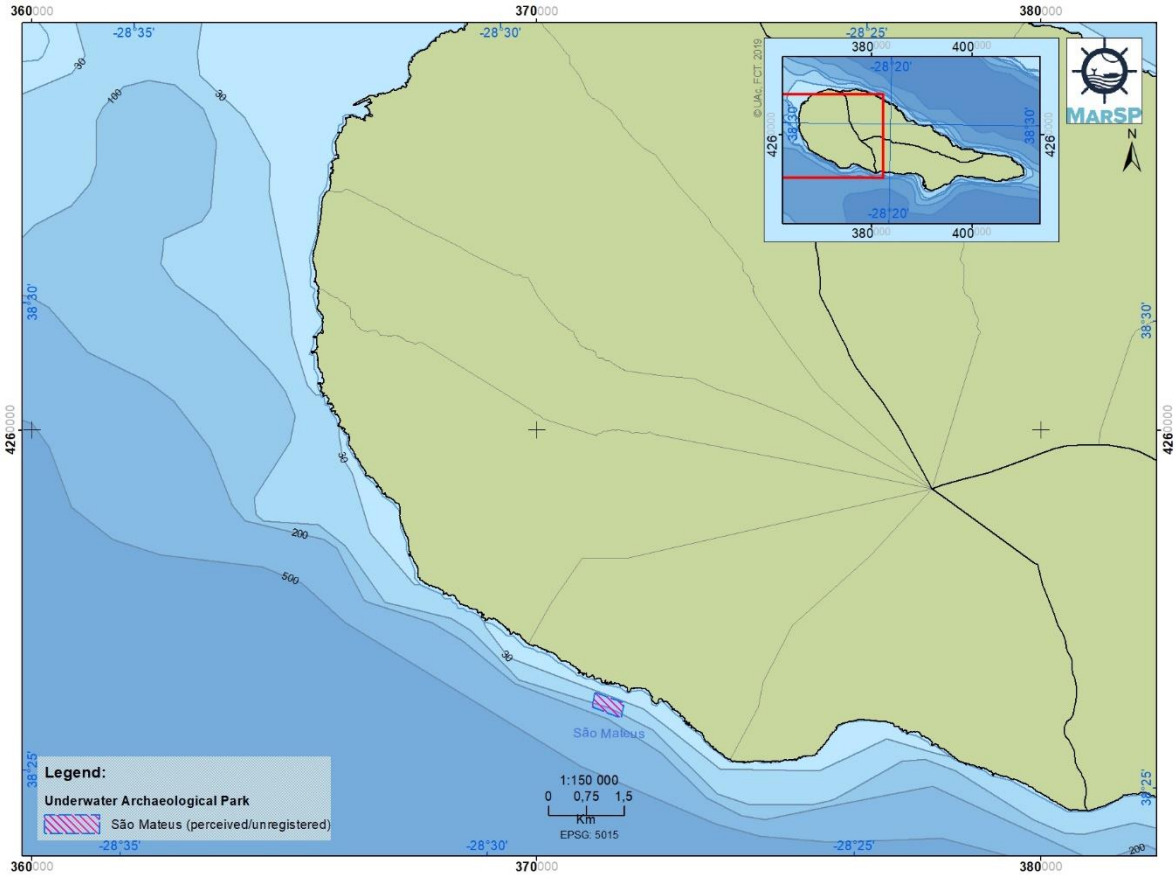


Figure 120. São Mateus as a potential Underwater Archaeological Park in Pico Island.

Beyond the places identified in **Figure 119** and **Figure 120**, a stakeholder suggested that the area within 6 nautical miles around the Azorean islands is a potential zone for this sector. However, the potentiality of this area is dependent on the confirmation of existent cultural heritage. As there was no access to information detailing the location of those sites (e.g. historical records), this area was not mapped for the potential situation of UCH sector.

It is important highlight that due to the cultural heritage in question, some stakeholders declined to identify potential areas for this sector.

PART III

Sectorial Analysis

The sector diagnosis presented in this section includes a SWOT analysis and the analysis of sectoral interactions (sector-sector, land-sea interactions, sector-environment). The methodological approach for all analysis was similar and mainly based on regional stakeholders' consultation.

The first step to develop the analysis was based on sectoral representative stakeholders' consultation, through individual interviews. Stakeholders were asked to give their technical opinion on the fulfilment of each analysis for the sector they represent. For UCH sector, two representative regional stakeholder accepted to participate in the individual interview. The analyses resulting from this step were reviewed during the 2nd MarSP Regional Stakeholders Workshop (developed in April 2019), which had the participation of 78 stakeholders distributed in three Azores Islands: São Miguel, Terceira and Faial. In the workshop, stakeholders were grouped according to the sectors they represent and were asked to comment on and complement the analyses for those sectors. The analysis for each sector includes consensual results from both regional stakeholders' consultation (individual interviews and the workshop) and additional topics from literature review for the sector.

SWOT Analysis

A SWOT analysis was developed for each maritime sector identified for the Azores. Stakeholders were asked to identify the strengths, weaknesses, opportunities and threats they consider as the most important for the sector they represent. The final SWOT analysis for the UCH sector in the Azores is represented in **Table 38**. The SWOT analysis resulting from the sectoral interview presented few points, whereby Workshop participants complemented the analysis. Furthermore, it is important to note that topics highlighted in bold in the table below were considered by stakeholders as most important.

Table 38. SWOT analysis from regional stakeholders' consultation for underwater cultural heritage in the Azores.

	Positive factors	Negative factors
Internal factors	***Strengths*** **- Scientific and historical potential value;** **- High potential for the development of maritime-tourist activities linked to UCH;** **- Sustainable tourism practices that effectively promote the preservation of UCH;** **- Great potential for new discoveries of UCH in the Azores, according to the existing historical evidences and to the insights coming from archaeological research;** **- Environmental Impact Assessment studies are considered in most cases of UCH;** - The known UCH, existing in high numbers, with good condition and significant historical and scientific value. Near the coast, at depths accessible to divers, with areas with favorable oceanographic conditions; - The Azores considered by UNESCO as having one of the best practices at international level for the protection of the UCH.	***Weaknesses*** **- UCH usually not being considered in advance in coastal infrastructure development programs (especially in the planning phase);** **- Seasonality (most evident), adding to the nature of anti-cyclones, affect the tourism sector and diving activities associated with the UCH;** **- Mobility-price relationship within the Archipelago is not advantageous for tourism sector, specifically for diving activities associated with the UCH;** **- Lack of financial, public and private support;** - A cultural barrier to the integration of the foreign tourist with the local population (the Azorean people have to be more receptive with theme); - Numerous maritime operators with a strong connection to local communities (interconnected with the cultural activity).
External factors	***Opportunities*** **- Further promotion of scientific research and tourism;** **- Great and visible advances in research in underwater archaeology;** **- Tendency towards establishing a network of interpretive centres with shared management involving all stakeholders;** - Developed port infrastructures; - Potential for nautical tourism growth in the Azores.	***Threats*** **- Port installations and extraction of non-metallic mineral resources (sand and aggregate extraction) on the coast in areas that are not properly evaluated/characterized for UCH;** **- Treasure hunters; strategy based on increasing the public awareness;** **- Difficulties in planning fishing sector increases conflicts with UCH sites and associated diving activities;** - Difficulty in obtaining and allocating resources for a correct management of the Portuguese sea; - Collecting and searching by collectors and private initiatives.

Analysis of interactions

The development of a certain activity in the maritime space is usually linked to interactions with the remaining uses and maritime sectors. Those interactions can be both positive or negative and can be both induced or suffered by a certain sector. In the context of the MarSP project, for each maritime sector, three types of interactions were analysed: sector-sectors interactions, land-sea interactions and interactions with the environment. The analysis intended to identify if interactions exist and the level of intensity of the interactions using the following scale: negative values for negative interactions, positive values for positive interactions and zero for absence of interactions. In the matrices, the column "C" represents the negative impacts induced or suffered by the sector, identified as conflicts, while the column "S" represents the induced or suffered positive interactions, deemed as synergies.

Sector-sectors interactions analyses whether there is any type of conflict and/or synergy between each of the maritime sectors identified and the other sectors. The resulting matrix reflects only the

analysis of interactions occurring offshore, not including coastal areas within less than 30m bathymetry (the protection maritime zone of protection defined by the coastal zone spatial Plan - POOC).

Land-sea interactions analyse whether there is any type of conflict and/or synergy between each of the maritime sectors identified and coastal activities (up to the 30m bathymetry) developed in the various areas identified in the POOC.

Interactions with the environment analyses if there is any kind of negative and/or positive effect of each of the maritime sectors identified to the environment, specifically considering the descriptors of the good environmental status (GES), and respective criteria, as defined by the Marine Strategy Framework Directive (MSFD).

During the individual interviews, stakeholders were asked to identify the levels of conflicts and/or synergies of underwater cultural heritage with other sectors. The final values were calculated using the tendency of answers and represent the stakeholders' perception trend. As this first analysis is based on inputs from stakeholders representing the maritime sector, to avoid or decrease possible bias in the results, during the Workshop, stakeholders were asked to comment and, when in disagreement, to propose a different value to classify the level of conflict/synergy. The final values from the workshop were calculated using the mean of all values resulting from all discussion tables. Literature review was also used to complement the characterization of the interactions, identifying if a conflict or a synergy exists in the Azores or on other contexts.

Interactions with other sectors

In order to analyse the interactions between UCH and other uses and activities developed in the maritime space, an interaction matrix was created according to the aforementioned methodology. The values featured on the matrix below represent the trend analysis of the stakeholders' sectoral consultation and the 2nd MarSP Stakeholder Engagement Workshop. Nonetheless, it is important to observe that the underwater cultural heritage sector was analysed mainly based on the Stakeholders workshop sector group, considering that the participation on face to face interviews was almost nule (two interviews).

Table 39. Characterization of the interactions between underwater cultural heritage and other maritime sectors in the Azores resulting from stakeholders' consultation and literature review

Sector-Sectors	Underwater cultural heritage					
	Sectoral interviews		2nd Workshop		Literature review	
	C	S	C	S	C	S
Fisheries	†	†	-1.6	0.2	x	
Aquaculture	0	0	-0.4	0		
Extraction of non-metallic mineral resources	†	0	-1.8	0.2	x	
Energy	†	0	-0.6	0	x	
Maritime security, defence, surveillance and civil protection	†	†	-0.4	0.2		
Navigation and maritime transportation	0	0	-0.4	0	x	
Infrastructures	†	†	-1.2	0	x	
Coastal and maritime tourism	-2	†	-0.6	1.8		x
Scientific research and marine biotechnology	0	†	-0.2	2.2		x
Environmental conservation and MPAs	0	†	0	2.6		x
Legend	**C –** Conflict; **S –** Synergy; **X –** Existent **-3 –** High conflict; **-2 –** Moderate conflict; **-1 –** Low conflict **0 –** Without conflict/synergy **1 –** Low synergy; **2 –** Moderate synergy; **3 –** High synergy **"-" –** Does not answer; † It was not possible in the interviews to gauge trends.					

† It was not possible in the interviews to gauge trends.

The reasons behind the grades given by the sectoral interviews and 2nd MarSP Stakeholder Engagement Workshop for each of the identified interactions with UCH are the following:

- Fisheries: Moderate conflict with fisheries. The conflict identified is because in some UCH areas legally protected it is prohibited fishing and some fishermen don´t agree with that. Also, because some UCH sites (legally not protected) are exploited by fishermen questioning the state of conservation of the heritage present on them;
- Extraction of non-metallic mineral resources: Some extraction areas coincide with areas where there is UCH. This is possible if the areas with UCH are not known;
- Infrastructures: The identified conflict is attributed to the dredging activity on the Port of Horta (Faial Island);
- Coastal and maritime tourism: The conflict arises from the fact that maritime tourism operators often use the areas of UCH for the development of their activities and the possibility of unregulated use may compromise the preservation and conservation of the UCH sites. Therefore, a solution is needed and the relationship with the operators and the UCH sector can be the key. Also, the conflicts are related with the possibility of tourists stealing artefacts;
- Scientific research and marine biotechnology: There are synergies as there is archaeological research and biological research;
- Environmental conservation and MPAs: There are synergies because in the UCH sites legally protected the environmental and biodiversity are also protected.

Uses compatibilization and Multi-uses

Ocean multi-use (MU) is an emerging concept which responds to the increasing demand for marine resources and space. It has been defined as the intentional "joint use of resources in close geographic proximity by either a single user or multiple users. It is an umbrella term that covers a multitude of use combinations in the marine realm and represents a radical change from the concept of exclusive resource rights to the inclusive sharing of resources and space by one or more users" (in (Schupp, et al., 2019)).

By law, in the Azores, are incompatible with the UCH sector the sectors: Fisheries (except in the case of "Dori", where only trolling is allowed, by professional fishing vessels, in case the area is not marked for diving); Extraction of non-metallic mineral resources; Maritime security, defence, surveillance and civil protection; Navigation and maritime transportation; Infrastructures; Ports and marinas. Furthermore, other sectors like Aquaculture and Energy (in future), must be conditioned given that they interfere with the seabed or the activities associated with underwater heritage.

According to a recent study developed (Vergílio, Calado, & Caña Varona, MUSES Project Case study 3B: Development of tourism and fishing in the Southern Atlantic Sea (Azores archipelago – Eastern Atlantic Sea, 2017) to identify opportunities of MU development, existing MU in the Azores are mainly related to "soft" or traditional uses of the maritime space, such as fisheries associated with tourism or tourism associated with UCH and environmental protection or scientific research associated with tourism. The study included sectoral stakeholders' consultation to ensure that representatives and practitioners of the main sectors were consulted and actively involved.

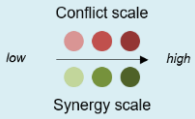
One of the most relevant MU combinations identified in the Azores was the association of touristic or recreational activities with the protection of UCH and its adjacent marine ecosystems, the latter in the form of areas under environmental protection measures. Considering that UCH sites often act as artificial reefs and become an important refuge for several marine life forms, environmental protection initiatives such as establishing marine protected areas, can therefore be compatible with (and beneficial to) UCH conservation initiatives, for instance the creation of underwater archaeological parks. Simultaneously, tourism could benefit from the MU's environmental and cultural values, with activities such as in situ access to scuba divers (e.g. wreck diving) and dry access to the sites (e.g. glass bottom boats; land-based museums). By making UCH sites accessible to the public, such MU has the potential to foster their protection and the appreciation of their value and significance.

Land-sea interaction

Similarly, the interaction between underwater cultural heritage and sectors which take place on coastal areas was analysed through a comparison matrix. This analysis assumes that activities are developed within less than 30 m in bathymetry (areas from the maritime zone of the coastal zone spatial plan - POOC).

Table 40. Characterization of interactions of underwater cultural heritage with coastal zones in the Azores resulting from stakeholders' consultation and literature review

Land-sea		Underwater cultural heritage					
		Sectoral interviews		2nd Workshop		Literature review	
		C	S	C	S	C	S
Critical areas for the sustainable coastal use	Natural, cultural and scenic special area	0	3	0	3		
	Bathing zones	-1	†	-0.7	1.5		
	Edified areas in risk zones	0	0	0	0		
Environmental protection	Marine environmental protected areas	0	†	-0.7	2.5		x
	Land environmental protected areas	0	†	0	1.3		
Coastal protection areas	Edified areas	0	0	0	0		
	Agricultural, forestry and other uses	0	0	0	0		
	Touristic potential areas	0	†	-0.7	1.5		
Infrastructures	Airport	0	†	-0.3	0.3		
	Road	0	†	0	0.3		
Navigation	Ports	-3	†	-3	0.3	x	
	Marinas, 'portinhos'	†	†	-3	0.5		
Legend	**C –** Conflict; **S –** Synergy; **X –** Existent **-3 –** High conflict; **-2 –** Moderate conflict; **-1 –** Low conflict **0 –** Without conflict/synergy **1 –** Low synergy; **2 –** Moderate synergy; **3 –** High synergy **"-" –** Does not answer; † It was not possible in the interviews to gauge trends.						



† It was not possible in the interviews to gauge trends.

The explanation for identified interaction with UCH for the stakeholders-based matrix is the following:

- Navigation in ports: Some areas under port jurisdiction in the Azores comprise UCH sites that can are accessible to divers. For example, in the Underwater Archaeological Park of Angra do Heroísmo Bay, under port jurisdiction, it is possible to dive and sometimes conflicts occur between the vessels navigating the area. It is necessary to create solutions to avoid these type of conflicts according to stakeholders;
- Marine environmental protected areas: Stakeholders consider that the synergy arises from the fact that, in most cases, establishing protection measures for underwater cultural heritage also assures environmental protection to those areas;
- Touristic potential areas: The synergy exists due to the potential of UCH sites to be accessed for the development of tourism activities.

Interactions with the environment

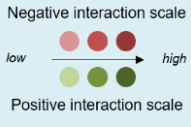
The impacts of UCH on the environment were analysed taking into consideration the Good Environmental Status (GES) descriptors, as defined by the MSFD.

Table 41. Characterization of impacts of underwater cultural heritage considering the MSFD's GES descriptors resulting from stakeholders' consultation and literature review

Interactions with the environment	Underwater cultural heritage					
	Sectoral interviews		2nd Workshop		Literature review	
	N	P	N	P	N	P
Biodiversity	0	3	-0.3	3		X
Non-indigenous species	0	†	0	0.3		
Exploited fish and shellfish	†	†	-0.3	1.5		
Food-webs	0	3	0	2.5		X
Human-induced eutrophication	†	0	0	0		
Sea floor integrity	0	†	-0.3	0.5		
Hydrographical conditions	†	†	-0.3	0		
Contaminants (water, sediments, biota)	†	0	-0.3	0		
Contaminants in fish and seafood	†	0	-0.3	0		
Litter	†	0	-0.3	0		
Level of noise	†	0	-0.3	0		

Legend

N – Negative effect; **P –** Positive effect; **X –** Existent
-3 – High negative effect; **-2 –** Moderate negative effect; **-1 –** Low negative effect
0 – Without negative/positive effect
1 – Low positive effect; **2 –** Moderate positive effect; **3 –** High positive effect
"-" – Does not answer; † It was not possible in the interviews to gauge trends.



† It was not possible in the interviews to gauge trends.

The explanation for each identified interaction is the following:

- Biodiversity: There is a positive impact because the UCH sites legally protected usually have higher species richness and abundance of individuals;
- Elements of food webs: There is a positive impact because for stakeholders some known UCH sites function as nurseries.

There were no notes for the explanation of impacts of underwater cultural heritage in the GES descriptors defined by stakeholders' in the 2nd MarSP Workshop.

Additional documents and links

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General-Directorate for Cultural Heritage (2018), at: http://www.patrimoniocultural.gov.pt/en/ ;
National Center for Nautical and Underwater Archaeology - CNANS (2018), at: http://www.patrimoniocultural.gov.pt/en/patrimonio/patrimonioimovel/patrimonio-arqueologico/gestao-da-actividade-acqueologia/arqueologia-nautica-esubaquatica/;
Division of Mobile and Intangible and Archaeological Heritage (2019), at: http://www.culturacores.azores.gov.pt/documentos/?categoria=6;
Manual for Activities directed at Underwater Cultural Heritage (2013), at: http://www.unesco.org/culture/en/underwater/pdf/UCH-Manual.pdf;

Good Practices Manual of the Azores Underwater Archaeological Cultural Heritage - Manual de Boas Práticas do Património Cultural Arqueológico Subaquático dos Açores (Neto & Parreira, 2018); **Guide of the Underwater Cultural Heritage of the Azores** (Bettencourt, et al., 2017).

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Supplement II. Awareness and Education about UCH in the Azores

The regional museum network has always been essential to raise awareness and foster education about the historical and symbolic dimension of the Azores, and Angra do Heroísmo in particular, in the context of the first globalization in Europe. Thus, in the Museum of Santa Maria are deposited archaeological materials belonging to the wrecks of the Canaries and Arnel. In São Miguel, in the city of Ponta Delgada, the Carlos Machado Museum houses a set of archaeological material belonging to the Oakfield, while in the Municipal Museum of Vila Franca do Campo are deposited two pieces of artillery, known as Cannons of Ponta Garça, recovered as a result of archaeological work carried out by the Regional Directorate for Culture. In Angra do Heroísmo Museum, on Terceira island, archaeological materials corresponding to the shipwrecks of the Angra B, Angra C and Angra D ships are deposited, three vessels that underwent underwater excavation work (DRC, 2019). In addition to these materials, it houses several finds of parts from the underwater environment, decontextualized, as well as a figure of a bow from a Spanish ship, dating back from the 18th century. Also, a noteworthy collection of cannons, which were erected throughout the 60s and 70s of the 20th century, corresponds to the result of pioneering underwater archaeology campaigns in the country. In the Graciosa Museum are deposited archaeological materials corresponding to the shipwrecks of Mazzini and Terceirense. There is also a figurehead, belonging to the shipwreck of the Julia schooner, carrier of merchandise, which was shipwrecked in the port of Santa Cruz da Graciosa on October 2, 1905. At the Francisco Lacerda Museum in São Jorge, there are archaeological materials corresponding to the shipwrecks of Her Majesty Ship Pallas and, in temporary exhibition, of the Mont Ferran barge (DRC, 2019). In the Museum of the Pico are deposited archaeological materials corresponding to the shipwreck of the American galley Ravenswood, responsible for the transport of goods that happened next to the Cais de Morato, on January 14, 1856. To these is added a drawing coach and a dish from the Caroline wreck, in private collection depot. In the Museum of the Horta archaeological materials are deposited corresponding to the shipwreck of the ship of Our Lady of Light, of the Race of India, that overcame in the bay of Porto Pim, on November 6, 1615. It also houses a set of estate from several shipwrecks, found as a resultof underwater archaeology interventions in the bay of Horta. In the Museum of Flores are deposited archaeological materials belonging to the wrecks of Slavonia and Bidart, as well as old photographs of the Papadiamantis. The museum also holds material from archaeological research in a dump site north of the village of Santa Cruz, with a chronology varying between the 17th and 20th centuries. There are also artefacts belonging to the shipwreck of SV Brillant, a merchant ship of German origin, under the Norwegian flag which ran aground in the area of Quebrada Nova on the north coast of the island on February 16, 1899, and to the shipwreck Fajã Grande 1, which investigation revealed as a 19th century boat. The ground floor of the museum is dedicated to the theme of corsairs, pirates and shipwrecks in the Azores. (DRC, 2019).
It is also possible to visit in Terceira Island an interpretive centre of the Bay of Angra do Heroísmo, which combines the underwater cultural heritage with the World Heritage City recognition.
In 2018, DRC published an illustrated children's book about the shipwrecks of the Azores, an action to raise awareness of the underwater cultural heritage and the need to perverse and protect it.

Figure 121. Illustrated children's book about the shipwrecks of the Azores (Published by DRC, 2018).

NAVIGATION AND MARITIME TRANSPORT

Introduction

The aim of the MarSP (Macaronesian Maritime Spatial Planning) project is to develop concrete actions for the Member States (Portugal and Spain), through regional and national competent entities to build the necessary capacities and tools for the implementation of the European Union (EU) Directive on Maritime Spatial Planning (MSP) (Directive 2014/89/EU, 2014) in the Macaronesia region, including mechanisms for cross-border cooperation.

For the characterization of the existing uses in the Azores maritime space, the main blue sectors and activities need to be considered. In the context of the MarSP project, the shipping and maritime transport is a fundamental activity to consider in every process of MSP, and even more importantly in outermost regions. This sector, despite its dependence from fixed infrastructures onshore (fundamentally ports and marinas), uses the maritime space temporarily. The sector includes both passengers and cargo transportation.

Purpose

This sector briefing summarises the current status of the shipping and maritime sector in the Autonomous Region of the Azores (Portugal), under MarSP project work package 2 "Mapping the current conditions and creating a vision for the MSP in Macaronesia" and Task 2.2 "Mapping the maritime uses and activities and defining the MSP current conditions". It includes a characterization of the current situation of the shipping and maritime sector and MPA in the Azores and the proposed and adopted methodologies to map the activity. It also includes a sector diagnosis and the main interactions with other sectors, the environment and the land-sea interface.

PART I

Sector characterization

The archipelago of the Azores is highly dependent on maritime transportation and the Azores has been a strategic crossing point in the Atlantic (Varona et al., 2017). Its insular condition makes shipping an activity of crucial importance for the overall economy of the region. By ship, many goods that cannot be produced in the islands are imported. At the same time, goods and people are transported between the nine islands of the archipelago. Around 70% of the Azorean external trade uses this mode of transport (European Commission, 2017). The geographical location of the Azores archipelago places it in the center of one of the main navigation zones for long-distance maritime traffic between Europe and the North American continent. The vast majority of the traffic that crosses the Azores subarea of the Portuguese exclusive economic zone does not interact directly with the port structures of the region, except in case of need due to failure or accident.

There are significant differences between passengers and freight transport in the Azores. While the passenger transport is economically unprofitable and subsidised by the Government in order to ensure a public service, freight transport responds to market demand without receiving financial support.

Passengers transport inter-islands is currently done by the public company Atlânticoline S.A. (besides from Atlânticoline S.A., there was also Transmaçor - Transportes Marítimos Açoreanos Lda, but both public companies were merged in 2015). The passenger transport is usually done by five ships (currently four, as "Ariel" is no longer available to ensure maritime transport between Flores and Corvo islands) operating all along the year and two chartered ships operating only seasonally. The islands of Faial, Pico and São Jorge are the ones presenting the highest number of passengers transported, particularly the route covering the Pico-Faial channel between Horta and Madalena (European Commission, 2017). Passenger transport is conditioned by season, weather conditions, vessel availability and port infrastructures with diverse conditions. Maritime passenger traffic is exclusively among the islands, being the connections with the mainland necessarily by air (SRRN, 2014). Besides the passenger ships, cruise ships are responsible for transporting around 15% of the passengers by sea (European Commission, 2017), however, the cruise ships will be better analysed in the tourism report.

Concerning freight transport, the Azores is a nodal region for international freight maritime transport due to its geographic position, especially for bunkering purposes (European Commission, 2017). The archipelago is linked to mainland Portugal through three freight companies transporting containers with an average weekly capacity of 1.500 TEU (SRRN, 2014). There are 23 ships that operate almost exclusively in the region or between the archipelago and the mainland: six container ships; one oil tanker, six general cargo ships, six passenger ships and two extraction of aggregates ships. Freight transport is concentrated in the ports of Ponta Delgada and Praia da Vitoria (European Commission, 2017).

The number of passengers has been gradually increasing in the Azores, passing from 480,921 in 2010 to 512,688 in 2015. Gross Value Added (GVA) increased at an annual rate of 24% having a positive effect on employment and turnover, respectively +8.45% and +4.5%. Maritime passengers transport is expected to grow and generate new job opportunities in the short term, especially due to the development of tourism, which will increase the demand for connections among the islands

(SREA, 2019).

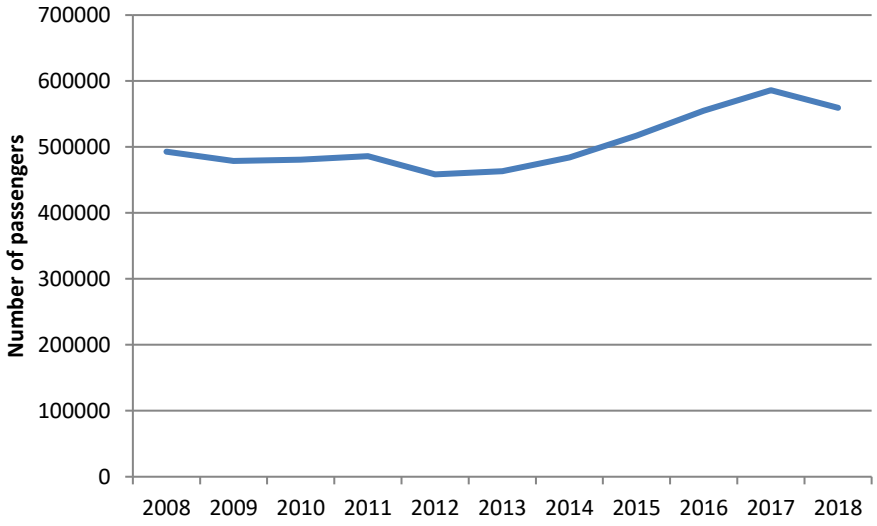


Figure 122. Evolution of the number of ferry passengers 2010-2015 (SREA, 2019)

The annual freight growth is positive (+2%), although the GVA shows a slight decrease growth while turnover is stable. In the last years, the activity recorded a decreasing trend in goods loaded and unloaded, although a partial recovery in 2015 (European Commission, 2017).

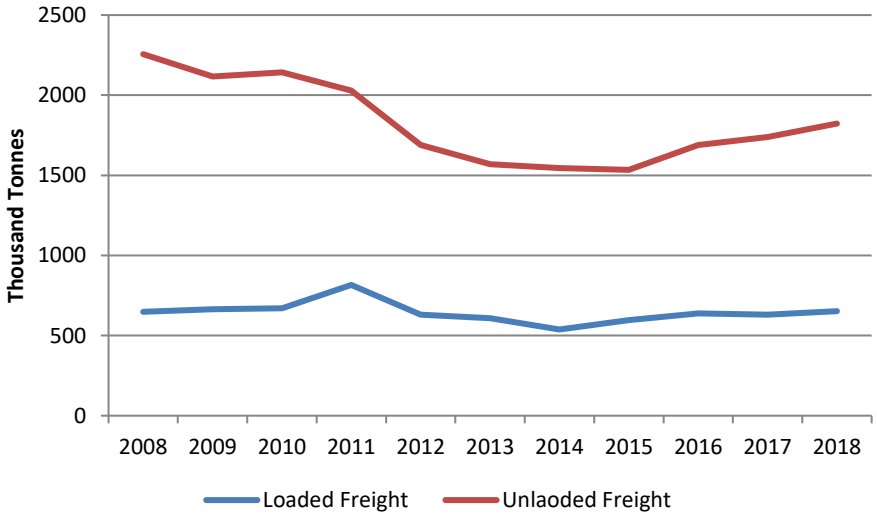


Figure 123. Evolution of loaded and unloaded freight in the Azorean ports 2008-2015 (SREA, 2019)

Maritime freight transport is the main channel for supplying the archipelago's internal demand. The increasing flows of tourists will require additional supplies of goods and the necessary adjustments in the logistics chain, from transport to freight movements and storage. This means that increased supplies of goods need more efficient services, reducing transport costs and improving facilities on

land for managing and moving cargo (intermodal freight transport). The geographical position of the Azores has potential to attract international shipping flows and to develop transhipments facilities. Creating a hub in the middle of the Atlantic that serves as a platform for cargo distribution among Europe, America and Africa could be one of the opportunities for the future (European Commission, 2017).

Legal framework and constrains

This section had the collaboration of the MarSP Deliverable D.6.5. (MSP Governance Analysis of the Macaronesia) (Pallero et al., 2019).

Competent institutions for sectorial management

National institutions:

- National Maritime Authority (Autoridade Marítima Nacional)
- National Republican Guard (Guarda Nacional Republicana - GNR)
- Directorate General of Natural Resources, Safety and Maritime Services (Direção Geral de Recursos Naturais, Segurança e Serviços Marítimos)

Regional institution:

- Regional Directorate for Transport (Direção Regional de Transportes)

Normative basis

Table 42 lists the legal framework for maritime transport at the international, national and regional level.

Table 42. Legal framework for the shipping and maritime transport sectors (Source: Pallero et al., 2019)

		Shipping and maritime transport
International	1952 Brussels Convention for the Unification of Certain Rules Relating to Penal Jurisdiction in Matters of Collision or other Incidents of Navigation	Regulates penal jurisdiction in matters of collision or other incidents of navigation
	International Convention for the Control and Management of Ships' Ballast Water and Sediments (BWM Convention, 2004)	Sets standards and procedures for the management and control of ships' ballast water and sediments
	The International Convention for the Prevention of Pollution from Ships (MARPOL)	Defines rules to preserve the marine environment in an attempt to eliminate pollution by oil and other harmful substance
	International Convention on Oil Pollution Preparedness,	Sets minimum safety standards in the construction, equipment and operation of merchant ships

	Response and Cooperation (OPCR, 1990)	
	United Nations Convention on the Law of the Sea (UNCLOS, 1982)	Defines the rights and responsibilities of nations with respect to their use of the world's oceans, establishing guidelines for businesses, the environment, and the management of marine natural resources.
National	Decree-Law 23.432	Regulation of maritime traffic with national ports
	Decree-Law 196/98, of 10 July	Regulation of the maritime transport activity
	Decree-Law 197/98, of 10 July	Regulation of the maritime transport regarding local traffic vessels
	Decree-Law 7/2006, of 4 January	Regulation of maritime transport for the national cabotage of passengers and goods. Altered by Decree Law 137/2015, of 30 July
	Decree-Law 263/2009, of 28 September	Establishes the national system of maritime traffic control (SNCTM). Altered by Decree Law 52/2012, of 7 March
	Decree-Law 61/2012, of 14 March	Transposes the Directive 2009/16/EC of the European Parliament and of the Council of 23 April 2009 on vessel control by the port State Amended and republished by Decree Law 27/2015, of 6 February.
	Law 146/2015, of 9 September	Regulates the activity of seafarers aboard Portuguese flag vessels, as well as the responsibilities of the Portuguese State as flag State or port, with a view to complying with mandatory provisions of the Maritime Labour Convention, 2006, of the International Labour Organization, transposes Council Directives 1999/63 / EC of 21 June 1999, 2009/13 / EC, of the Council of 16 February 2009, 2012/35 / EU of the European Parliament and of the Council of 21 November 2012 and 2013/54 / EU of the European Parliament and of the Council of 20 November 2013
	Decree-Law 547/99, of 14 December (Rectified by the Declaration 4-H/2000, 31 January), transposing the Directive 98/41/CE, of 18 June	Establishes the registration of people traveling in passenger ships, altered by the Decree-Law 51/2005, of 25 January
	Decree 287/2000, of 25 May, altered by the Decree 83/2015, of 19 March	Regulates the system of data registration created by the Decree-Law 547/99, of 14 December
	Decree-Law 280/2001, of 23 October, altered by the Decree-Law 51/2005, of 25 February, 228/2005, or 28 November, 105/2007, of 31 May, 181/2014, of 24 December, and 162/2016, of 24 August	Approves the regime applicable to the professional activity of seaman and establishes a safety occupation for passenger vessels
	Decree-Law 48/2002, of 2 March	Establishes the legal regime for the public pilotage service in the ports and approves the General Regulation of the Piloting Service
	Decree-Law 180/2004, of 27 July, altered by the Decree-Law 236/2004, of 18 December, 51/2005 of 25 February, 263/2009, of 28 September, 52/2012, of 7 March, 121/2012, 19 June and 3/2016, of 12 January	Establishes a communitarian vessel traffic monitoring and information system
	Decree-Law 370/2007, of 6 November	Regulates the acts and procedures applicable to the entrance and exit of vessels from national ports
	Decree-Law 106/2004, of 8 May, altered by the Law 18/2012, of 7 May	Regulates the application of the 1974 International Convention for the Safety of Life at Sea (SOLAS 74) and its protocol
	Decree-Law 226/2006, of 15 November	Adopts framework rules for Regulation 725/2004 of the European Parliament and of the Council, of 31 March, on enhancing ship and port facility safety and transposes Directive 2005/65/CE of the European Parliament and of the Council, of 26 October, on enhancing port security.

	Law 34/2006, of 28 July	Establishes the expansion of maritime zones under the sovereignty or national jurisdiction and the powers exerted by the Portuguese state, as well as the power exerted on high seas
	Decree-Law 15/94, of 22 January, altered by the Decree-Law 399/99, of 14 October	Creates the National System for Search and R9escue on Sea
	Decree Law 201/1998, of 10 July	Defines the ship's legal statute
	Decree-Law 203/98, of 10 July	On the Maritime Rescue Legal Regime
	Decree-Law 248/2000, of 3 October, that transposes the internal legal regime of the Directive 97/79/CE, from the Council, of 11 December, and the Directive 1999/19/CE, from the Commission, of 18 March, that alters the Directive 97/70/CE, from the Council, altered by the Decree-Law 306/2001, of 6 December	Establishes a harmonized safety regime for fishing vessels of 24m in length or more
Regional	Regional Regimental Decree 20/87/A	Establishes provisions on the granting of financial support for maritime transport .
	Regional Regimental Decree 22/84/A	Determines the provision of financial support for projects considered to be of regional interest, in order to ensure and increase the maritime traffic of people and goods
	Regional Regimental Decree 24/2002/A, of 30 August	Defines the pilot areas covered by the ports under the jurisdiction of the port authority of the Azores
	Regional Legislative Decree 93/2018, of 13 November	Establishes the new Legal Regime for Recreational Boating
	Regional Legislative Decree 35/2004/A, of 27 August	Establishes the limits of recreational navigation areas in the Autonomous Region of the Azores
	Decree-Law No. 265/72, of 31 July	Establishes the General Regulations of the Captaincies
	Public Notice No. 340/2018, of 26 March	Corresponding to the edict of the Captaincy of Port of Horta
	Public Notice No. 554/2018, of 4 June	Corresponding to the edict of the Captaincy of Port of Santa Cruz das Flores
	Public Notice No. 419/2018, of 24 April	Corresponding to the edict of the Captaincy of Port of Angra do Heroísmo
	Public Notice No. 327/2018, of 23 March	Corresponding to the edict of the Captaincy of Port of Praia da Vitória
	Public Notice No. 813/2017, of 17 October	Corresponding to the edict of the Captaincy of Port of Ponta Delgada
	Public Notice No. 420/2018, of April 26	Corresponding to the edict of the Captaincy of Port of Vila do Porto

In the context of maritime spatial planning, pursuant to Law no. 17/2014 of 10 April, and Decree-law no. 38/2015, of 12 March, the navigation and transports sector falls under what is considered common use of the national maritime space, as it does not require the allocation of an area or volume in that space. As such, the activity is not considered a private use and it is not subject to the issuance of a Title of Private Use of the National Maritime Space (TUPEM). Nonetheless, it must comply with the licensing requirements established by the sectorial legal framework. For the purposes of the MSP, it is necessary to map all existing activities related to navigation and transports as they constitute a common use, which may impose certain restrictions to the development of other uses and activities, mostly arising from maritime security aspects (e.g. navigation channels, port approach areas, mooring and anchorage areas, mandatory pilot areas).

Navigation can also be prohibited or restricted in certain areas of the maritime space, for example, within a number of marine protected areas.

Maritime safety and security aspects of international shipping are under the responsibility of the International Maritime Organization (IMO), enshrined in the International Convention for the Safety of Life at Sea (SOLAS). SOLAS is an international maritime treaty that sets minimum safety standards in the construction, equipment and operation of merchant ships, giving special attention to Safety on Navigation in the Chapter 5. Furthermore, the sector must accomplish with national and regional administrative constraints and restrictions in force. Administrative easements result from legal impositions, or administrative acts, which have public utility as purpose, and which may result in prohibitions or limitations, or compel the practice of actions. Public utility restrictions are distinct from administrative easements as they derive directly from the law and do not dependent on any administrative act, and they concern any limitations over the private use and occupation of the maritime space, thus preventing full enjoyment of private use rights.

Table 43. Administrative constraints and restrictions to shipping and maritime transport in the Azores

Administrative constraints and restrictions	Observations
Natural heritage	
Regional Legislative Decree 15/2012/A, of 2 April	Legal regime for nature conservation and protection of biodiversity of the Autonomous Region of the Azores
Regional Legislative Decree 28/2011/A, of 11 November, modified and republished by the Regional Legislative Decree 13/2016/A, of 19 July	Creates the Marine Park of the Azores
Regional Legislative Decree 47/2008/A, of 7 November, modified and republished by the Regional Legislative Decree 39/2012/A, of 19 September	Creates the Island Natural Park of Santa Maria
Regional Legislative Decree 11/2018/A, of 28 August	Creates the Paleopark of Santa Maria
Regional Legislative Decree 19/2008/A, of 8 July	Creates the Island Natural Park of São Miguel
Regional Legislative Decree 11/2011/A, of 20 de April	Creates the Island Natural Park of Terceira
Regional Legislative Decree 45/2008/A, of 5 November	Creates the Island Natural Park of Graciosa
Regional Legislative Decree 10/2011/A, of 28 March	Creates the Island Natural Park of São Jorge
Regional Legislative Decree 20/2008/A, of 9 July	Creates the Island Natural Park of Pico
Regional Legislative Decree 46/2008/A, of 7 November, modified and republished by the Regional Legislative Decree 7/2019/A, of 27 March	Creates the Island Natural Park of Faial
Regional Legislative Decree 8/2011/A, of 23 March	Creates the Island Natural Park of Flores
Regional Legislative Decree 44/2008/A, of 5 November	Creates the Island Natural Park of Corvo
Decree order 57/2018, of 30 May, modified by the Decree order 69/2018, of 22 de June	Legal regime for harvesting marine species in the Azores sea
Built heritage	
Regional Legislative Decree 27/2004/A, of 24 August, modified by the Regional Legislative Decree 8/2006/A, of 10 March and the Regional Legislative Decree no. 6/2018/A, of 16 May	Establishes the normative framework for the management of archaeological heritage, concerning the prevention, rescue and investigation of movable and immovable archaeological heritage in the Autonomous Region of the Azores
Regional Regulatory Decree no. 24/2015/A, of 29 October	Creates the Underwater Archaeological Park of the Canarias, in front of Praia Formosa (Santa Maria)
Regional Regulatory Decree 12/2012/A, of 28 May	Creates the Underwater Archaeological Park of Dori (São Miguel)
Regional Regulatory Decree 20/2005/A, of 12 October, modified and republished by the Regional Regulatory Decree 19/2015/A, of 27 October	Creates the Underwater Archaeological Park of Baía de Angra (Terceira)
Regional Regulatory Decree 15/2014/A, of 19 August	Creates the Underwater Archaeological Park of Caroline (Pico)
Regional Regulatory Decree 17/2015/A, of 29 September	Creates the Underwater Archaeological Park of Slavonia, in Lajedo coast, Lajedo parish (Flores)

Basic infrastructures, national defence and public security	
Law 2078, of 11 July (1955)	Establishes the regime of the areas subject to military constraints
Decree-Law 45987, of 22 October (1964)	Establishes the general regime military and aeronautic constraints
Decree-Law 116/2006, of 16 June	Defines aeronautic constraints for the neighbouring land of João Paulo II airport (Ponta Delgada, São Miguel)
Decree 1/2019, of 18 January	Establishes the protection general zone around Lajes air-base (Terceira)
Regional Regulatory Decree 27/84/A, of 24 July	Establishes the protection general zone around Graciosa island aerodrome
Regional Regulatory Decree 36/84/A, of 11 October, modified by the Regional Regulatory Decree 21/2012/A, of 9 November	Establishes the protection general zone around São Jorge (Velas) island aerodrome
Regional Regulatory Decree 28/84/A, of 7 August	Establishes the protection general zone around Pico island aerodrome
Regional Legislative Decree 24/2011/A, of 22 August	Approves the ports system in the Azores. Rectified by the Statement of Rectification 31/2011, of 11 October (terrestrial jurisdiction of Vila do Porto, Santa Maria)
Decree-Law 594/73, of 7 November	Establishes the legal regime of constitution of easements of maritime signage
Regional Regulatory Decree 554/2018, of 04 June, 340/2018, of 26 March, 813/2017, of 17 October, 327/2018, of 23 March	Establishes the anchoring and mooring areas and legal aspects in the ports of Islands of Flores, Faial, São Miguel and Terceira
Other	
Decree-Law 166/2008, of 22 August, modified and republished by the Decree-Law 239/2012, of 2 November	Establishes the legal regime of the National Ecological Reserve
Decree order 419/2012, of 20 December	Defines the conditions and requirements for the uses and actions concerning the National Ecological Reserve
Government Council Resolution no. 103/2019, of 26 September	Establishes of the aquaculture production area "Baía do Filipe", located in Graciosa island
Government Council Resolution no. 126/2016, of 25 July, altered by the Government Council Resolution 2/2018, of 24 January	Approves the establishment of the aquaculture production areas located on Faial, Terceira and São Miguel islands, as well as authorized species, production limits and exploitation regime
Regulatory Ordinance 70/2016, of 1 July	Establishes the fishing zone around Graciosa Island
Regulatory Ordinance 54/2016, of 21 June	Establishes the fishing zone at Ribeira Quente, in São Miguel Island
Regulatory Ordinance 53/2016, of 21 June	Establishes the fishing zone in Pico and Faial Island
Regulatory Ordinance 87/2014, of 29 December	Establishes the fishing zone in Santa Maria Island
Regulatory Ordinance 97/2018, of 6 August	Establishes the fishing zone in Quatro Ribeiras, Terceira Island
Regulatory Ordinance 94/2017, of 28 December	Regulates fishing and permanency of boats at Condor Bank
Regional Regulatory Decree 15/2008/A, of 25 June	Coastal Zone Spatial Plan (POOC) of Santa Maria
Regional Regulatory Decree 6/2005/A, of 17 February	Coastal Zone Spatial Plan (POOC) of North Coast of São Miguel
Regional Regulatory Decree 29/2007/A, of 5 December	Coastal Zone Spatial Plan (POOC) of South Coast of São Miguel
Regional Regulatory Decree 3/2019/A, of 2 April (partial suspension) Regional Regulatory Decree 1/2005/A, of 15 February	Coastal Zone Spatial Plan (POOC) of Terceira
Regional Regulatory Decree 13/2008/A, of 25 June	Coastal Zone Spatial Plan (POOC) of Graciosa
Regional Regulatory Decree 24/2005/A, of 26 October	Coastal Zone Spatial Plan (POOC) of São Jorge
Regional Regulatory Decree 24/2011/A, of 23 November	Coastal Zone Spatial Plan (POOC) of Pico
Regional Regulatory Decree 4/2017, of 17 March (annex of Declaration 5/2016) Declaration 5/2016, of 14 September (first amendment to the synthesis plant) Regional Regulatory Decree 19/2012/A, of 3 September	Coastal Zone Spatial Plan (POOC) of Faial

Regional Regulatory Decree 24/2008/A, of 26 November	Coastal Zone Spatial Plan (POOC) of Flores
Regional Regulatory Decree 14/2008/A, of 25 June	Coastal Zone Spatial Plan (POOC) of Corvo
Regional Legislative Decree 9/2010/A, of 8 March (altered and republished by Regional Legislative Decree no. 31/2012/A, of 6 July)	Approves the legal regime for non-metallic minerals extraction in the coastal zone and territorial sea
Government Council Resolution no. 105/2013, of 6 November (altered by Government Council Resolution no. 3/2014 of 15 January)	Approves areas for the commercial extraction of sands
Decree of the President of the Republic 67-A/97, of 14 October	Submarine cables (ratifies the United Nations Convention on the Law of the Sea of 10 December 1982)
Decree-Law 507/72, of 12 December	Updates the legal dispositions for the protection of submarine cables
Regional Regulatory Decree 420/2018, of 26 April, 554/2018, of 4 June, 340/2018, 26 March, 419/2018, of 24 April, and 244/2016, of 15 March	Establishes the dispositions and area of protections for the submarine cables in the Islands of Santa Maria, Flores, Faial, and Terceira

Instruments

At the regional level, the Azores has developed in 2014 the Integrated Transportation Plan (Plano Integrado dos Transportes) that covers the existing infrastructure and sectorial goals for the sea-, air- and land-based transportation modals.

For the national level, the instruments are the following:

- National Strategy for the Sea 2013-2020 (approved by Resolution of the Council of Ministers 12/2014)
- Strategic Plan for Transportation and Infrastructure for the 2014-2020 horizon (Plano Estratégico dos Transportes e Infraestruturas - PETI3+, para o horizonte 2014-2020 - Resolução do Conselho de Ministros nº 61-A/2015)

PART II

Methodology for mapping sector activity

Current spatial distribution

The current spatial distribution can be observed at **Figure 124** to **Figure 127** . The information used in this characterization is available at EMODNET, provided at the European level. Nonetheless, for a more precise characterization at a regional level, a methodology will be further proposed in this section.

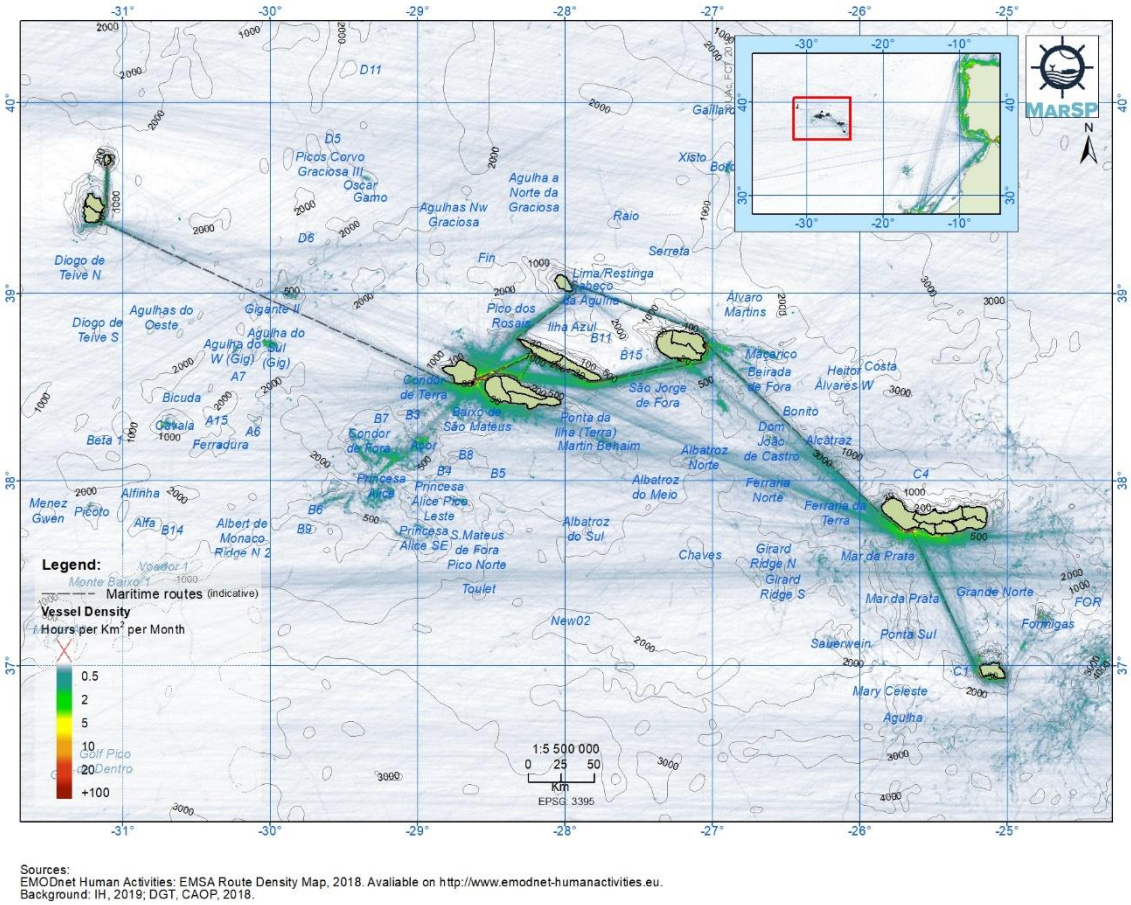
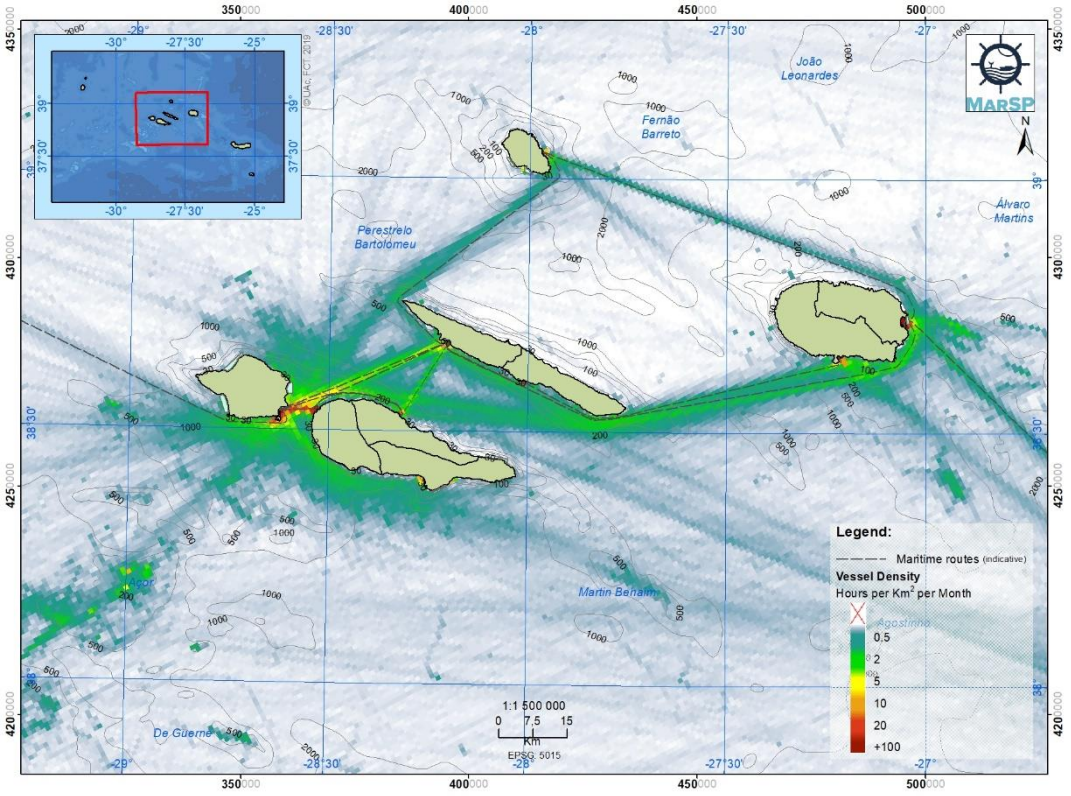
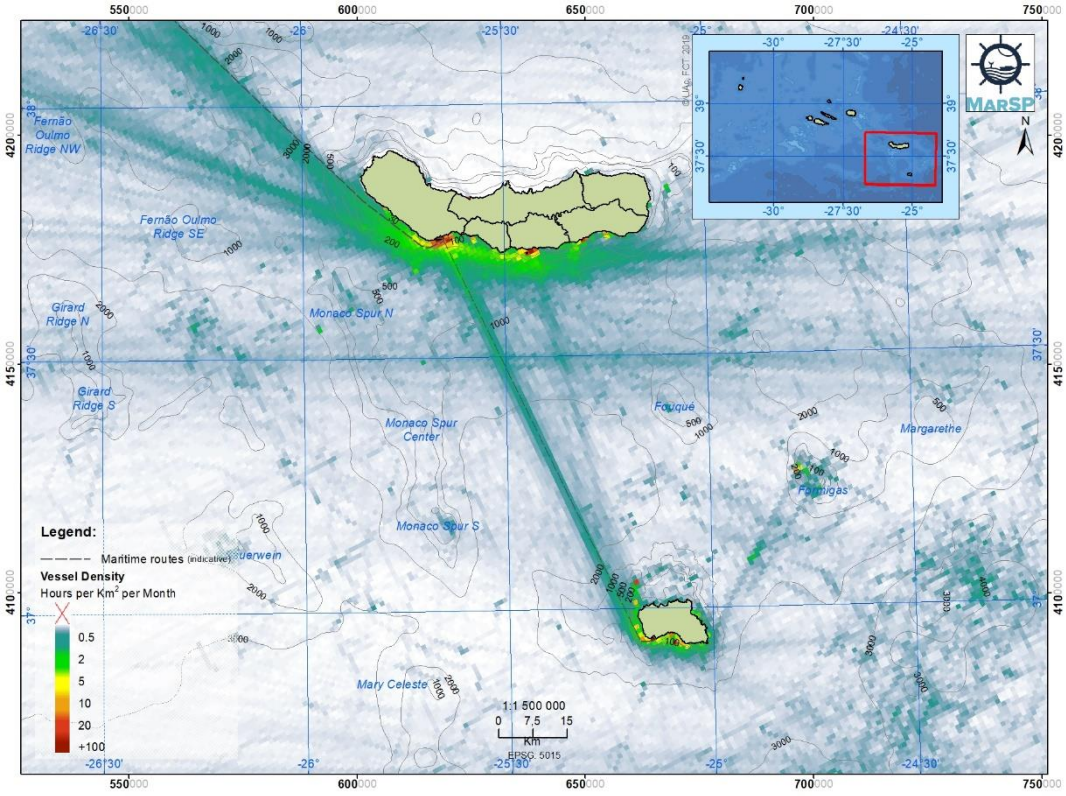


Figure 124. Vessel density and maritime routes (Azores archipelago) (Source: EMODnet)



Sources:
EMODnet Human Activities: EMSA Route Density Map, 2018. Avaliable on http://www.emodnet-humanactivities.eu.
Background: IH, 2019; DGT, CAOP, 2018.

Figure 125. Vessel density and maritime routes (Central group) (Source: EMODnet)



Sources:
EMODnet Human Activities: EMSA Route Density Map, 2018. Avaliable on http://www.emodnet-humanactivities.eu.
Background: IH, 2019; DGT, CAOP, 2018.

Figure 126. Vessel density and maritime routes (Eastern group) (Source: EMODnet)

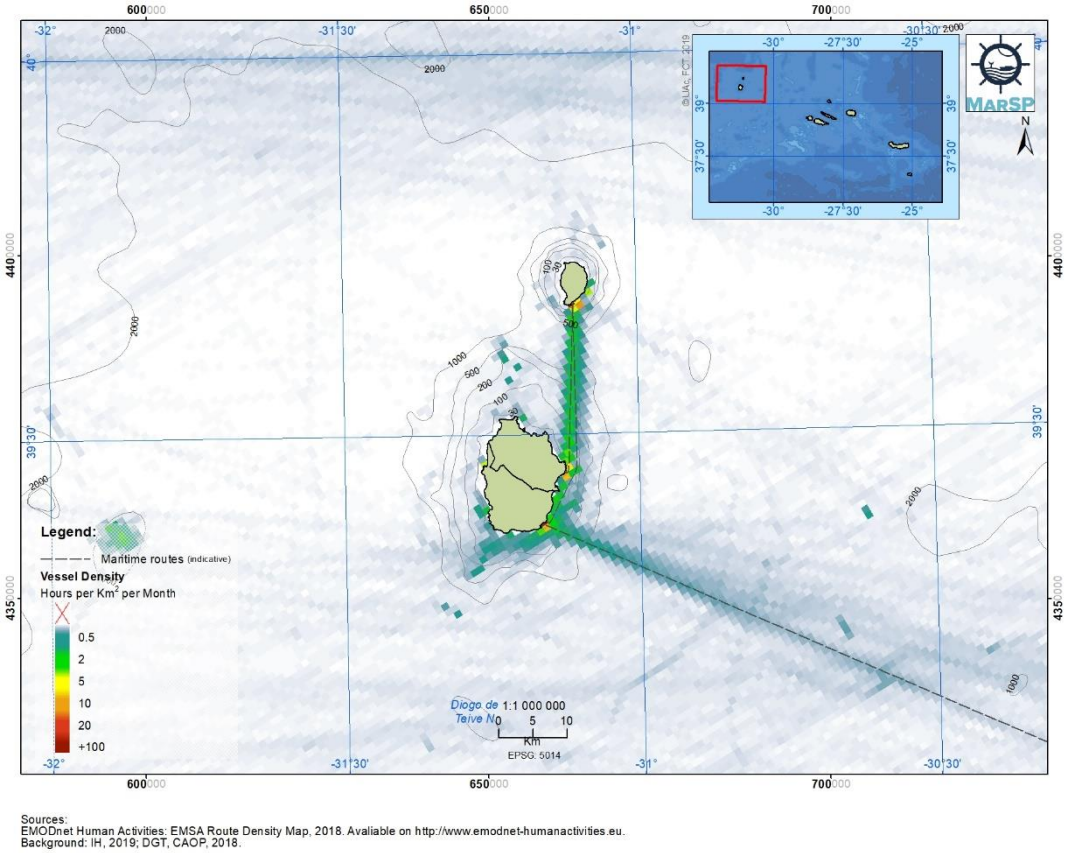


Figure 127. Vessel density and maritime routes (Western Group) (Source: EMODnet)

The analysis of maritime transport is commonly made by traffic density maps, which analyse the total or segmented intensity of shipping within a time period. The information needed to make these maps usually comes from Automatic Identification Systems (AIS) receivers that provide data about vessels near real-time. According to the SOLAS Convention, the AIS data transmissions are mandatory for every vessel over 300 GT (Gross Tonnage) in international routes as well as cargo ships over 5000GT in national routes. However, smaller vessels may use this system in a voluntary basis. In the Azores, the MACAIS project established in 2000 installed 16 points over the next years to collect AIS data of vessels sailing up to 20 nautical miles from the shore.

There is no standard methodology to map the current situation of the maritime transport sector and determine its potential. This study is mainly based on the work done by Tixerant et al. (2018), Coomber et al. (2016), as well as in the methodology applied by Nicolas, Frias e Backer (2016) in the BaltSeaPlan. The proposed methodology is represented in **Figure 128** through seven main steps. The steps represented in orange do not depend on previous phases while those represented in blue colour do rely on previous steps.

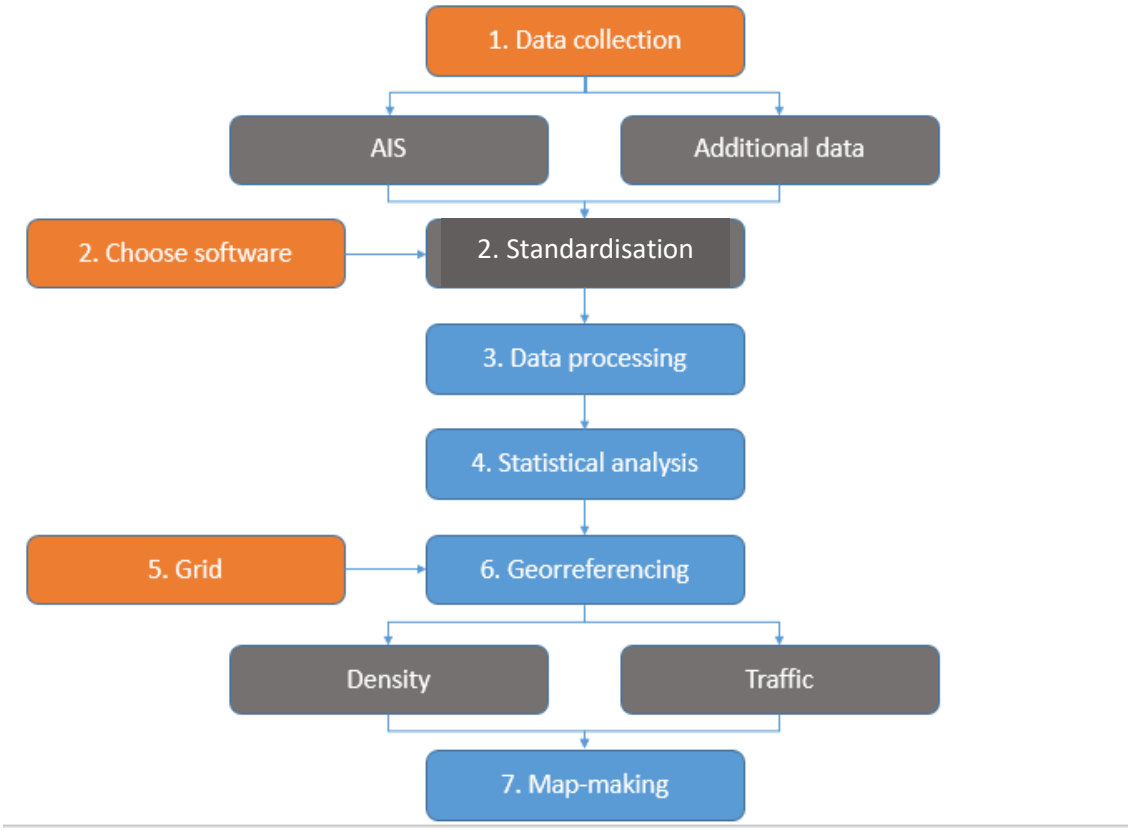


Figure 128. Methodology proposed to map the current situation of the shipping and maritime transport sector

In this methodology, an approach will be introduced to analyse and understand shipping and maritime transport in the Azores. For doing so, first it is necessary to gather the necessary data and process it to standardize in terms of scale and format. This data still needs to be obtained, which can be done by simply acquiring an AIS database or estimating the traffic based on the main routes. Afterward, this information will be processed to generate density maps that can indicate what the primary and secondary routes in the Azores are. By visualizing the density, there can be provided an overview of how the shipping lines behave throughout the year for each vessel category. From that, we can also extrapolate other analysis such as collision risk, noise and ballast water contamination.

Step 1. Data collection

The first step in the methodology addresses data collection for the analysis of the sector.

AIS data: Automatic Identification System (AIS) is a continuous system of vessel identification and monitoring which allows the exchange of vessel data electronically among vessels and with onshore stations. AIS data is compiled in databases that can be accessed in different platforms. The acquisition of this data usually involves costs, which vary according to the number of vessels or shipping routes requested. Nevertheless, some platforms make available some of the data for research purposes. The main sources are Marine Traffic, Vessel Finder, exactEarth e Fleet Mon. This data is usually available in CSV or XLS format and raw data coming from the transmissions that have been previously processed. For this study, there are four main data fields of interest, namely data,

latitude, longitude and ship type.

Additional data: since small ship transmissions are not mandatory, further data collection is needed to determine the maritime traffic. This is especially important in the Azores, where many of the fishing ships are less than 15 meters long. This information can be collected through Vessel Monitoring System (VMS), which is acquired by ships longer than 12 meters. But also, by remote sensing techniques or interviews with experts and stakeholders such as the navy, coastal guard and governmental agencies. The most common alternative to determine ships missing in AIS data is based in the routine operations, as recommended by Perlot and Plummer (2010). For this purpose, information about the origin, destination, route, time duration and day is needed.

Step 2. Choose software

Once collected, data need to be processed. Several GIS software can be used but some considerations need to be taken into account. The first is the information size. AIS data for the Baltic (BaltSeaPlan project) ranges between 50-200GB annually, meaning that the software selected needs to process large data files efficiently. In the Shetland Islands (Scotland), AIS data processing corresponding to a few months demanded a one-day processing approximately. Furthermore, AIS data may need to be processed and analysed by different users. The cost of the software is another matter to consider.

In this context, there is an interesting choice because of its efficiency and open source, the programming language "R". R has an integrated development environment for statistical estimates and graphs. Trough R it is possible to access algorithms developed by other organisations, such as those used by HELCOM. The scripts available allow the automatization of most of the steps described in this methodology. Despite R efficiency, a robust computer will still be necessary for final data processing. An external server could also facilitate this task. ArcGIS can be an alternative to R. Spatial Analyst tools together with additional Python scripts can be used for this purpose. Despite the user-friendly environment that ArcGIS provides, this tool is not open source and requires the payment of a license.

Step 3. Data processing

The data compiled need to be processed and integrated in CSV (Comma Separated Value) format to accelerate the processing. Depending on the size of the files, they may need to be divided in shorter timelines, such as in months or semesters. Data need to be harmonised and inconsistent data need to be removed. Common inconsistencies are data duplications, omissions and errors, such as negative or very high-speed values. Some ships have Maritime Mobile Service Identity (MMSI) duplicated.

Data is transmitted every 2-10 seconds by AIS systems when the ship is in route. But according to Harati-Mokhtari (2007), between 56% and 74% of the ships have incoherent information about their category and 18% for their size. The route data obtained by additional data need to be transformed in this step in estimates through algorithms. Precise linear regressions can be defined through the position of the ship across the route. The ship category also needs processing through the grouping of categories with similar spatial/temporal patterns. Vesselfinder classifies ships in more than 70 categories, which makes the analysis very complex.

Step 4. Statistical analysis

This step aims to assess if the processed data is statistically significant. Inconsistencies may arise in

the process of standardisation of data, specifically between speeds and geographical locations. Coomber et al. (2016) recommends an analysis of variance (ANOVA) or the test Kruskal-Kallis, which is a non-parametric method to test if samples are from the same distribution. Coomber et al. (2016) also recommends previous analysis such as simple data queries to provide wider perspectives.

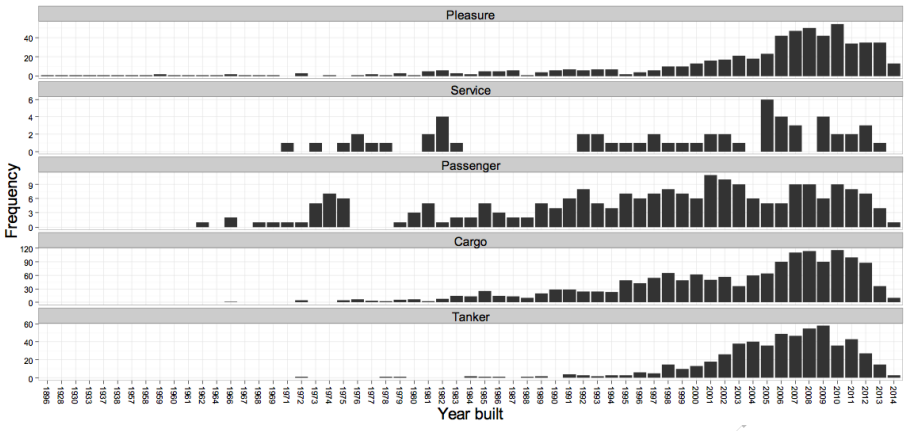


Figure 129. Analysis of vessel age (Coomber et al., 2016)

Step 5. Grid

The definition of a grid is a necessary step to create density maps with the data processed. The map grid will contain the final location of vessels. The grid of every European country is available in the website of the European Environment Agency (EEA). The grids available have resolution of 1, 10 and 100 square kilometres in shapefile format. The Exclusive Economic Zone (EEZ) of the Azores accounts for 1,039,300 cells in the grid of 1km resolution. The division of the grid in subgroups is recommended for map processing if this becomes too slow.

Step 6. Georreferencing

Points and lines: files with the ship routes that cross the Azores will be created and projected using AIS data. Two approaches can be taken according to Fiorini, Capata e Bloisi (2016): approach by points or methods using vector representation. In the first one, the points within each cell are counted, without taking in consideration ship speed. The analysis therefore takes the perspective of "use of the maritime space". A problem arises with ship speeds. Slower ships provide more transmissions, and consequently points, in the same cell. The other method connects points reproducing ship paths. The counting of how many lines cross a single cell will provide the maritime traffic. Although both approaches are valid, the second approach seems to provide more information to understand the use of the maritime space. This process can be developed through Python coding TrackBuilder provided by NOAA. Wu et al. (2017) points out another advantage of the vector method that is the lower amount of spatial data to be processed.

Traffic and density: for Wu et al. (2017), two analyses can be performed to understand maritime traffic. The vessel density in a region at time t is the number of vessels per unit area in this region at this time. The vessel density in a region from time t to t+T is defined as the expected value of vessel density in this region during the period. According to this definition, the vessel density in

grid_i in month_m can be calculated as:

$$ShipDensity_i^m = \frac{\sum_{s=1}^{s=ship\_count} Time_i^s}{Time_{month\_m} * Area_{grid\_i}}$$

Traffic density represents how many vessels crossed a unit area per unit time. The traffic density in a region from time t to t+T was defined as: the average number of vessels that cross this region per unit area per unit time. According to this definition, the traffic density in grid_i in month_m can be calculated as:

$$TrafficDensity_i^m = \frac{\sum_{s=1}^{s=ship\_count} CrossingCount_i^s}{Time_{month\_m} * Area_{grid\_i}}$$

Step 7. Map-making

Map-making requires overlapping the grid of 1 or 10 km with the layer of traffic lines (density or traffic). Combining the lanes (traffic or density) with the new grid will provide the intensity for each lane. Since the 1km grid is quite detailed, shipping lanes are expected to be clearly defined. Different maps can result from this analysis, according to various purposes and needs, such as:

Traffic for all grouped vessel categories;

Traffic for specific vessel category;

Total traffic per month, to understand shipping seasonality;

Total traffic per year, to see shipping increasing or decreasing.

These maps will provide the shipping lanes, together with the directions. An example of maps resulting from the analysis is in **Figure 130**Figure 130.

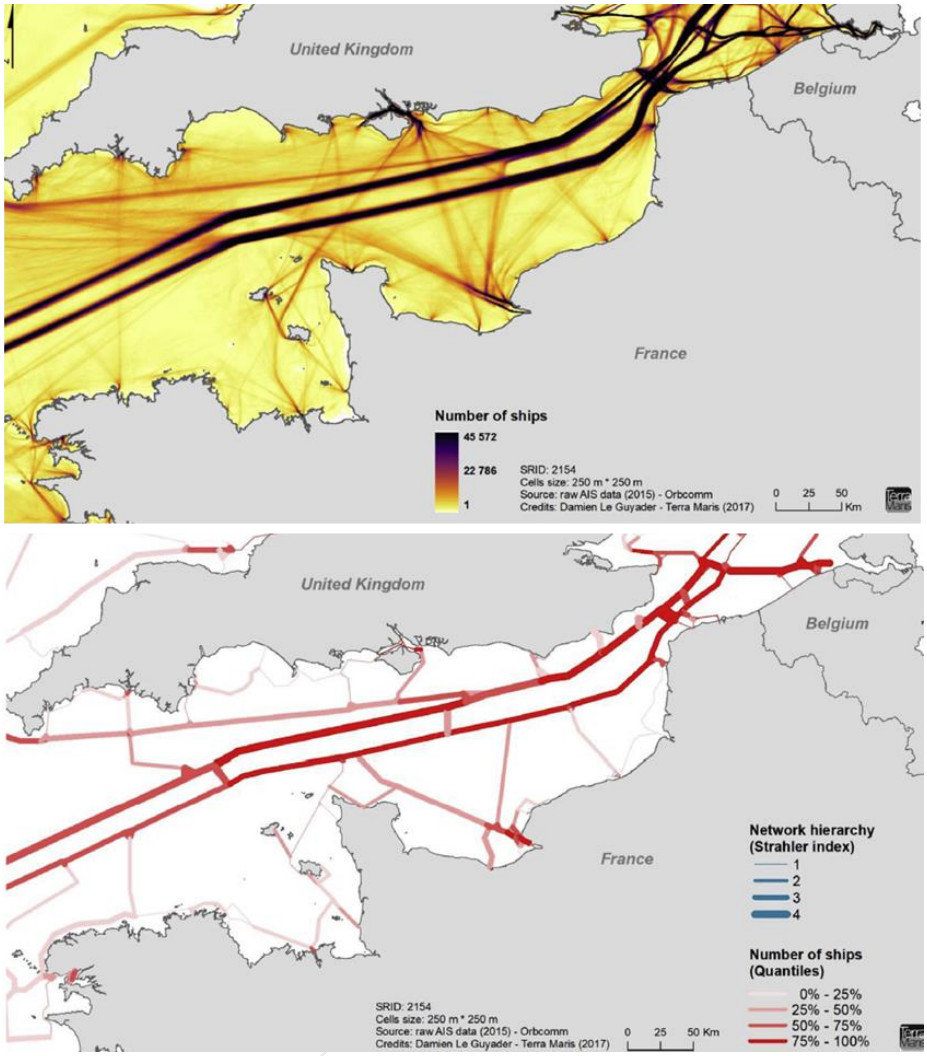


Figure 130. Shipping lanes identified and created through AIS data (Tixerant et al. 2018)

These maps provide information about the hierarchy of shipping lanes as well as time-space conflicts present at sea. Additional data such as anchoring areas, port areas, marinas, their jurisdictional spaces, coastal infrastructures or dredging areas contribute to better understand the spatial dynamics of the maritime traffic. The final layers will be available in raster format, which can be used in various software solutions. Besides their interoperability, these layers are not heavy. The overlapping with other maritime uses and activities would allow the identification of further conflicts and synergies.

Necessary data

Table 44 shows the necessary data to apply this methodology, including the relevance of every data for the successful application of the methodology. It is important to observe that this data still need to be collected.

Table 44. Data necessary for the implementation of the proposed methodology

Relevance	Description
Essential	AIS data for the last 3 years
	Fisheries logbooks for 12-18m long vessels
Important	Offshore diving sites
	Whale watching areas
	Additional data for passenger traffic
	Port and marinas location
	Port and marinas jurisdictions
Relevant	Maritime infrastructures
	Dredging areas Anchoring zones

PART III

Sector diagnosis

The sector diagnosis presented in this section includes a SWOT analysis and the analysis of sectorial interactions (sector-sector, land-sea interactions, sector-environment). The methodological approach for all analysis was similar and mainly based on regional stakeholders' consultation.

The first step to develop the analysis was based on sectorial representative stakeholders' consultation, through individual interviews. Stakeholders were asked to give their technical opinion on the fulfilment of each analysis for the sector they represent. The analyses resulting from this step were reviewed during the 2nd MarSP Regional Stakeholders Workshop (developed in April 2019), which had the participation of 78 stakeholders distributed in three Azores Islands: São Miguel, Terceira and Faial. In the workshop, stakeholders were grouped according to the sectors they represent and were asked to comment on and complement the analyses for those sectors. The analysis for each sector includes consensual results from both regional stakeholders' consultation (individual interviews and the workshop) and additional topics from literature review for the sector.

SWOT Analysis

A SWOT analysis was developed for each maritime sector identified for the Azores. Stakeholders were asked to identify the strengths, weaknesses, opportunities and threats they consider as the most important for the sector they represent. The final SWOT analysis for shipping and maritime transport sector in the Azores is represented in Table 45. The SWOT analysis resulting from the sectorial interviews presented few points, whereby Workshop participants complemented the analysis. The stakeholders contribution is represented in white colour.

Table 45. SWOT analysis from regional stakeholders' consultation for shipping and maritime transport in the Azores

	Positive Factors	Negative Factors
Internal Factors	**Strengths** - Ease of planning in a sector characterised for strict operation schedules; - Supply of fundamental goods for the Azores based on a public service operating from mainland to supply the Azores; - Crucial for the transportation of cargo and passengers; - Good land-based infrastructure (e.g. ports and marinas); - Investments in modernizing the passengers fleet; - Existence of "Janela Única Portuária" that simplifies administrative processes; - Existence of a seasonal public service of passenger transportation between the islands, contributing to mobility, and territorial and social cohesion, in special in the islands of the triangle; - Complementary to air transport.	**Weakness** - Geographical location may imply difficulty in supplying some islands due to distance between islands and small populations/market, interfering on the direct imports and exports as well; - Geographical isolation from the European economical centre also affects the imports and exports; - High costs of operation; - Limited connection with other transportation modals; - The Azores climate that frequently presents rough weather and sea conditions, adverse to navigation.
External Factors	**Opportunities** - Advances in sustainable technologies to the sector; - Perspective of increasing the maritime traffic due to restrictions in road transportation; - Tax benefits for fuels on the navigation sector; - Alternative to air transportation.	**Threats** - Increase in fuel costs; - Climate change (harder winters); - MSP can restrict navigation routes and limit traffic; - Risk of increase in the number of accidents, due the increase in maritime traffic; - The underwater cultural heritage limits the available space for anchorage at the bays.

Analysis of interactions

The development of a certain activity in the maritime space is usually linked to interactions with the remaining uses and maritime sectors. Those interactions can be both positive and negative and can be both induced or suffered by a certain sector. In the context of the MarSP project, for each maritime sector, three types of interactions were analysed: sector-sectors interactions, land-sea interactions and interactions with the environment. The analysis intended to identify if interactions exist and the level of intensity of the interactions using a scale of: negative values for negative interactions, positive values for positive interactions and zero for absence of interactions. In the matrices, the column "C" represents the negative impacts induced or suffered by the sector, identified as conflicts, while the column "S" represents the induced or suffered positive interactions, deemed as synergies.

Sector-sectors interactions analyses whether there is any type of conflict and/or synergy between each of the maritime sectors identified and the other sectors. The resulting matrix reflects only the analysis of interactions occurring offshore, not including coastal areas within less than 30m bathymetry (the protection maritime zone of protection defined by the coastal zone spatial Plan - POOC).

Land-sea interactions analyse whether there is any type of conflict and/or synergy between each of the maritime sectors identified and coastal activities (up to the 30m bathymetry) developed in the

various areas identified in the POOC.

Interactions with the environment analyses if there is any kind of negative and/or positive effect of each of the maritime sectors identified in to the environment, specifically considering the descriptors of the good environmental status (GES), and respective criteria, as defined by the Marine Strategy Framework Directive (MSFD).

During the individual interviews, stakeholders were asked to identify the levels of conflicts and/or synergies of ports and marinas with other sectors. The final values were calculated using the tendency of answers and represent the stakeholders' perception trend. As this first analysis is based on inputs from stakeholders representing the maritime sector, to avoid or decrease possible bias in the results, during the Workshop, stakeholders were asked to comment and, when in disagreement, to propose a different value to classify the level of conflict/synergy. The final values from the workshop were calculated using the mean of all values resulting from all discussion tables. Literature review was also used to complement the characterization of the interactions, identifying if a conflict or a synergy is existing in the Azores or on other contexts.

Interaction with other sectors

In order to analyse the interactions between navigation and other uses and activities developed in the maritime space, an interaction matrix was created according to the aforementioned methodology. The values featured on the matrix below represent the trend analysis of the stakeholders' sectorial consultation and the 2nd MarSP Stakeholder Engagement Workshop. Nonetheless, it is important to observe that the navigation sector was analysed mainly based on the Stakeholders workshop sector group, considering that the participation on face-to-face interviews was almost null.

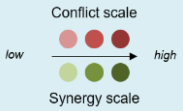
Table 46. Characterization of interactions between shipping and maritime transport and other maritime sectors in Azores resulting from stakeholders' consultation

Sector-Sectors	Shipping and maritime Transport					
	Sectorial interviews		2nd Workshop		Literature review	
	C	S	C	S	C	S
Fisheries	0	0	-0.3	0.5	X	
Aquaculture	0	0	-0.5	0		
Extraction of non-metallic mineral resources	0	0	-0.3	0.8		
Energy	0	0	-1	0.5		X
Defence	0	0	0	1		
Infrastructures	0	0	-0.5	0		
Coastal and maritime tourism	-2	0	-1.5	1.3		
Scientific research and marine biotechnology	0	0	-0.3	0.8		
Underwater cultural heritage	0	0	-0.8	0	X	
Environmental conservation and MPA	0	1	-1.5	0.5	X	

Legend

C – Conflict
S – Synergy
3 – High conflict
2 – Moderate conflict
1 – Low conflict

0 – Without conflict/synergy
1 – Low synergy
2 – Moderate synergy
3 – High synergy
X – Existent



The reasons behind the grades given by the sectorial interviews and 2nd MarSP Stakeholder Engagement Workshop for each of the identified interactions with navigation are the following:

- Coastal and maritime tourism: Moderate conflict related to the interference on vessels schedule. The priority is given to the touristic vessels that can result in delays and increase expenses;
- Environmental conservation and marine protected areas: there is an increasing concern by the stakeholders on protect the environment, to which shipping routes may offer, for stakeholder's perception, a manner of safeguarding regions from other more threatening activities. In the other hand, ships are often considered by stakeholders as a significant source of contaminants;
- Fisheries: stakeholders identified low spatial conflict in some islands between fishing vessels and other ships;
- Extraction of non-metallic mineral resources: In São Miguel, a synergy was mentioned with dredging operations at navigation channels for maintenance purposes, as the resulting resources could be used, for example, in construction;
- Defence: synergies were identified by the application of measures against the piracy;
- Infrastructures: In São Miguel, submarine cables were mentioned as a conflict once they cross navigation areas frequently. In Faial, the influence of windlasses was identified;
- Underwater cultural heritage: a moderate conflict was identified due to presence of wrecks at the navigation channels;
- Environmental conservation and MPAs: a conflict was indicated due the vessels being considered as significant source of contaminants.

Uses compatibilization and Multi-uses

Ocean multi-use (MU) is an emerging concept which responds to the increasing demand for marine resources and space. It has been defined as the intentional "joint use of resources in close geographic proximity by either a single user or multiple users. It is an umbrella term that covers a multitude of use combinations in the marine realm and represents a radical change from the concept of exclusive resource rights to the inclusive sharing of resources and space by one or more users" (*in* (Schupp, et al., 2019).

The Ocean Multi-Use Action Plan (Schultz-Zehden et al. 2018) does not include combination with maritime transportation, as this is not an activity that has been explored in this context. However, it includes MU such as shipping terminals combined with marine renewables (wind, wave or tide energy facilities). This MU is mainly focused for shipping facilities and not for vessels. For vessels, recent projects have proposed the use of cargo ships to collect on-going sea data along their commercial routes, possibly accompanied by researchers on board, that could profit to gather data for studies on climate change and ocean acidification.

In what concerns incompatibility between uses, it is worth refereeing that maritime transportation is incompatible, namely with scuba diving, bathing, aquaculture, extraction of non-metallic mineral resources, fisheries and whale watching.

Land-sea interaction

Similarly to the previous matrixes, the interaction between shipping and maritime sector activities

and the coastal sectors was analysed through a comparison matrix. This analysis assumes that activities are developed within less than 30m bathymetry (areas from the maritime zone of the coastal zone spatial Plan - POOC). In the matrices, the first column represents the conflicts while the second column represents the synergies. Moreover, the analysis was done based on a 7-level scale, where the lowest value represents high conflict while the highest number represents high synergy. Neutral interactions are represented as zero. The values represented on the first matrix are the trend analysis of the stakeholders' consultation.

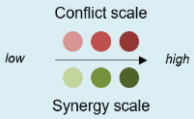
Table 47. Characterization of interactions of shipping and maritime transport with coastal zones in the Azores resulting from stakeholders' consultation

Land-sea		Shipping and the Maritime Sector					
		Sectorial interviews		2nd Workshop		Literature review	
		C	S	C	S	C	S
Critical areas for the sustainable coastal use	Natural, cultural and scenic special area	0	0	0	0		
	Bathing zones	0	0	-0.5	0		
	Edified areas in risk zones	0	0	0	0		
Environmental protection	Marine environmental protected areas	0	1	0	0.5		
	Land environmental protected areas	0	1	-0.3	0.5		
Coastal protection areas	Edified areas	0	0	0	0		
	Agricultural, forestry and other uses	0	0	0	0		
	Touristic potential areas	0	0	0	0		
Infrastructures	Airport	0	0	0	0.8		
	Road	0	0	0	0.8		
Navigation	Ports	0	0	-0.8	1.8		
	Marinas, small ports	0	0	-0.8	1.8		

Legend

C – Conflict
S – Synergy
3 – High conflict
2 – Moderate conflict
1 – Low conflict

0 – Without conflict/synergy
1 – Low synergy
2 – Moderate synergy
3 – High synergy
X – Existent



The explanation given on the sectorial interviews is the following:

- Environmental protection: similarly to the sector-sector interaction, navigation is perceived as a tool for safeguarding regions from other more threatening activities.

The second matrix values were based on the 2nd MarSP Workshop. In this workshop the participants were randomly distributed in the different groups, resulting in a multi-sectorial collaborative analysis. The results presented in the matrix below are the averages of the grades per island and per round.

Interaction with the environment

The impacts of shipping and the maritime sector on the environment were analysed taking into consideration the Good Environmental Status (GES) indicators, as defined by the MSFD. The values represented on the matrix below are the trend analysis of the stakeholder's consultation.

Table 48. Characterization of impacts of shipping and maritime sector in the environment according to the GES descriptors resulting from stakeholders' consultation.

Interactions with the Environment	Shipping and maritime Transport					
	Sectorial interviews		2nd Workshop		Literature review	
	N	P	N	P	N	P
Biodiversity	0	0	-1.8	0		
Non-indigenous species	0	0	-2	0		
Exploited fish and shellfish	0	0	-0.3	0.3		
Food-webs	0	0	-1	0		
Human-induced eutrophication	1	0	-0.8	0.3		
Sea floor integrity	0	0	-1	0		
Hydrographical conditions	0	0	-0.3	0		
Contaminants (water, sediments, biota)	0	0	-1.5	0		
Contaminants in fish and sea food	0	0	-1.5	0		
Litter	0	0	-2.3	0		
Level of noise	0	0	-2	0		

Legend

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3 – High conflict
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0 – Without conflict/synergy
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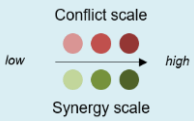

The explanations of the values for the 2nd MarSP Stakeholder Engagement Workshop are the following:

- Biodiversity: stakeholders affirmed that this descriptor is often affected, giving the examples of cetaceans;
- Marine litter: stakeholders associated the presence of marine litter with waste disposal by cruise ships and containers found at sea;
- Exploited fish and shellfish: stakeholders considered the shipping sector important in the transportation of products.

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PORTS AND MARINAS

Introduction

The aim of the MarSP (Macaronesian Maritime Spatial Planning) project is to develop concrete actions for the Member States (Portugal and Spain), through regional and national competent entities to build the necessary capacities and tools for the implementation of the European Union (EU) Directive on Maritime Spatial Planning (MSP) (Directive 2014/89/EU, 2014) in the Macaronesia region, including mechanisms for cross-border cooperation.

For the characterization of the existing uses in the Azores maritime space, the main blue sectors and activities need to be considered. For the context of the MarSP project, ports and marinas sector is defined as including all types of ports (in size and objectives, such as for the import and export of goods or passenger transport – ferry and cruise, and fishing ports) and all marinas existing in the Azores.

The Azores Region is located in the North Atlantic, approximately at mid distance between Europe and North America. This geographic context contributed to the Azores archipelago being one of the centres of trade between Europe, America and India in the 16th and 17th centuries, and its ports sheltered and serviced several galleons (Azores.com, 2018). The important geostrategic position of the Azores archipelago in the framework of transatlantic relations, which persists nowadays, as well as the populations' dependence on the sea as the most important communication route between islands and with the exterior, contributed to the development of ports and marinas, as they currently exist.

The importance of the maritime transport in the Azores, especially cargo, has led to the development of port infrastructures, which assume a fundamental role in inflows and outflows of goods in all islands. New passenger terminals were also built, with specific and modern features, providing greater safety, comfort for users and operational efficiency (PIT, 2014). All the islands have commercial ports and smaller ports for support of passengers, fisheries and/or other activities.

The Region has invested in the last decade in port infrastructures and facilities, mostly supported by European funds, aiming at stimulating the economic activities that depend on maritime transport. The potential for ports is also linked to sailing and yachting activities. Currently, there are a number of marinas that can support flows, but continuous modernisation and reception facilities (with higher number of berths) should be planned (European Commission, Realising the potential of the Outermost Regions for sustainable blue growth, 2017).

Purpose

This sector briefing summarises the current status of the ports and marinas sector in the Autonomous Region of the Azores (Portugal), under MarSP project work package 2. "Mapping the current conditions and creating a vision for the MSP in Macaronesia" and Task 2.2. "Mapping the maritime uses and activities and defining the MSP current conditions". It includes a characterization

of the current situation of ports and marinas in the Azores and the proposed and adopted methodologies to map the activity. It also includes a sector diagnosis and the main interactions with other sectors, the environment and the land-sea interface.

PART I

Sector characterization

In the Azores, the organization of the ports system is legally defined by the Regional Legislative Decree 24/2011/A, of 22 August. The ports system includes the infrastructures, facilities and equipment enabling the movement of passengers and goods between land transport and maritime transport, generated by commercial, industrial or fishing activities or by tourism or leisure activities.

The ports in the Azores are classified in five classes according to their characteristics and functions:

- **Class A:** Ports with commercial warehousing functions, with minimum seabed at 7m deep and a dockable quay of at least 400m;
- **Class B:** Ports with commercial functions supporting economic activities of the island where they are located, with minimum seabed at 4m deep and a dockable quay of at least 160m;
- **Class C:** Ports with mixed functions of small-scale trade, passenger transport and support to fisheries;
- **Class D:** Ports exclusively supporting fisheries;
- **Class E:** Small ports without any of the previous specific functions, usually designated by 'portinhos'.

Exceptionally, the 'porto da Casa', in Flores island, is currently included in Class B without all the characteristics listed for this class.

Ports areas reserved to fisheries within ports classified as class A, B or C are designated as fishing centres. Depending on the historic value and operating conditions of ports classified as class E, municipalities and other entities might request to use them for recreational or leisure purposes. In addition to port s, some of the Azorean islands are also equipped with marinas and/or nautical recreation centre mainly supporting recreational boating and tourism.

The Azores region has a total of 122 ports and "portinhos", 9 marinas and 2 nautical recreation centres. Main ports, classes A and B, assure the greatest part of the economic activity linked to passenger and freight transport and are equipped with fishing facilities (European Commission, Realising the potential of the Outermost Regions for sustainable blue growth, 2017). Only São Miguel, Terceira and Faial islands have a class A port, with the remaining islands having a class B port. Ports with mixed functions (class C) exist only in Terceira, São Jorge, Pico and Flores islands. The most frequent classes in the archipelago are classes D (ports exclusively supporting fisheries) and E ('portinhos'). **Table 49** reflects the importance of small-scale activities developed by local communities depending on these types of ports.

Pico Island, despite not being the most populated, is the one with more ports and/or 'portinhos', most of them of class E. São Miguel Island, the most populated, is equipped with 27 ports, most of them of classes D and E, followed by São Jorge, Faial and Terceira and Flores Islands. Graciosa, Santa Maria and Corvo, smaller islands or with main activities less dependent on the sea, are equipped with less ports.

Main ports in the Azores are:

- Port of Ponta Delgada, class A (São Miguel Island);
- Port of Vila do Porto, class B (Santa Maria Island);
- Port of Praia da Vitória, class A (Terceira Island);
- Port of Angra do Heroísmo, class C (Terceira Island);
- Port of Praia da Graciosa, class B (Graciosa Island);
- Port of Horta, class A (Faial Island);
- Port of São Roque do Pico, class B (Pico Island);
- Port of Madalena do Pico, class C (Pico Island);
- Port of Lajes do Pico, class C (Pico Island);
- Port of Velas de São Jorge, class B (São Jorge Island);
- Port of Calheta de São Jorge, class C (São Jorge Island);
- Port of Lajes das Flores, class B (Flores Island);
- Port of Poças, class C (Flores Island);
- Port of Casa, class B (Corvo Island).

The largest port is located in São Miguel Island, the Port of Ponta Delgada, with four different components. It has a commercial port, with a length of 1,259.90 meters, a quay for ferries (Portas do Mar) with a length of 545.4 meters, one marina with capacity for c.a. 640 vessels, as well as a fishing centre, with 486 meters of dockable dock (SRMCT, 2014).

Table 49. Number of ports and marinas in the Azores (source: DRAM).

Island / Port class	Santa Maria	São Miguel	Tercei-ra	Gracio-sa	São Jorge	Pico	Faial	Flores	Corvo	Total ARA
A	-	1	1	-	-	-	1	-	-	**3**
B	1	-	-	1	1	1	-	1	1	**6**
C	-	-	1	-	1	2	-	1	-	**5**
D	2	10	5	2	3	9	2	3	-	**36**
E	4	16	4	3	11	16	11	4	3	**72**
Total per island	**7**	**27**	**11**	**6**	**16**	**28**	**14**	**9**	**4**	**122**
Marinas	1	3	2	-	1	-	1	-	-	**9**
Nautical recreation centres	-	-	-	-	-	1	-	1	-	**2**
Total per island	**1**	**3**	**2**	**-**	**1**	**1**	**2**	**1**	**-**	**11**

An increased effort has been developed in the region to provide port facilities with equipment and infrastructure suitable for the enhancement of economic activities that depend on maritime traffic. Most commercial ports in the region have been reorganized and adapted to the new requirements of maritime transport policy in order to provide them with a greater capacity to provide services. All class A and B ports were equipped with Ro-Ro ramps (with the exception of Corvo Island), to allow an efficient operation of Ro-Ro ferries and thus increasing passengers and freight movement between islands, and four passenger terminals were built. Fishing ports have also been subject to investments and improvements (SRMCT, 2014; European Commission, Realising the potential of the Outermost Regions for sustainable blue growth, 2017).

The maritime transport model in the Azores presents significant differences between passenger and freight transport. While the passenger transport model is economically deficient and subsidized by the Azorean Government, the freight transport model responds in general terms to demand requirements without receiving any financial support (PIT, 2014).

The ports of Ponta Delgada and Praia da Vitória (São Miguel and Terceira Islands, respectively) presented the highest port activity, receiving the highest number of vessels, compared to the other ports in the Region (average = 1,076 vessels for the period 2006-2012) (SRMCT, 2014).

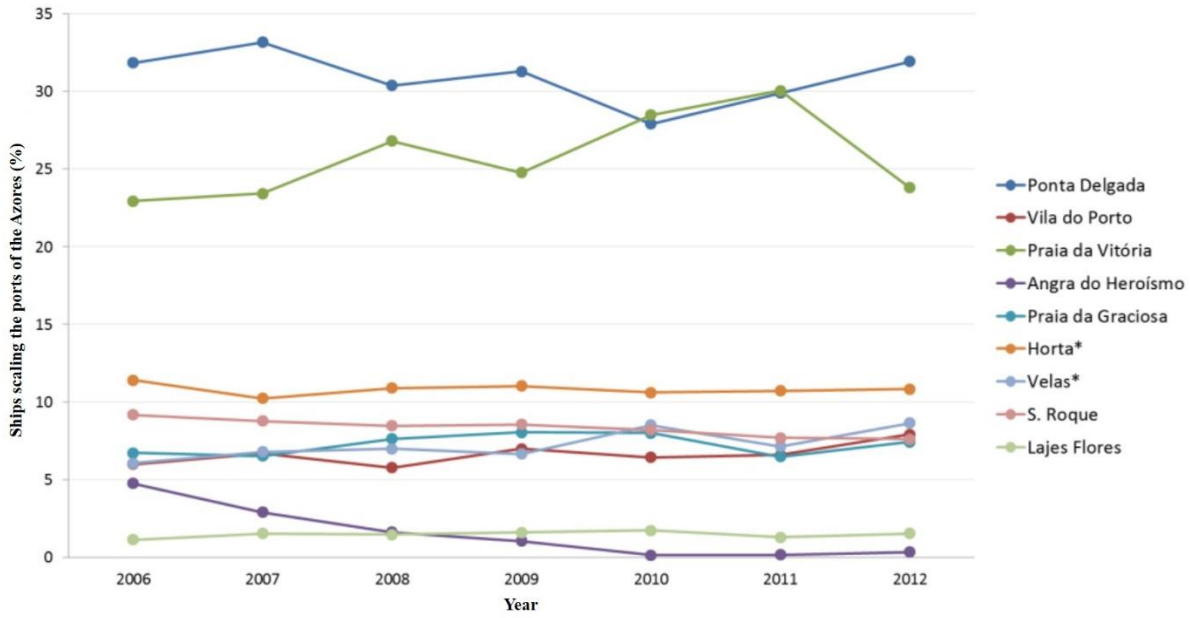


Figure 131. Importance of the ports of the Azores as a percentage of annual scales (Source: Regional Directorate for Transports fide (SRMCT, 2014)**).**

Transport of passengers

Movement of people has always been one the main challenges when living in islands. In the Azores, this was not an exception, mainly when air transport was limited. A few decades ago, maritime connections between the archipelago and mainland Portugal included the transport of passengers. Currently, the maritime transport of passengers (with exception for recreational and tourism

activities, such as yachting and shipping cruises) in the Azores is limited to connections between islands.

The transport of passengers, with a position already consolidated in the islands of the "Triângulo" of the Central Group and in the Western Group, is one of the activities in great development, mainly due to the introduction of vehicle transport, thus increasing the mobility of the residents and tourists (PIT, 2014). Connections between Flores and Corvo islands and between Faial, Pico and São Jorge islands are active throughout the year, while maritime connections between the remaining islands are available only in summer.

Nevertheless, in a general way, the number of passengers moving between the Azorean ports has increased.

As it was expected, the greatest number of passengers (c.a. 200000 passengers per year) is registered between Faial and Pico islands (the islands located closest to each other and with more inter-dependent activities in the archipelago), and São Jorge island, also due to the available connections during the whole year. Remaining islands have smaller amounts of passengers (less than 30000 per year).

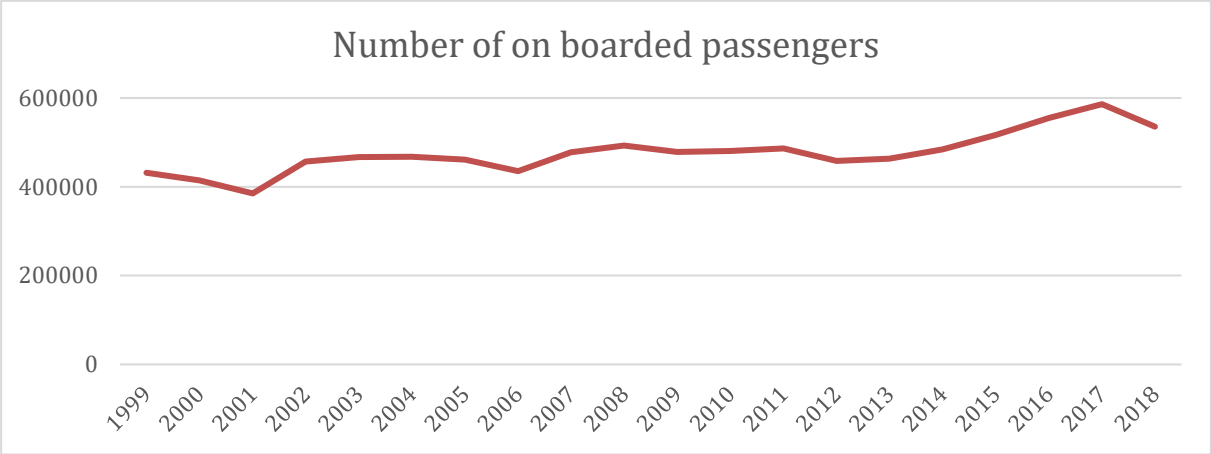


Figure 132. Evolution of the number of on boarded passengers in the Azorean ports, between 1999 and 2018 (source: based on (SREA, Serviço Regional de Estatística dos Açores - Portugal, 2019)**).**

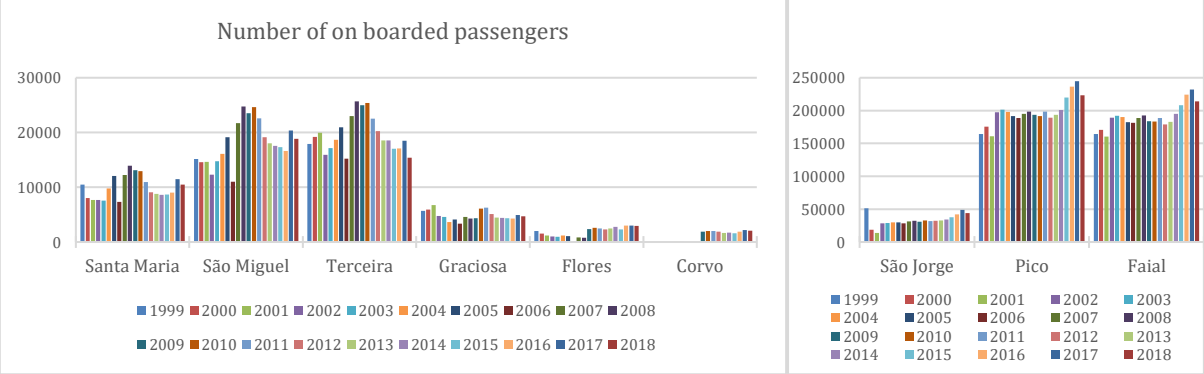


Figure 133. Evolution of the number of on boarded passengers per island in the Azorean ports, between 1999 and 2018 (source: based on (SREA, Serviço Regional de Estatística dos Açores - Portugal, 2019)**).**

Freight transport

Maritime freight transport arriving at the Azorean ports is of great importance for both imports and exports in the Region. The Azores registers more unloaded than loaded goods, which reflects the existing need for importing some goods. Since 1999, in the Azorean ports, both loaded and unloaded goods suffered an increase during approximately one decade and a decrease, specially the unloaded goods, after that. Since 2015, a new increase seems to be happening for the Azores in general, as well as for each island with exception for Terceira Island. As the most socio-economic developed islands or with higher population dimension, São Miguel and Terceira Islands registered the greatest values of loaded and unloaded goods.

Figure 134. Evolution of freight transport in the Azorean ports, between 1999 and 2017 (source: based on (SREA, Serviço Regional de Estatística dos Açores - Portugal, 2019)**).**

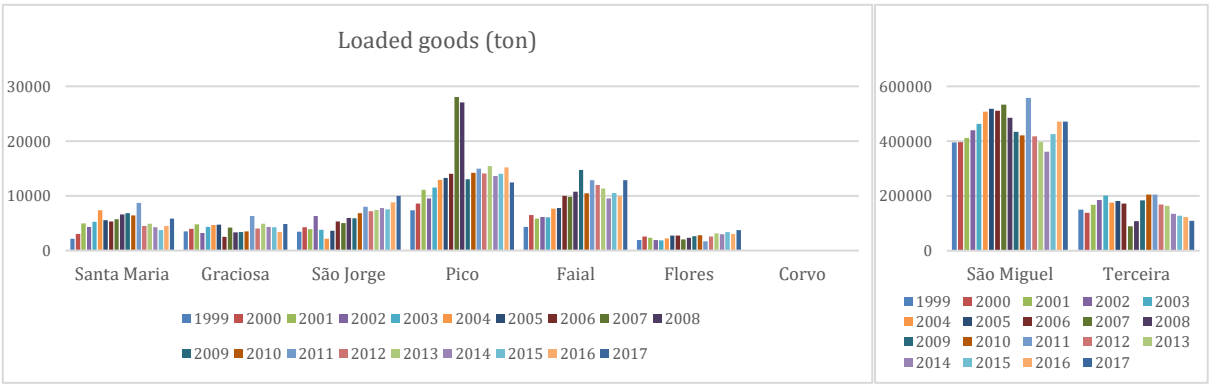


Figure 135. Evolution of loaded goods per island in the Azorean ports, between 1999 and 2017 (source: based on (SREA, Serviço Regional de Estatística dos Açores - Portugal, 2019)**).**

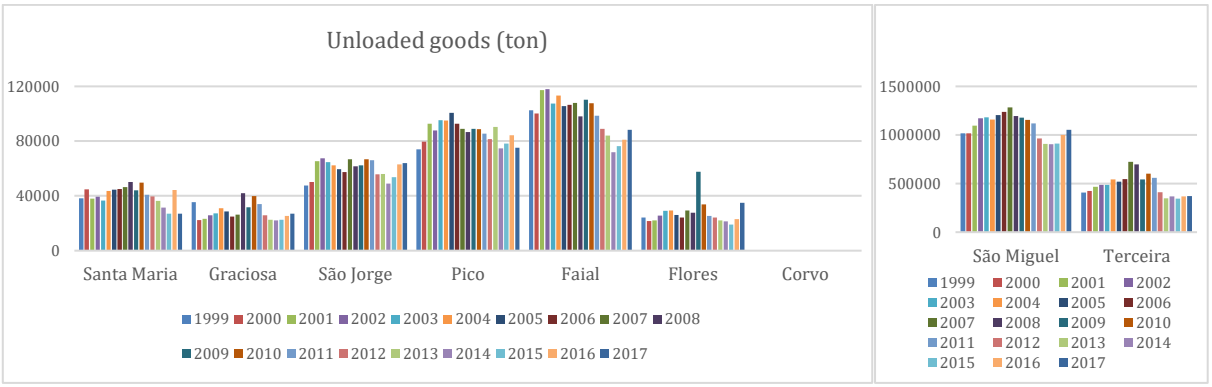


Figure 136. Evolution of unloaded goods per island in the Azorean ports, between 1999 and 2017 (source: based on (SREA, Serviço Regional de Estatística dos Açores - Portugal, 2019)**).**

Recreational vessels

According to the Regulations for the exploration of the ports under jurisdiction of the ports authority, Portos dos Açores, S. A. (e.g. (Regulamento de Exploração DGPTO)), recreational vessels are the ones used for nautical sports, sport fishing or for leisure, without any economic profit objectives.

The number of recreational vessels and, specially, the number of recreational passengers, in the Azorean ports and marinas has been increasing between 2000 and 2018. With exception for Corvo Island and despite some interannual fluctuations, in a general way, the evolution is similar when data is analysed by each island. As expected, biggest islands, with higher population dimension, or more socio-economic developed islands, such as São Miguel, Terceira and Faial, have more vessels and passengers. Faial Island is the one with more recreational vessels and passengers, which is also related to the fame of the Horta's Marina, the fourth most visited marina in the world (SRMCT, 2014), widely sought by people from all the world.

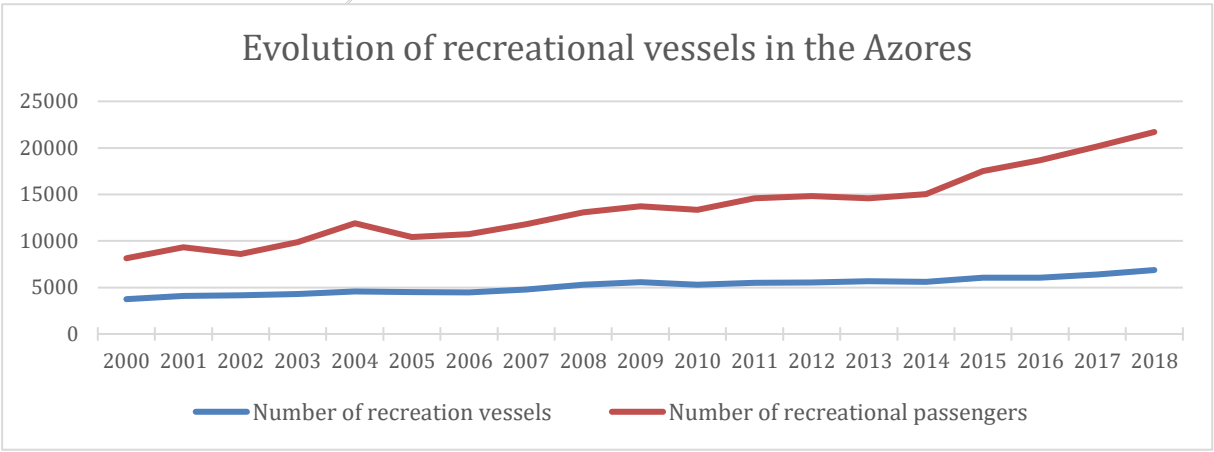


Figure 137. Evolution of the number of recreational vessels and passengers in the Azorean ports and marinas, between 2000 and 2018 (source: based on (SREA, Serviço Regional de Estatística dos Açores - Portugal, 2019)**).**

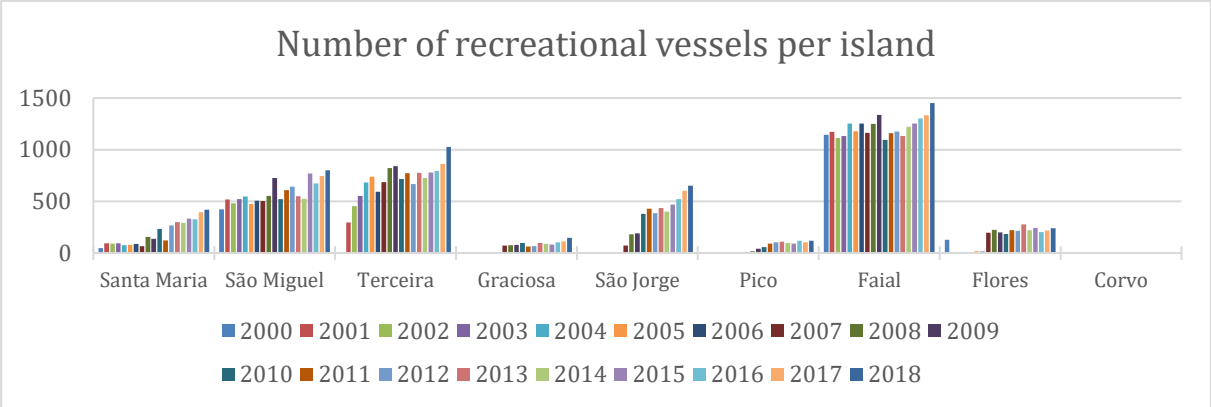


Figure 138. Evolution of the number of recreational vessels per island, in the Azorean ports and marinas, between 2000 and 2018 (source: based on (SREA, Serviço Regional de Estatística dos Açores - Portugal, 2019)**).**

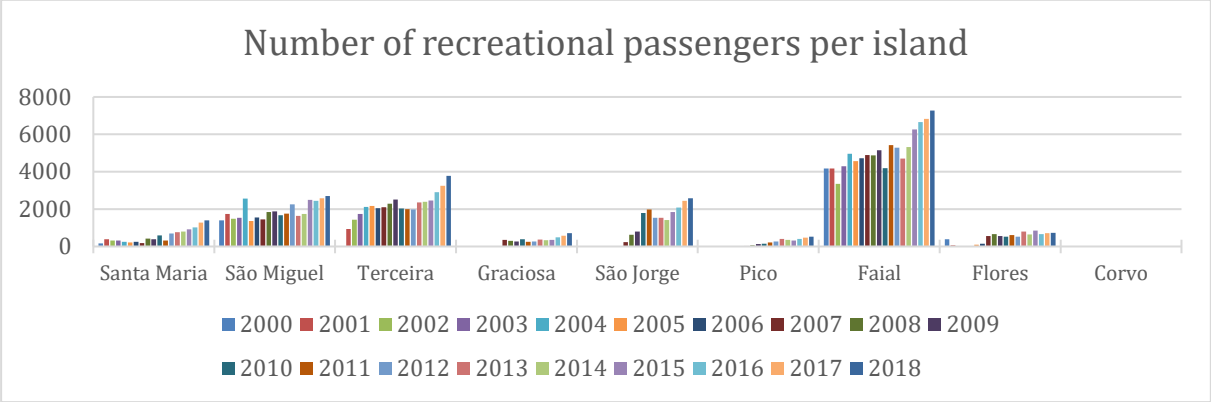


Figure 139. Evolution of the number of recreational passengers per island, in the Azorean ports and marinas, between 2000 and 2018 (source: based on (SREA, Serviço Regional de Estatística dos Açores - Portugal, 2019)**).**

Cruise ships

Cruise tourism is considered to be a developing industry. In Europe, the number of cruise passengers more than doubled between 2004 and 2014 and further growth in this sector is predicted for the future (McGowan L. , 2018). The Azores has also been investing in promoting the Archipelago as a cruise ship destination and results are already visible, with increasing number of vessels and passengers between 2012 and 2017. In the Azores, the main ports receiving cruise ships are in Ponta Delgada (São Miguel Island), in Praia da Vitória and Angra do Heroísmo (Terceira Island), and in Horta (Faial Island).

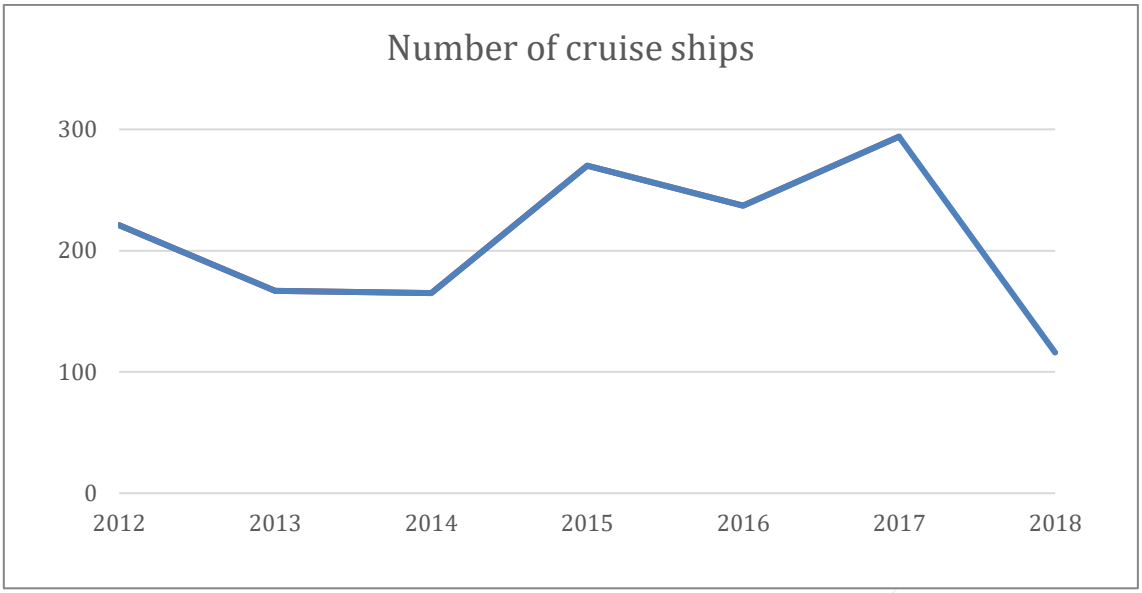


Figure 140. Evolution of the number of cruise ships in the Azorean ports, between 2012 and 2018 (source: based on (SREA, Serviço Regional de Estatística dos Açores - Portugal, 2019)**).**

Figure 141. Evolution of the number of cruise passengers in transit in the Azorean ports, between 2012 and 2018 (source: based on (SREA, Serviço Regional de Estatística dos Açores - Portugal, 2019)**).**

Legal framework and constraints

This section integrates information coming from MarSP Deliverable D.6.5. (MSP Governance Analysis of the Macaronesia) (Pallero, Cordero, García-Onetti, García-Sanabria, & Andrés, 2019).

Competent institutions for sectoral management

In the Azores, competent authorities for Ports management depend on the type of ports. The institution managing the ports classified as class A, B and C is Portos dos Açores, S.A.; for ports

categorized as class D (exclusively supporting fisheries) is the administrative department with competences for fisheries, currently the Regional Directorate for Fisheries (DRP); and for the remaining ports (class E) is the administrative department with competences for administrating the public maritime domain, currently the Regional Directorate for Sea Affairs (DRAM). The competent authorities for marinas, on the contrary, vary depending on the marina. Marinas of Horta (Faial Island), Velas (São Jorge Island), Angra do Heroísmo (Terceira Island), Ponta Delgada (São Miguel Island) and Vila do Porto (Santa Maria Island), together with Nautical Recreation Centres of Lajes das Flores and Lajes do Pico (Flores and Pico Islands respectively), are managed by Portos dos Açores, S.A.. Marina of Vila Franca do Campo (São Miguel Island) is managed by the Nautical Club of Vila Franca, marina of Praia da Vitória is managed by the municipality of Praia da Vitória and marina of Povoação is managed by the municipality of Povoação.

The port authority must ensure the coordination of all activities developed within the respective area of jurisdiction, specially the normal functioning of each port in its multiple aspects: economic, financial and patrimonial, human resources management and port operations, as well as other complementary activities. It is the port authority that proposes the operating regulations for each port, but it is the Regional Government that has the competence to approve those regulations.

Normative basis

In the Azores, the ports and marinas sectors are ruled by specific legislation. The following documents have a regional scope[13].

Table 50. Main legal documents ruling ports and marinas in the Azores.

Regional Law	Observations
Decree-Law 326/79, of 24 August	Transferred the administration of the archipelago's ports to the jurisdiction of the Azores Region
Regional Legislative Decree 24/2011/A, of 22 August, rectified by the Statement of Rectification 31/2011, of 11 October (terrestrial jurisdiction of Vila do Porto, Santa Maria)	Approves the ports system in the Azores
Resolution of the Government Council 161/2016, of 23 December	Approves the distribution of the ports of the Azores by class D and fishing centres
Decree order 17/2014, of 28 March	Approves the regulation for the management of fishing ports and fishing centres in the Azores
Decree order 114/2016, of 16 December, amended and republished by the Decree order 37/2017, of 21 April	Establishes the Regulation of the supporting scheme of investments in fishing ports, debarking sites, fish auction markets and shelters
Regional Legislative Decree 14/2002/A, of 12 April	Regulation of the tariff system of ports in the Azores

[13] Additional related legislation might be found at the Azores Government Portal: http://www.azores.gov.pt/Portal/pt/entidades/srtop-drt/textoImagem/Legislacao.htm.

Regional Law	Observations
Decree order 38/2019, of 30 May	Regulation of tariffs of the Portos dos Açores, S.A.
Decree order 40/2019, of 30 May	Regulation of specific tariffs of the Portos dos Açores, S.A.
Regional Regulatory Decree 24/2002/A, of 30 August	Defines the pilot areas covered by the ports under the jurisdiction of the port authority of the Azores
Decree order 39/2019, of 30 May	Regulation of marinas and nautical recreation centres' tariffs under the jurisdiction of Portos dos Açores, S.A.
Decree-Law 265/72, of 31 July	Approves the General Regulations of the Captaincies
Edict 340/2018, of March 26	Edict of the Captaincy of Porto da Horta
Maritime Rescue Plan for Horta Port Captaincy	Available at https://portosdosacores.pt/wp-content/uploads/2019/08/HOR-Plano_de_salvamento.pdf
Edict 554/2018, of June 4	Edict of the Captaincy of the Port of Santa Cruz das Flores
Edict 030/2019, of 3 December	Notice to Navigation (Conditions of Practice of Lajes das Flores Port) and cancels the Edict 22/2019
Maritime Rescue Plan for Santa Cruz das Flores Port Captaincy	Available at https://portosdosacores.pt/wp-content/uploads/2019/08/FLO-Plano_de_salvamento.pdf
Edict 419/2018, of April 24	Edict of the Captaincy of the Port of Angra do Heroísmo
Edict 327/2018, of March 23	Edict of the Captaincy of the Port of Praia da Vitória
Edict 813/2017, of October 17	Edict of the Captaincy of the Port of Ponta Delgada
Edict 420/2018, of April 26	Edict of the Captaincy of the Port of Vila do Porto
Maritime Rescue Plan for Vila do Porto Port Captaincy	Available at https://portosdosacores.pt/wp-content/uploads/2019/08/VDP-Plano_de_salvamento.pdf
Regulation of exploration of port under jurisdiction of Portos dos Açores, S.A.	Available at https://portosdosacores.pt/wp-content/uploads/2019/09/RegulamentoExploracao.pdf
Regulation of exploration and use of marinas in the Azores	Available at https://portosdosacores.pt/wp-content/uploads/2019/08/regulamento_exploracao_marinas_dos_acores.pdf

Instruments

In addition to legislation, the Azorean Government developed and approved, in 2014, the Integrated Plan for Transports of the Azores (PIT, 2014). The document defined the framework, both at the level of the infrastructures, the existing means and levels of services, following the objectives to be achieved, and proposed what should be done at the level of coordination and promotion of the intermodality. It also included a set of measures to be developed in the period 2014-2016.

Administrative easements and restrictions of public utility

Port and marinas, as public infrastructures, are regulated by legislation and are considered as administrative easements and restrictions of public utility. Beyond the limits of jurisdiction of the port authority, there must be considered the administrative easements related to the needs of

transit of ships and vessels to and from the ports and marinas. More details regarding maritime transport are presented in the corresponding maritime sector report (Kramel, et al., 2019).

Administrative constraints or easements result from legal impositions, or administrative acts, which have public utility as purpose, and which may result in prohibitions or limitations, or compel the practice of actions. Public utility restrictions are distinct from administrative easements as they derive directly from the law and do not dependent on any administrative act, and they concern any limitations over the private use and occupation of the maritime space, thus preventing full enjoyment of private use rights.

It is worth referring that, according to the Decree-Law 38/2015, of 12 March (develops Law 17/2014, of 10 April, that establishes the policy basis for planning and management of the Portuguese national maritime space), the areas under port jurisdiction are not included in the limits of intervention of the instruments for the national MSP.

In the Azores, the areas defined as administrative constraints and restrictions of ports (Regional Legislative Decree 24/2011/A) are represented in **Figure 142** to **Figure 155**, mainly including areas under ports jurisdiction, together with administrative constraints of maritime signalling, such as lighthouses and lights, anchorages and pilot areas. The areas identified in these figures are the areas available as cartographic information in vectorial format. In some cases, this information might need to be later updated. For example, the distinction between areas under ports jurisdiction and areas under maritime jurisdiction, including Captaincies areas, namely in accordance with the Regional Legislative Decree 24/2011/A and the Decree-Law 265/72. In addition, the most updated location and limits of pilot areas and coastal and port anchorages might need to be revised according to the Regional Legislative Decree 24/2011/A, Regional Regulatory Decree 24/2002/A and the Edicts published for each port.

Stakeholder's perception on the legal framework

The stakeholders' consultation developed in the context of the MarSP project aims to gather information on stakeholder's perceptions about the legislative context of maritime sectors applicable in the Azores. Selected stakeholders include representatives of the regional and/or local administration and ports and marinas operators. The consultation process was performed through individual interviews. Stakeholders were asked if they agreed with the legislative context for ports and marinas and what type of changes would they recommend. In a general way, stakeholders did not identify the need for deep changes in the legal framework in the Azores for this maritime sector. It was referred that the existing legislation is enough but there is the need for improving the capacity to implement it. Regulations should be improved in line with changes in blue growth and technological development and actors/governmental agencies should work closer and improve cooperation. For example, a common platform should be created where the different entities, such as ports administration, foreign services and borders, sanitary entity and costums office, would be able to work together. An official legal document identifying the 'portinhos' in the Region should be provided. Additionally, stakeholders were concerned about the restrictive rules of Corvo Island Natural Park, which deeply hinders any activity in Corvo coastal area (and consequently might decrease the activity of Porto da Casa); and the need for regulation of deep-sea mining in the Azores.

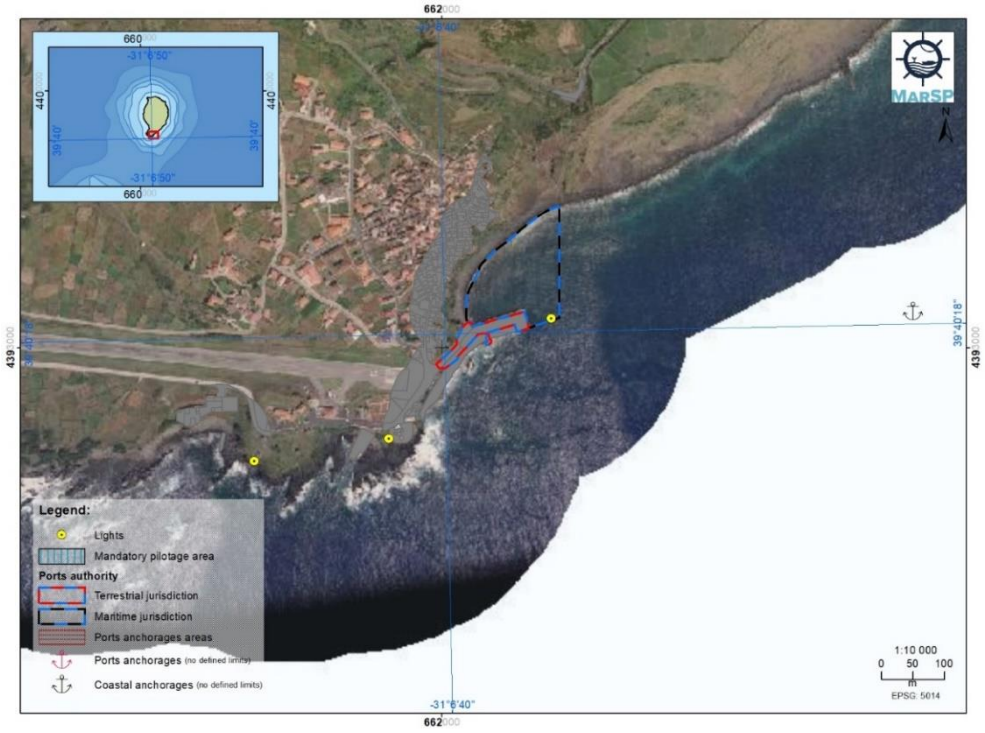


Figure 142. Areas of administrative constraints or easements of Porto da Casa (Corvo Island).

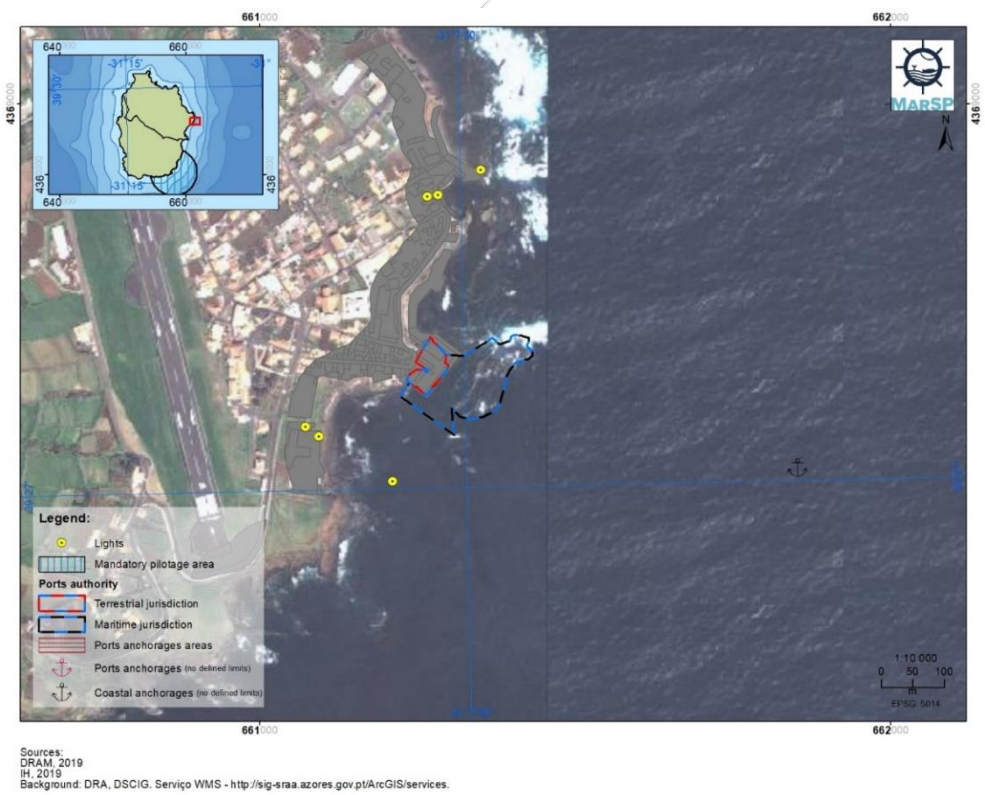


Figure 143. Areas of administrative constraints or easements of port of Santa Cruz (Flores Island).

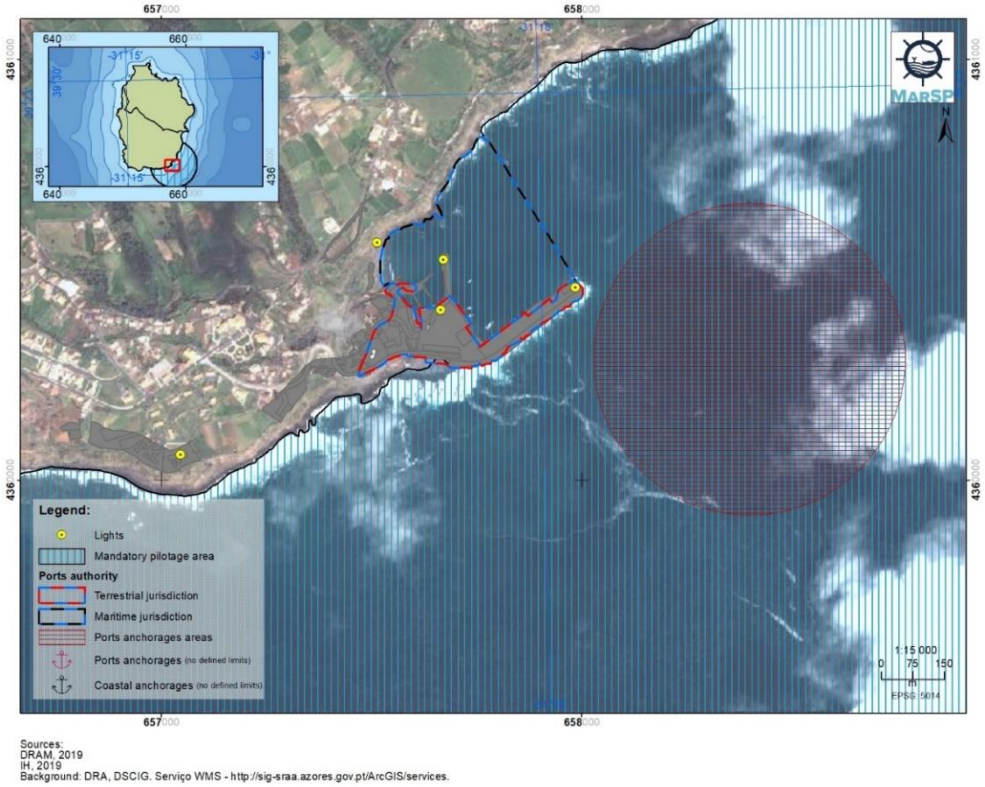


Figure 144. Areas of administrative constraints or easements of port of Lajes das Flores (Flores Island).

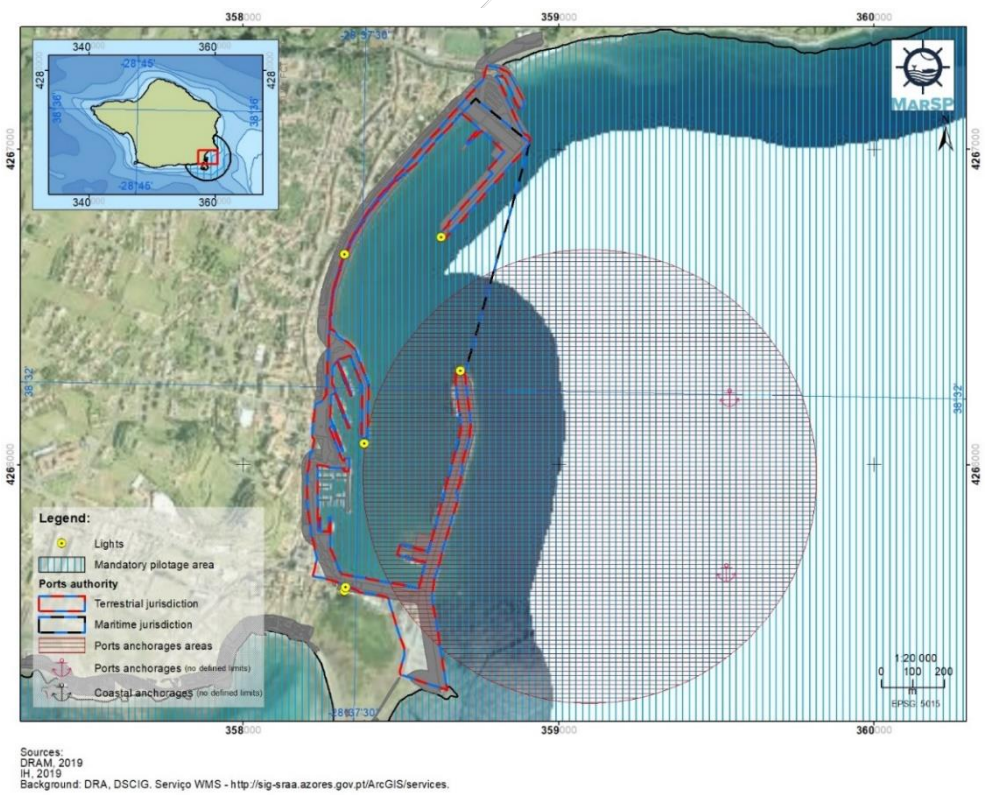


Figure 145. Areas of administrative constraints or easements of port of Horta (Faial Island).

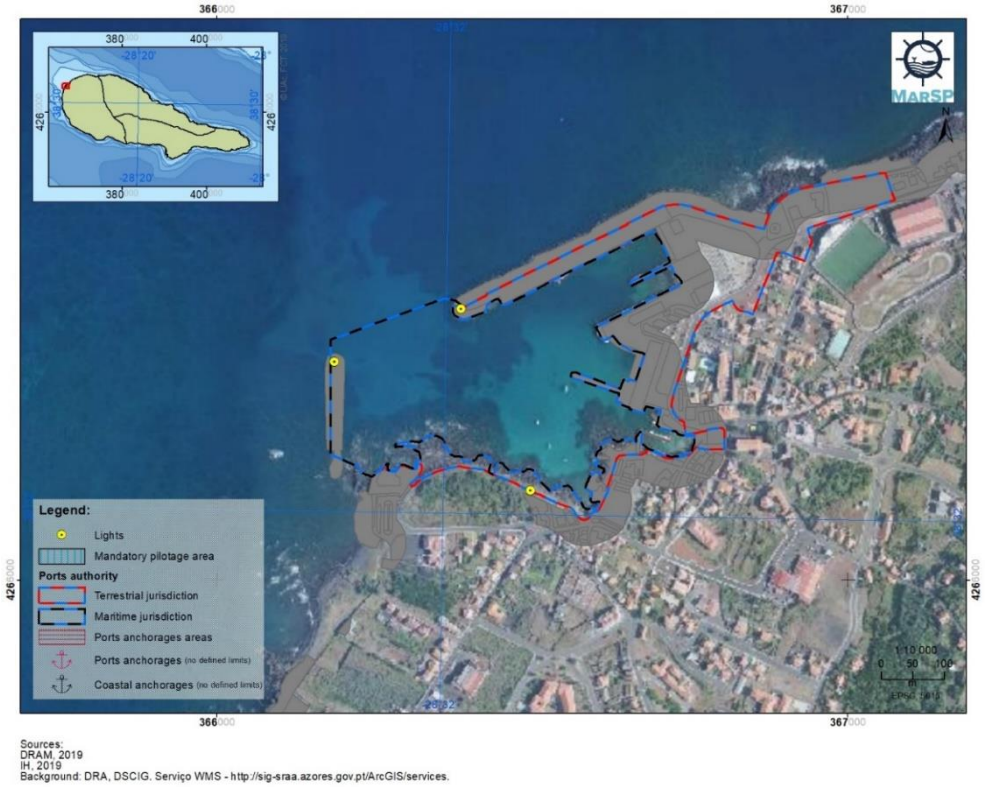


Figure 146. Areas of administrative constraints or easements of port of Madalena (Pico Island).

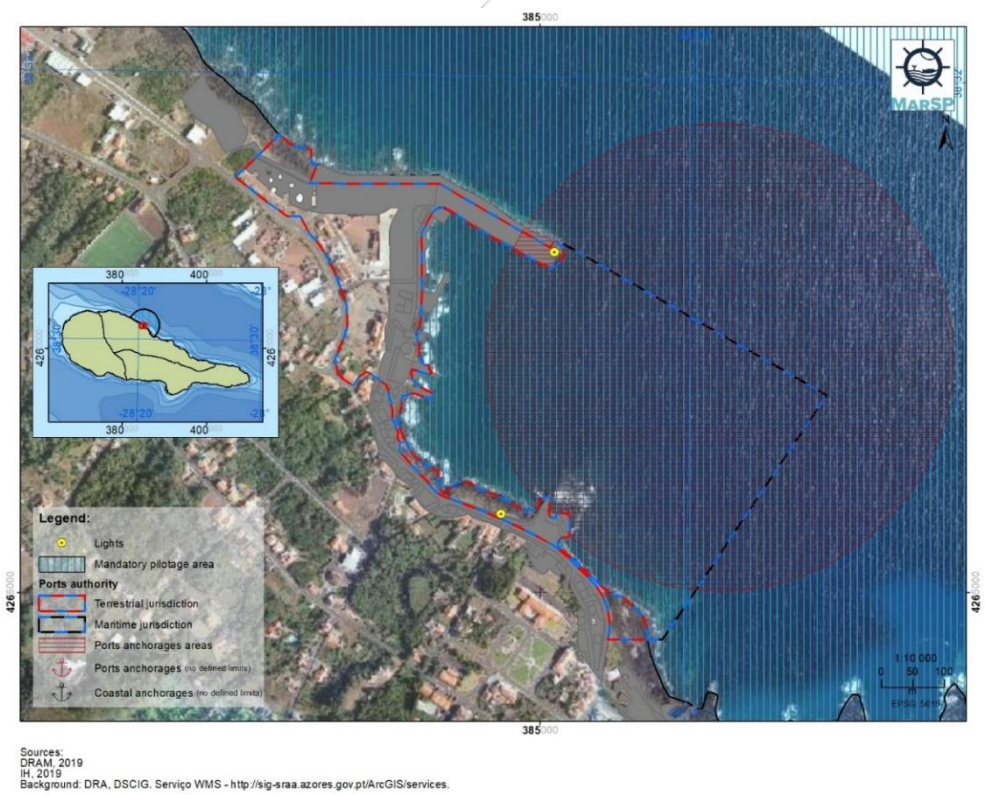


Figure 147. Areas of administrative constraints or easements of port of São Roque do Pico (Pico Island).

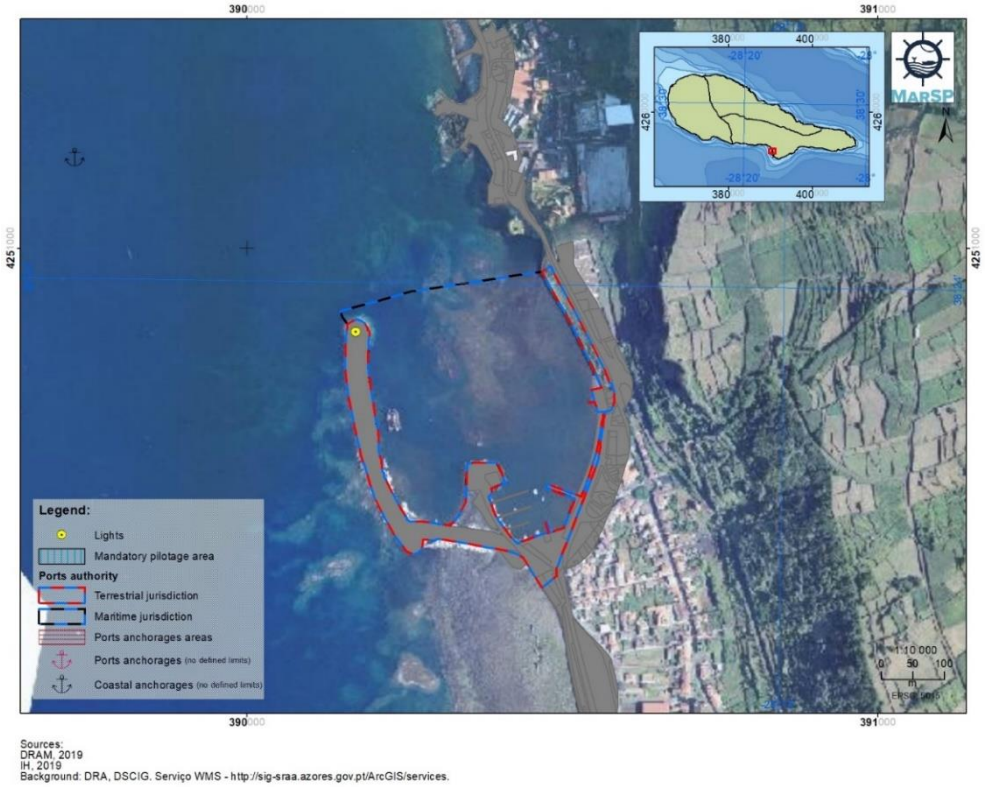


Figure 148. Areas of administrative constraints or easements of port of Lajes do Pico (Pico Island).

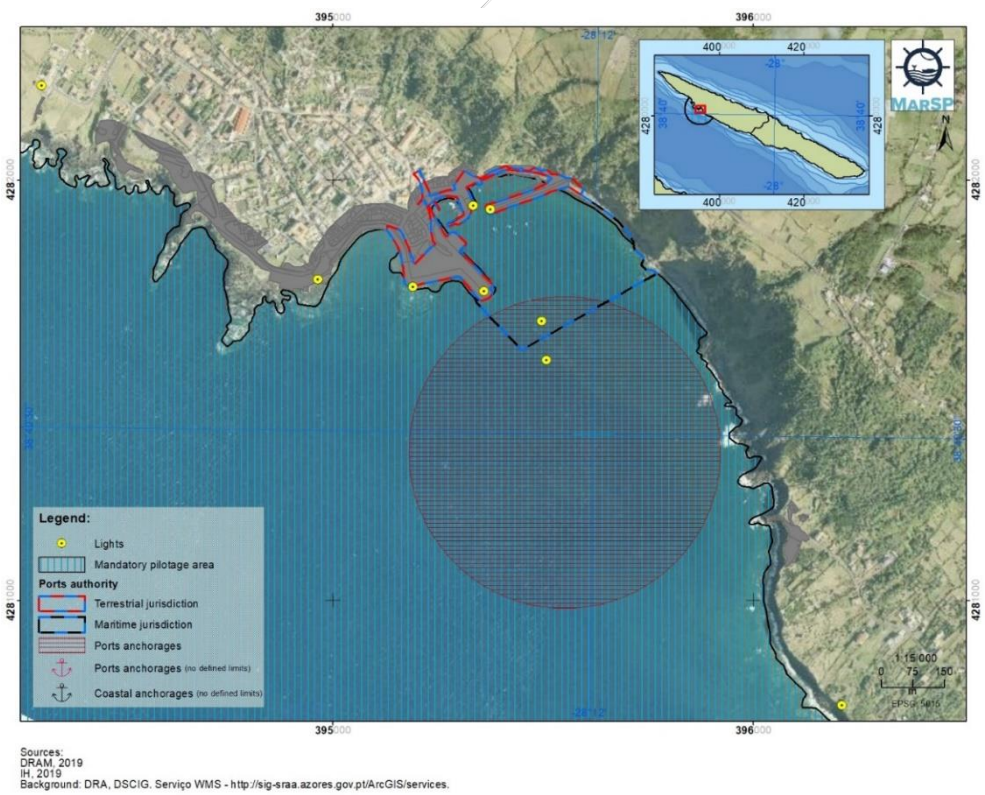


Figure 149. Areas of administrative constraints or easements of port of Velas (São Jorge Island).

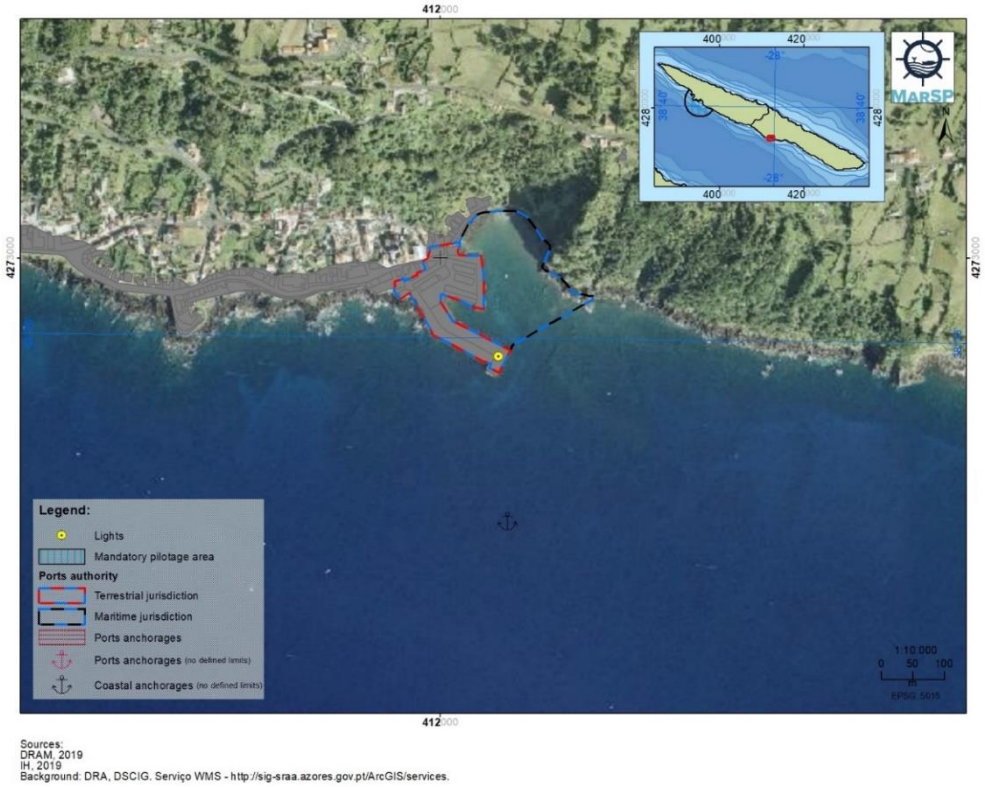


Figure 150. Areas of administrative constraints or easements of port of Calheta (São Jorge Island).

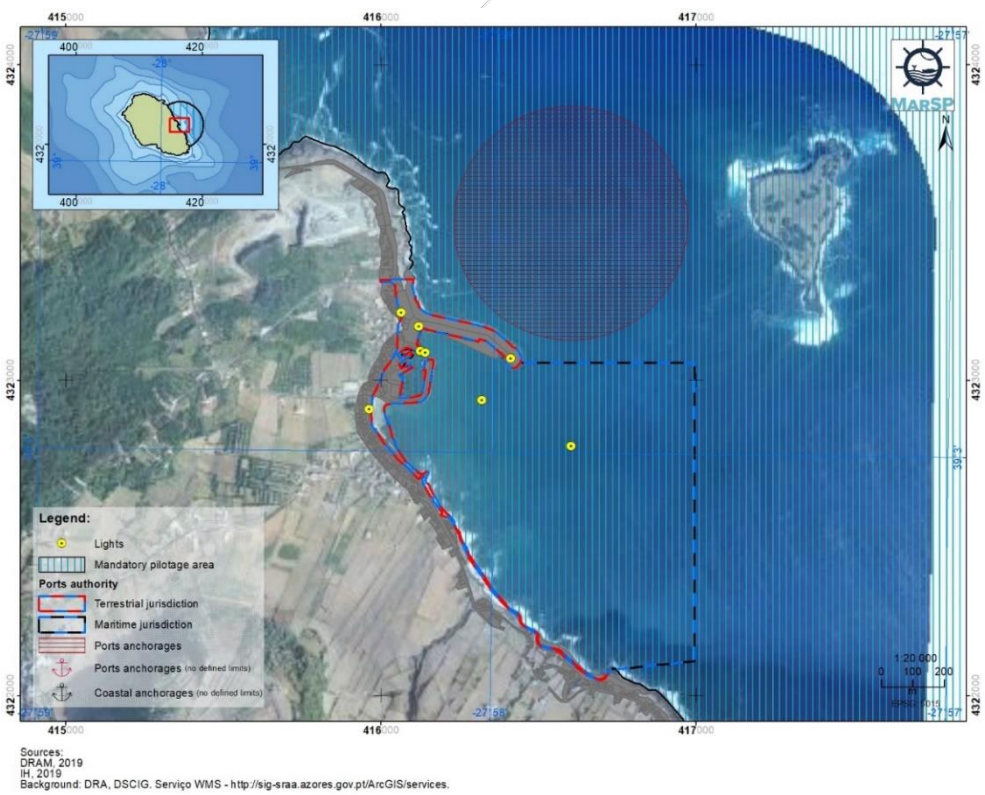


Figure 151. Areas of administrative constraints or easements of port of Praia da Graciosa (Graciosa Island).

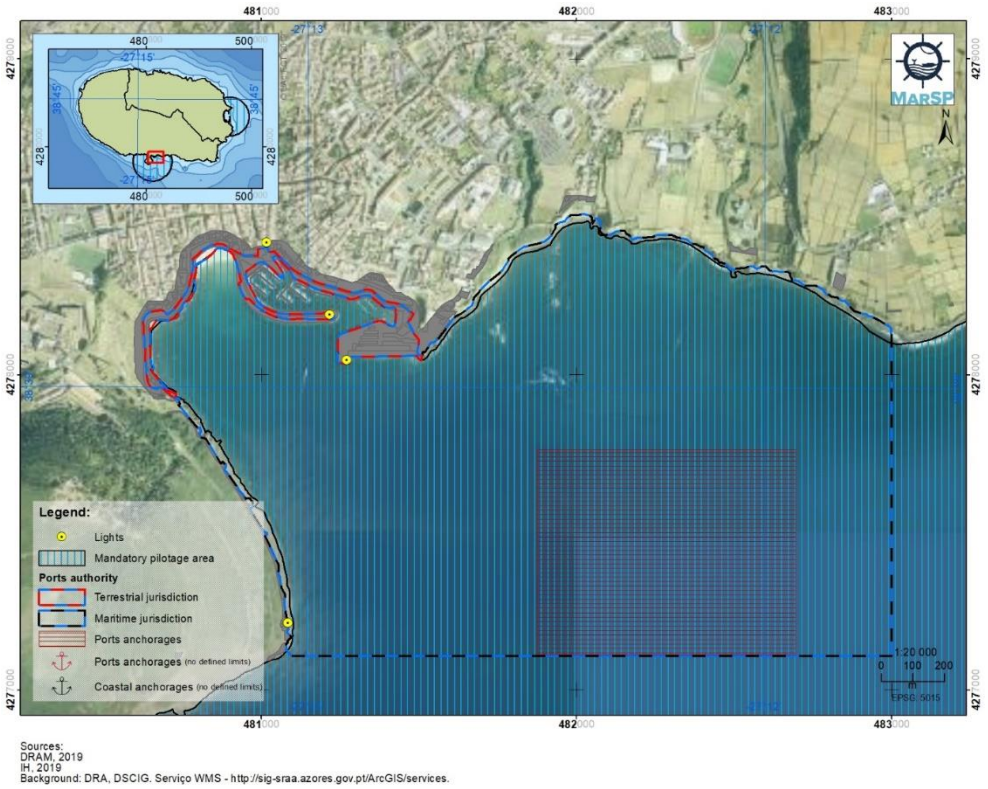


Figure 152. Areas of administrative constraints or easements of port of Angra do Heroísmo (Terceira Island).

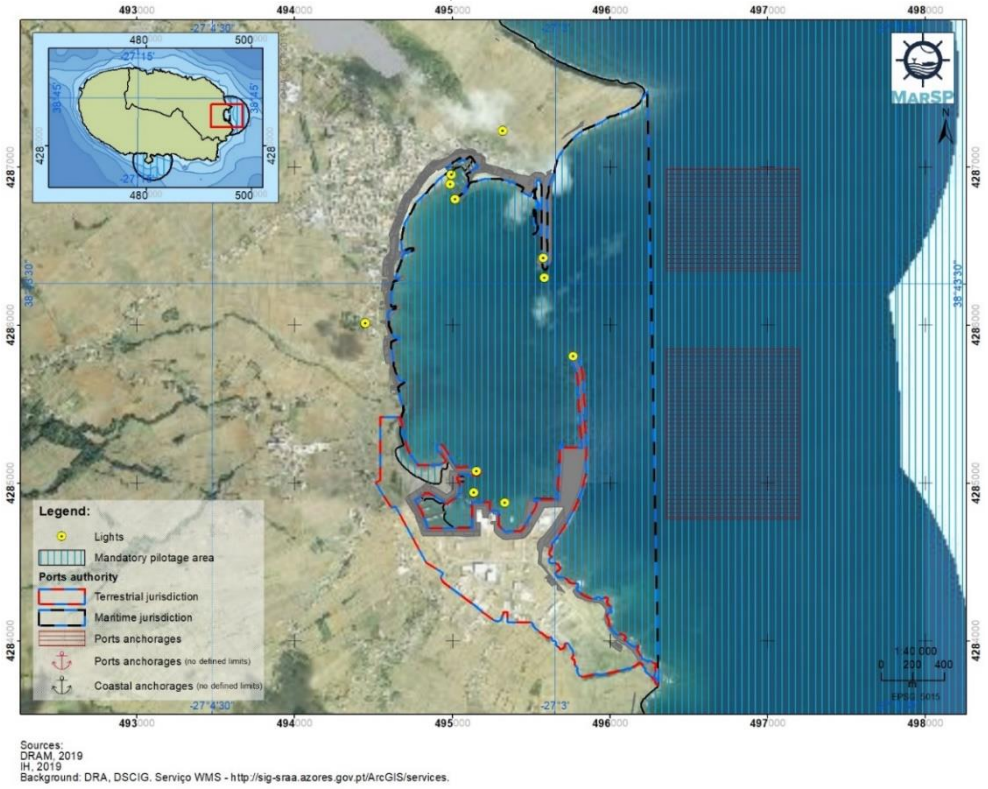


Figure 153. Areas of administrative constraints or easements of port of Praia da Vitória (Terceira Island).

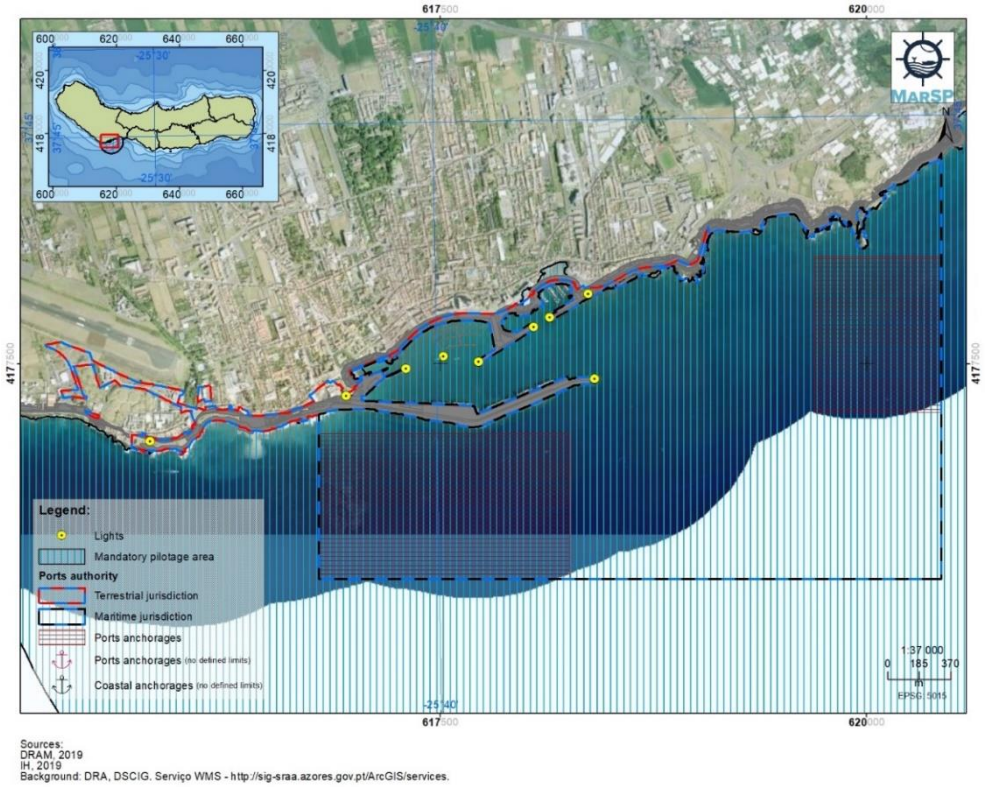


Figure 154. Areas of administrative constraints or easements of port of Ponta Delgada (São Miguel Island).

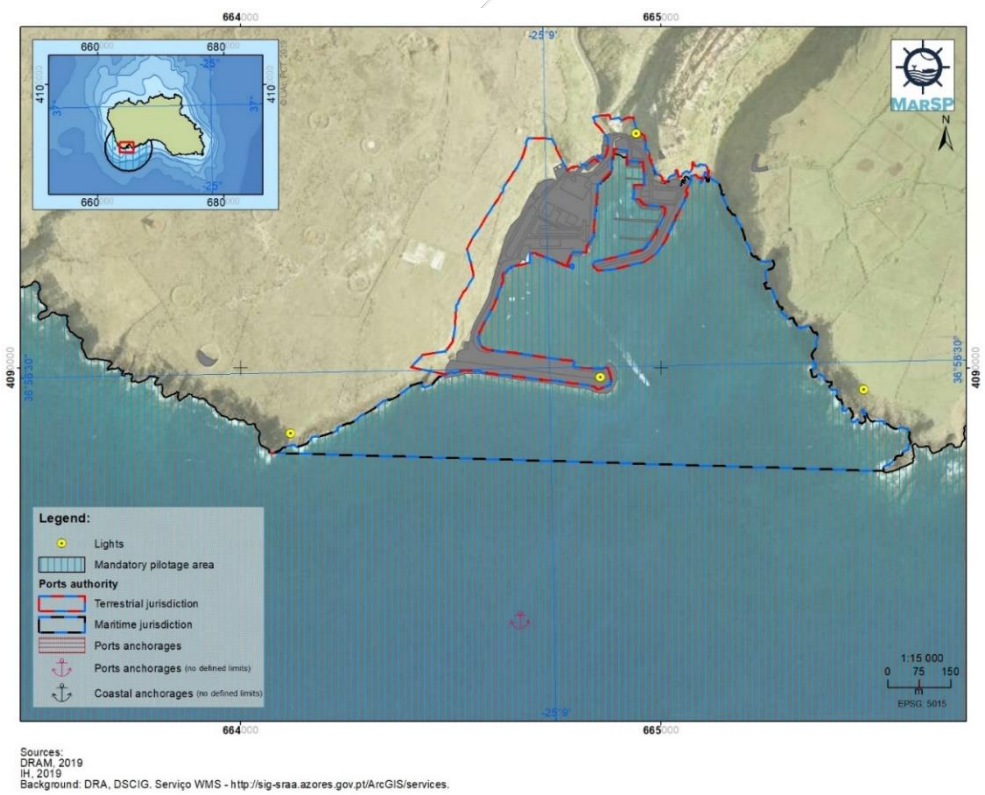


Figure 155. Areas of administrative constraints or easements of port of Vila do Porto (Santa Maria Island).

PART II

Methodology for mapping the sector

Ports and marinas are fixed infrastructures developed to support other activities (e.g. navigation, fisheries, recreational boating), and are limited in space. Changes in these areas usually result from increasing demand of the activities being supported by these infrastructures.

Current spatial distribution

The methodology for mapping the current situation of ports and marinas sector in the Azores was based on the existing and available databases on ports and marinas infrastructures, including the maritime and the terrestrial area with built infrastructures supporting ports and marinas, as well as on stakeholders' consultation and engagement. Information collected during stakeholders' consultation and engagement was transferred to the geographic information system tool used in the MarSP project. In addition to these areas, cartography of this sector must include the areas under the jurisdiction of the port authority defined as administrative constraints and restrictions.

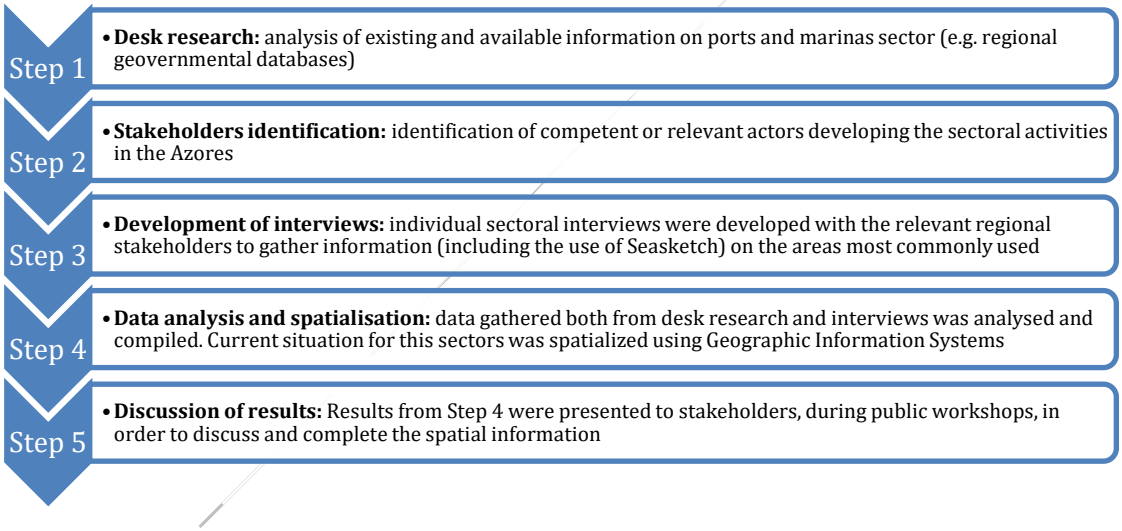


Figure 156. Methodological scheme for the characterization of the existing situation of scientific research and marine biotechnology sectors in the Azores.

Geographic databases for ports, marinas and its administrative easements and restrictions can be provided by administrative institutions of the Azorean Government, including the entities with authority for the management of ports and marinas, currently, the Portos dos Açores, S.A. for ports of classes A, B and C, marinas of Horta, Velas, Angra do Heroísmo, Ponta Delgada and Vila do Porto and Nautical Recreation Centres of Lajes das Flores and Lajes do Pico; the DRP for ports of class D, DRAM for ports of class E, the Nautical Club of Vila Franca for Marina of Vila Franca do Campo, Municipality of Povoação for marina of Povoação and Municipality of Praia da Vitória for Marina of Praia da Vitória. Legislation, such as the Regional Legislative Decree 24/2011/A, of 22 August, also provides information for mapping this maritime sector.

Competent authorities delivered the information for mapping of the current situation presented in this section (**Figure 157** to **Figure 165**).

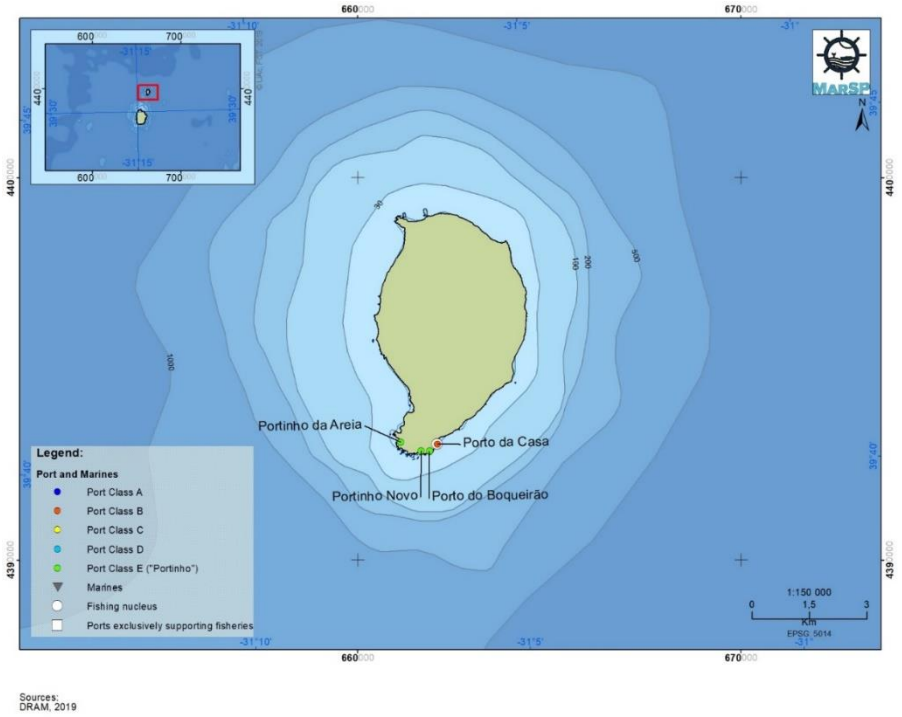


Figure 157. Ports and marinas in Corvo Island.

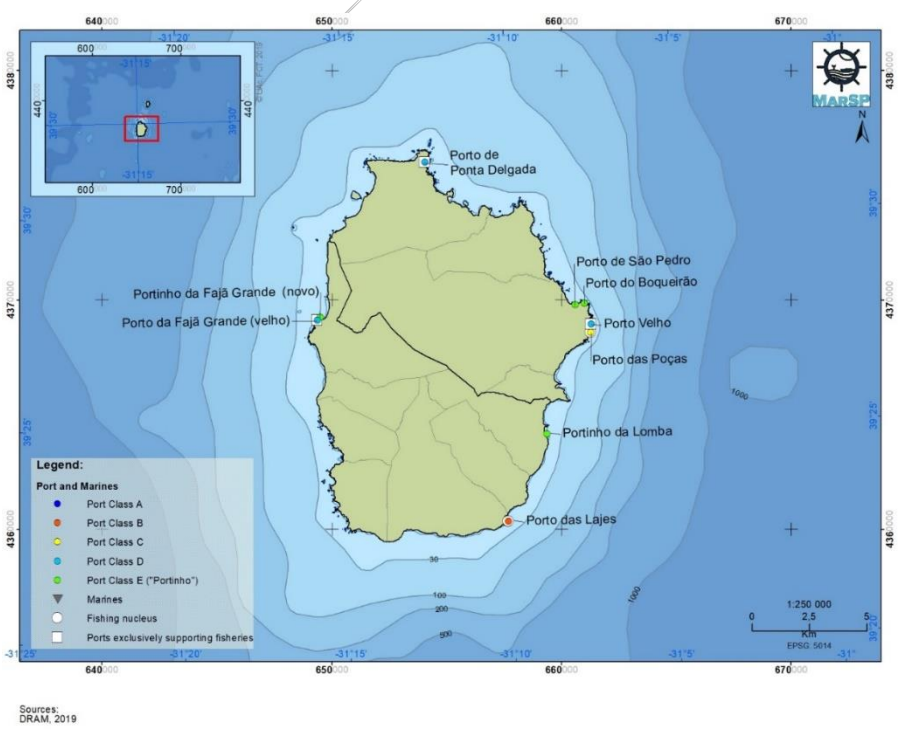


Figure 158. Ports and marinas in Flores Island.

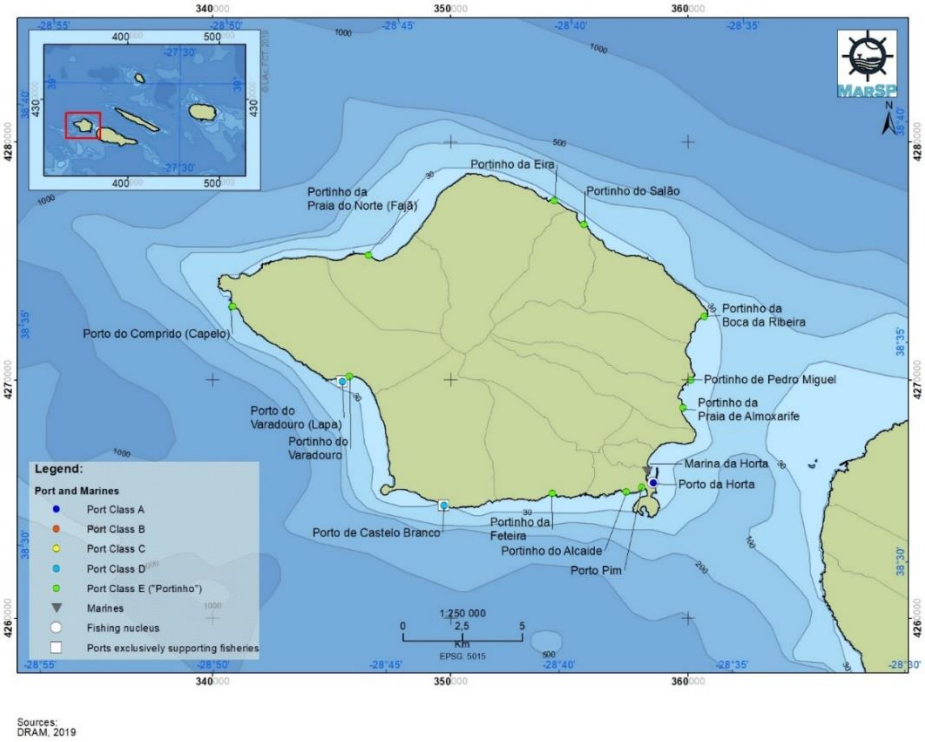


Figure 159. Ports and marinas in Faial Island.

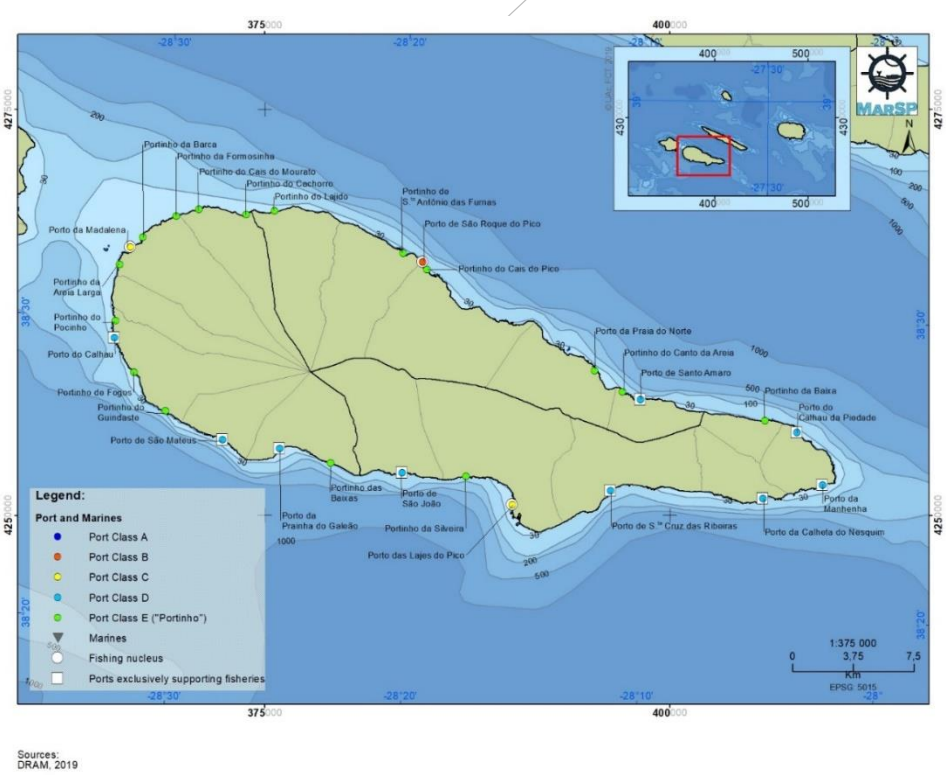
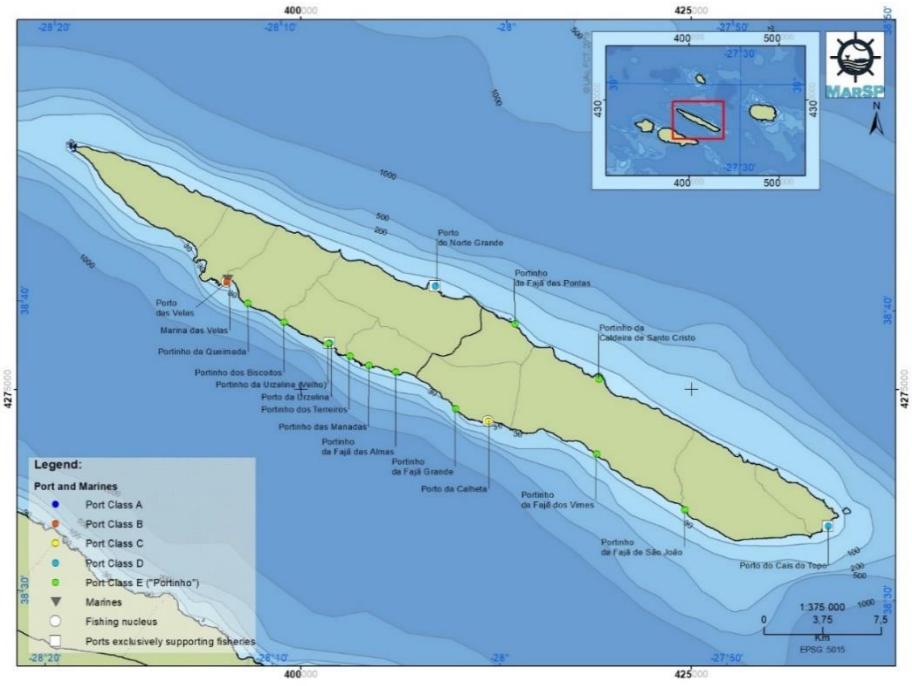
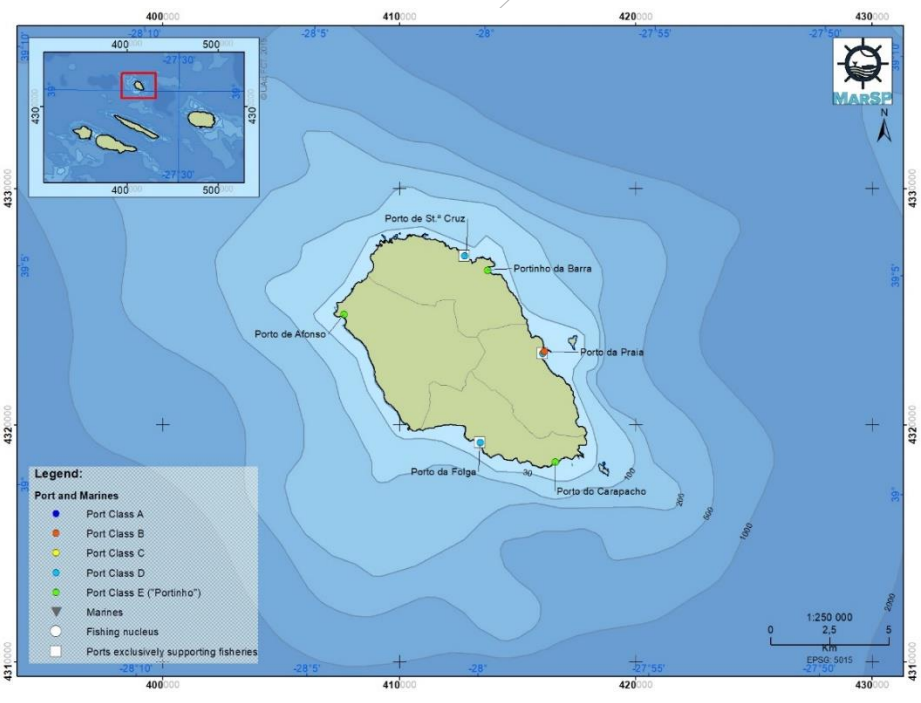


Figure 160. Ports and marinas in Pico Island.



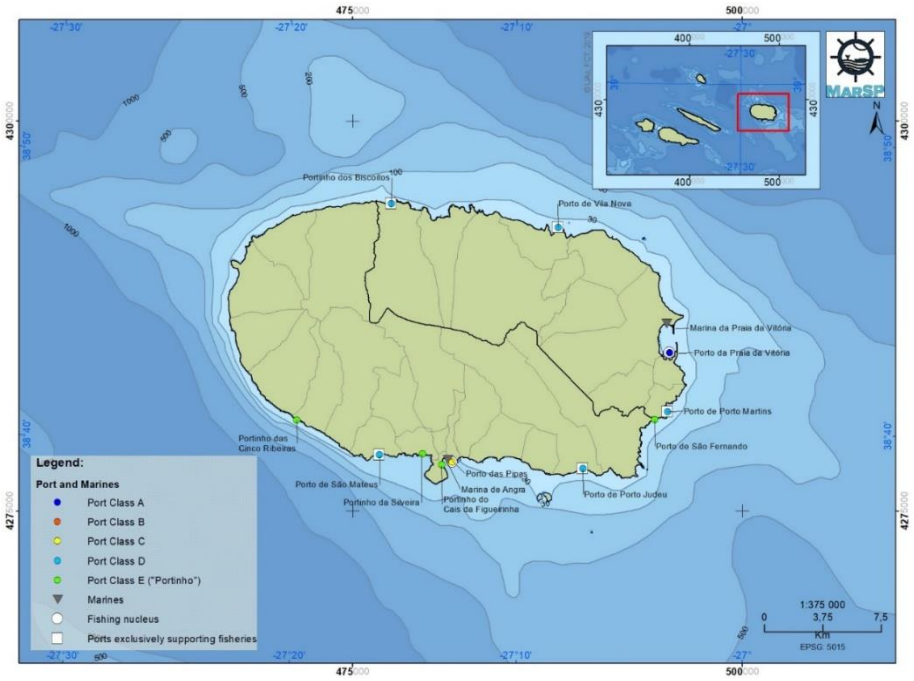
Sources:
DRAM, 2019

Figure 161. Ports and marinas in São Jorge Island.



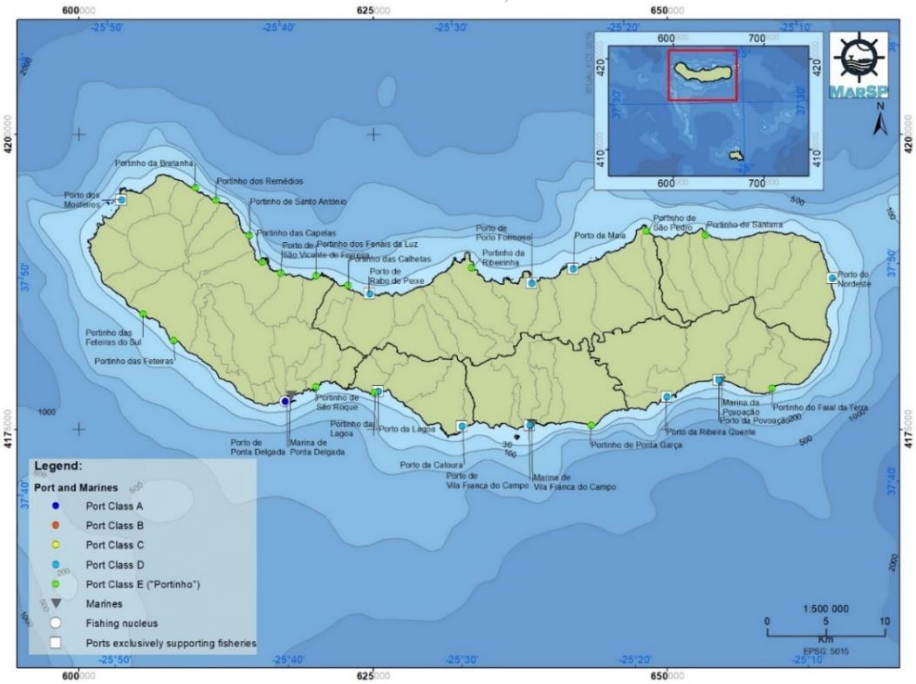
Sources:
DRAM, 2019

Figure 162. Ports and marinas in Graciosa Island.



Sources:
DRAM, 2019

Figure 163. Ports and marinas in Terceira Island.



Sources:
DRAM, 2019

Figure 164. Ports and marinas in São Miguel Island.

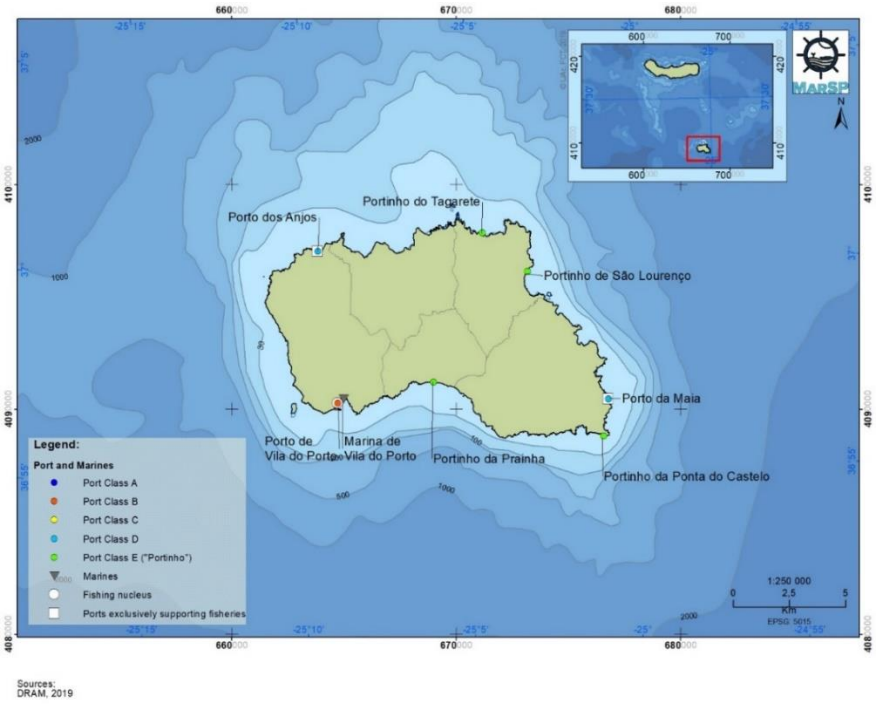


Figure 165. Ports and marinas in Santa Maria Island.

PART III

Sector diagnosis

The sector diagnosis presented in this section includes a SWOT analysis and the analysis of sectoral interactions (sector-sector, land-sea interactions, and sector-environment). The methodological approach for all analysis was similar and mainly based on regional stakeholders' consultation.

The first step to develop the analysis was based on sectoral representative stakeholders' consultation, through individual interviews. Stakeholders were asked to give their technical opinion on the fulfillment of each analysis for the sector they represent. For ports and marinas sector, six representative regional stakeholders accepted to participate in the individual interviews. The analyses resulting from this step were reviewed during the 2nd MarSP Regional Stakeholders Workshop (developed in April 2019), which had the participation of 78 stakeholders distributed in three Azores Islands: São Miguel, Terceira and Faial. In the workshop, stakeholders were grouped according to the sectors they represent and were asked to comment on and complement the analyses for those sectors. The analysis for each sector includes consensual results from both regional stakeholders' consultation (individual interviews and the workshop) and additional topics from literature review for the sector.

SWOT Analysis

A SWOT analysis was developed for each maritime sector identified for the Azores. Stakeholders were asked to identify the strengths, weaknesses, opportunities and threats they consider as the most important for the sector they represent.

The final SWOT analysis for ports and marinas sector in the Azores is presented in **Table 51**. A few topics from the different domains of the SWOT analysis generated some controversy amongst stakeholders.

The Azorean Government has responsibility in approving the regional ports tariffs. The low autonomy of ports management entities to define those taxes was identified during the interviews as a weakness to the sector; however, in the literature it is considered as a strength (SRRN, Estratégia Marinha para a subdivisão dos Açores. Diretiva Quadro Estratégia Marinha., 2014), as the Government is able to control taxes values according to the social objectives.

During the interviews, the concession of ports management to municipalities, so they will be able to implement infrastructures, was identified as an opportunity; during the 2nd workshop, however, it was referred that municipalities, in a general way, have no financial neither technical capacity to manage and maintain those infrastructures. Transatlantic container traffic market was initially identified as an opportunity, but during the 2nd workshop some participants disagreed as they consider that container traffic is not in line with the maritime development trends in the Azores. Finally, it was initially identified as a threat the close proximity between the Government and the population, due to the small size of the islands and population, and an excessive tendency towards the autonomy of the Regional Government, but during the 2nd workshop it was referred that it is both an advantage and a challenge.

The main strengths and opportunities of ports in the Azores seem to be related to the geographical context of this archipelago. The location in the middle of the Atlantic demands for good inter island connections for residents, as mainland is much more distant, and offers a possibility of scale for supplies for those crossing the Atlantic. The investment already done to construct the existing infrastructures has contributed to this. At the same time, however, the Azorean location also contributes to the main weaknesses and threats: frequent rough conditions of the sea, mainly during winter, causing frequent damages in ports infrastructures, together with a significant number of ports scattered along the nine islands, demands for high financial investments to maintain functional infrastructures in a Region with common insular features, such as isolation, limited resources and small economies.

Table 51. SWOT analysis resulting from regional stakeholders' consultation for ports and marinas sector in the Azores (topics highlighted in bold were considered by stakeholders as most important; topics in blue were added from literature review).

	Positive factors	Negative factors
Internal factors	**Strengths** **- Atlantic Centrality (Euro-Asia-Africa-America axis) and geostrategic position;** **- The sea as the most important resource in the Azores and the ports are the main access route;** **- Ports lever coastal development and territorial cohesion;** **- Wide network of ports on all islands with good infrastructures;** **- Network of 'portinhos' without a specific function allows the development of activities that cannot be allowed in other types of ports (e.g. leisure zone and exit of vessels);** - Existence of information and knowledge of the sea; - Portos dos Açores, S.A. has an isolated position in the port regional market; - Each island has at least one port able to receive passengers and goods.	**Weaknesses** **- Nine islands, multiplying financial costs (maintenance, equipment and human resources);** **- Seasonality of optimal conditions (meteorology and oceanography) for port operations;** **- Equipment obsolete and not well adapted to current operation requirements;** **- Reduced commercial activity/economies of scale;** **- Need for large investments in equipment in the short term;** - Cost of services (smaller populations in some islands lead to less interest of companies to establish themselves outside urban centres); - As more Ports exist, trends for parallel economy and extraction of marine life without being declared increases; - Current rigid and restrictive policy, legislation and regulation.
External factors	**Opportunities** **- Implementation of infrastructures to allow ships to refuel with new fuels (e.g. Liquefied Natural Gas-LPG);** **- Possibility of wintering vessels (dry berthing);** **- Cruise market;** - Request by other sectors (e.g. tourism); - The scientific interest of the Azores bringing vessels from other places; - Optimization of interests (e.g., local commerce); - Improvement of ports capacity; - Improving ocean literacy and inclusion of marine-related subjects in school curricula; - The quality of the fish and its demand (it requires good reception conditions in ports); - Ports as logistical support for aquaculture; - Potential for recreational boating growth; - Availability of European funds; - Information and communication technologies to facilitate ports operations; - Allocate to the final client the profits resulting from ports operating efficiency.	**Threats** **- As small island communities, there is a very close proximity between the Government and the population and an excessive tendency towards the autonomy of the Regional Government, which might difficult controversial decisions;** **- Operationality of weather-dependent infrastructures;** **- High maintenance costs due to climatic features that greatly impact the infrastructure;** **- Urban pressure for port areas;** **- Exponential increase in tourism and decrease in the quality of tourism;** - Decrease of people in fisheries and fishing industry and the unsustainable exploitation of fishery resources, relatively small areas of fish concentration compared to the size of the Exclusive Economic Zone - Needs for rehabilitation and improvement of 'portinhos'; - Existence of an excessive number of 'portinhos' with high maintenance costs.

Analysis of interactions

The development of a certain activity in the maritime space is usually linked to interactions with the remaining uses and maritime sectors. Those interactions can be both positive and negative and can be both induced or suffered by a certain sector. In the context of the MarSP project, for each maritime sector, three types of interactions were analysed: sector-sectors interactions, land-sea interactions and interactions with the environment. The analysis intended to identify if interactions exist and the level of intensity of the interactions using the following scale: negative values for negative interactions, positive values for positive interactions and zero for absence of interactions.

In the matrices, the column "C" represents the negative impacts induced or suffered by the sector, identified as conflicts, while the column "S" represents the induced or suffered positive interactions, deemed as synergies.

Sector-sectors interactions analyses whether there is any type of conflict and/or synergy between each of the maritime sectors identified and the other sectors. The resulting matrix reflects only the analysis of interactions occurring beyond the 30m bathymetry, not including coastal areas within less than 30m bathymetry (the protection maritime zone of protection defined by the coastal zone spatial Plan - POOC).

Land-sea interactions analyse whether there is any type of conflict and/or synergy between each of the maritime sectors identified and coastal activities (up to the 30m bathymetry) developed in the various areas identified in the POOC.

Interactions with the environment analyses if there is any kind of negative and/or positive effect of each of the maritime sectors identified to the environment, specifically considering the descriptors of the good environmental status (GES), and respective criteria, as defined by the Marine Strategy Framework Directive (MSFD).

During the individual interviews, stakeholders were asked to identify the levels of conflicts and/or synergies of ports and marinas with other sectors. The final values were calculated using the tendency of answers and represent the stakeholders' perception trend. As this first analysis is based on inputs from stakeholders representing the maritime sector, to avoid or decrease possible bias in the results, during the Workshop, stakeholders were asked to comment and, when in disagreement, to propose a different value to classify the level of conflict/synergy. The final values from the workshop were calculated using the mean of all values resulting from all discussion tables. Literature review was also used to complement the characterization of the interactions, identifying if a conflict or a synergy is existing in the Azores or on other contexts.

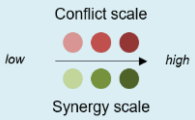
Interactions with other sectors

Ports and marinas provide support for many other sectors, such as fisheries, maritime transport, extraction of mineral resources, marine renewable energy, tourism, leisure and sports activities. They can facilitate economic and trade development for inland. On the other side, ports can also compete for space, for example with aquaculture (European Commission, The EU Blue Economy Report 2019, 2019; McGowan L. , 2018). Ports and marinas also act as starting points and destinations for leisure and excursion boats, with significant importance with regard to tourism (Käppeler, et al., 2012).

The characterization of the interactions of ports and marinas sector with the other maritime sectors in the Azores is represented in**Table 52**. Considering the structural differences between ports and 'portinhos' in the Azores, regional stakeholders considered these should be analysed separately.

Table 52. Characterization of the interactions between ports and marinas and other maritime sectors in the Azores.

Sector-Sectors	Ports						'Portinhos'			
	Sectoral interviews		2nd Workshop		Literature review		Sectoral interviews		2nd Workshop	
	C	S	C	S	C	S	C	S	C	S
Fisheries	-1	2	-1	2.3		X	-1	2	-1	2
Aquaculture	0	0	-0.3	0	X	X	0	0	-0.3	0.3
Extraction of non-metallic mineral resources	0	3	-0.3	3		X	-2	0	-1.5	0.3
Energy	0	3	-0.3	3		X	0	1	-0.3	1
Maritime security, defence, surveillance and civil protection	-2	3	-1.5	3		X	0	1	-0.3	0.8
Navigation and maritime transportation	0	3	0	3		X	-1	2	-0.8	1.8
Infrastructures	-1	3	-1.3	3	X		-1	1	-0.8	0.8
Coastal and maritime tourism	0	3	-0.3	3		X	-1	2	-0.8	2
Scientific research and marine biotechnology	0	3	0	3			0	1	0	1.3
Underwater cultural heritage	-3	3	-3	3			0	1	0	1
Environmental conservation and Marine Protected Areas	-3	2	-3	2	X	X	0	2	-0.3	1.7
Legend	**C** – Conflict; **S** – Synergy; **X** – Existent **-3** – High conflict; **-2** – Moderate conflict; **-1** – Low conflict **0** – Without conflict/synergy **1** – Low synergy; **2** – Moderate synergy; **3** – High synergy **"-"** – Does not answer									



The matrix of interactions shows slightly differences between ports and 'portinhos'. Despite the fact that stakeholders considered the existence of conflicts or synergies in both types of infrastructures, generally when there is a conflict or a synergy the assigned level was lower for 'portinhos'. Due to their smaller dimension, 'portinhos' have lower capacity to support other activities, especially the ones requiring robust physical infrastructures and equipment. At the same time, when there is a conflict, due to the lower intensity of the activities, conflicts are also lower.

According to the regional stakeholders' perceptions, in the Azores ports might have spatial conflicts with fisheries, aquaculture, aggregate extraction and underwater cultural heritage (UCH). With fisheries and aquaculture, for example, the conflict is related to the proximity to fisheries centres and the stricter rules existing in ports. Due to the reduced availability of sand at depths that can be exploited in the Azores, ports might have a conflict with aggregate extraction as this activity can pressure to be developed closer to ports with associated negative risks (e.g. changes in the sea floor that may jeopardize the stability of ports infrastructures; 'portinhos' are also an obstacle to this activity). The conflict with UCH is due to the greater care required in port operations, when UCH is present, usually entailing additional costs. With defence sector, the conflict is related to the port physical space occupied by military ships that will not be available for ports operations. Similarly, the conflict with scientific research is mainly related to infrastructures and sample collection that might interfere with port activities. Conflicts with environmental conservation and marine protected areas (MPA) are mainly due to the restrictions that prevent or hinder the expansion of ports or their retro-areas.

The main synergies between ports and the other maritime sectors were also referred as strengths in the SWOT analysis and are related to ports infrastructures being the gateway to land for the remaining activities (e.g. navigation and transports, fisheries, maritime tourism and scientific research). Navigation and transports are the closer maritime sector to ports and are deeply interconnected. Despite being a gateway to scientific research activities, ports are also the subject of research studies, for example in the study of non-indigenous species. Aquaculture might benefit from sharing ports retro-areas and infrastructures. Tourism, namely cruise tourism, can establish synergies with ports and marinas and develop closer activities. The existence of UCH in ports and marinas can improve the value of these areas, mainly marinas where diving can more easily be compatible with marinas' activities, boosting the island economy. This synergy, however, requires careful planning to ensure the security of all involved parties. In addition, it is not supported by the Regulation of exploration and use of marinas in the Azores, which forbids in the marina area fishing, spearfishing and swimming or diving, except inspection and maintenance of the vessel, as long as previously authorized.

Uses compatibilization and Multi-uses

Ocean multi-use (MU) is an emerging concept, which responds to the increasing demand for marine resources and space. It has been defined as the intentional "joint use of resources in close geographic proximity by either a single user or multiple users. It is an umbrella term that covers a multitude of use combinations in the marine realm and represents a radical change from the concept of exclusive resource rights to the inclusive sharing of resources and space by one or more users" (*in* (Schupp, et al., 2019).

A study has already been developed in the Azores (Vergílio, Calado, & Caña Varona, MUSES Project Case study 3B: Development of tourism and fishing in the Southern Atlantic Sea (Azores archipelago – Eastern Atlantic Sea, 2017) to identify opportunities of MU development. The study included sectoral stakeholders' consultation to ensure representatives and practitioners of the main sectors were listen and involved. Combinations of MU, according to the definition of Schupp, et al. (2019), were not identified in the Azores involving ports and marinas sector. However, considering the high synergies identified there seems to be room to deeper explore the potential for the intentional joint use of ports maritime space. For example, if marine renewable energy is developed, there is potential for MU with ports sector (Schultz-Zehden, et al., 2018).

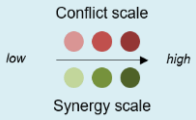
Land-sea interactions

Competition for space is a major issue for the ports and marinas sectors. For ports, capacity to expand and support diversifying activities may be limited by the location of the port in built up or intensively used coastal areas (McGowan L. , 2018).

The characterization of the land-sea interactions of ports and marinas sector in the Azores is represented **Table 53**. Considering the structural differences between ports and 'portinhos' in the Azores, regional stakeholders considered these should be analysed in separately.

Table 53. Characterization of the land-sea interactions of ports and marinas sector in the Azores.

Land-sea		Ports						'Portinhos'			
		Sectoral interviews		2nd Workshop		Literature review		Sectoral interviews		2nd Workshop	
		C	S	C	S	C	S	C	S	C	S
Critical areas for the sustainable coastal use	Natural, cultural and scenic special area	0	3	-0.6	1.8	X		-1	1	-0.8	0.8
	Bathing zones	-2	3	-2	1.6	X		0	1	-0.6	1.2
	Built-up areas in risk zones	0	0	0	0	X		0	1	0	0.6
Environmental protection	Marine environmental protected areas	-1	0	-1.4	0	X		-1	1	-1	0.6
	Land environmental protected areas	-2	0	-2	0	X		0	0	-0.4	0
Coastal protection areas	Built-up areas	0	3	-0.4	3	X		-1	1	-0.8	1
	Agricultural, forestry and other uses	0	2	0	1.6	X		0	0	0	0
	Touristic potential areas	0	3	-0.4	3	X		-1	2	-0.4	2
Infrastructures	Airport	0	2	0	1.6	X		0	1	0	0.6
	Road	0	3	0	2.8	X		0	0	0	0.2
Navigation	Ports	n.a.									
	Marinas, small ports										
Legend	**C –** Conflict; **S –** Synergy; **n.a. –** not applicable; **X –** Existent **-3 –** High conflict; **-2 –** Moderate conflict; **-1 –** Low conflict **0 –** Without conflict/synergy **1 –** Low synergy; **2 –** Moderate synergy; **3 –** High synergy **"-" –** Does not answer										



In a general way, and similarly to sector-sectors interactions, slight differences between ports and 'portinhos' are presented in the matrix: when there is a conflict or a synergy the assigned level was lower for 'portinhos'.

Main land-sea conflicts identified by stakeholders are related to the use of ports areas for bathing zones, arising security issues, even if it is legally forbidden, as well as the classification of coastal protected areas, constraining port activities in the maritime space and in their retro-areas. Other conflict was identified with edified areas, due to the need of constraining a buffer of 50 meters around ports, hindering the expansion of urban areas and other constructions.

The proximity with urban areas has, at the same time, identified synergies, as the existence of ports allows the access to the sea and act as a commercial gate for remaining activities developed inland; 'portinhos' are used as bathing areas and there are currently several 'portinhos' with little activity, promoting (recreational vessels) and benefiting from tourism.

Interactions with the environment

Ports activities are identified in literature as having significant negative impacts in the environment, namely due to the water pollution and the contribution to the introduction and spread of non-indigenous species from ballast water, which can additionally become invasive species. Despite this, ports and shipping legislation can also contribute to conservation objectives, for example through the Port Reception Facilities Directive (Directive 2000/59/EC of the European Parliament

and of the Council of 27 November 2000) and the Ballast Water Management Convention (McGowan L. , 2018).

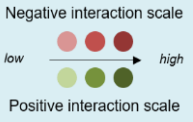
The analysis of the interaction of ports and marinas sector with the environment, using as reference the descriptors to evaluate the GES, according to the MSFD is also presented through a matrix.

Table 54. Characterization of the interactions of ports and marinas sector in the environment in the Azores.

Interactions with the environment	Ports						'Portinhos'			
	Sectoral interviews		2nd Workshop		Literature review		Sectoral interviews		2nd Workshop	
	N	P	N	P	N	P	N	P	N	P
Biodiversity	-2	-	-1	0.3	X		-1	0	-0.8	0.3
Non-indigenous species	-2	-	-1.5	0	X		-1	1	-1.3	0
Exploited fish and shellfish	0	0	-0.5	0			-3	0	-0.8	0
Food-webs	0	0	-0.8	0.3			-2	1	-0.8	0.3
Human-induced eutrophication	-2	0	-1.3	0			-1	0	-0.8	0
Sea floor integrity	-2	0	-1.3	0	X		-2	0	-1	0
Hydrographical conditions	0	0	-0.5	0	X		-1	0	-0.5	0
Contaminants (water, sediments, biota)	-2	0	-2.3	0	X	X	-1	0	-1.3	0
Contaminants in fish and seafood	-2	0	-2.3	0	X		-1	0	-1.3	0
Litter	-3	-	-2.8	0	X	X	-2	0	-1.8	0
Level of noise	-1	0	-1.8	0	X	X	-1	0	-1	0

Legend

N – Negative effect; **P –** Positive effect; **X –** Existent
-3 – High negative effect; **-2 –** Moderate negative effect; **-1 –** Low negative effect
0 – Without negative/positive effect
1 – Low positive effect; **2 –** Moderate positive effect; **3 –** High positive effect
"-" – Does not answer



Ports and marinas have several negative impacts in the environment, as recognized and identified by regional stakeholders and confirmed by existing literature. In a general way, stakeholders identified no positive impacts of ports and marinas in the environment. Only references to the use of ports as access points for implementing conservation actions to decrease non-indigenous species and eutrophication.

In addition to non-indigenous species, contaminants and litter resulting from ports activities, stakeholders also referred that ports, with exception for those of higher dimensions, might act as an easier access point for people to catch fish and shellfish.

Additional documents and links

Directive 2000/59/EC of the European Parliament and of the Council of 27 November 2000 on port reception facilities for ship-generated waste and cargo residues - Commission declaration (https://eur-lex.europa.eu/legal-content/GA/TXT/?uri=CELEX:32000L0059)

EcoPorts: The the main environmental initiative of the European port sector (http://www.ecoports.com/)

ESPO: The European Sea Ports Organisation is the principal interface between European seaports and the European institutions and its policy makers (https://www.espo.be/)

European Commission: Maritime Ports (https://ec.europa.eu/transport/modes/maritime/ports/ports_en)

European Maritime Safety Agency: One of the EU's decentralised agencies providing technical assistance and support to the European Commission and Member States in the development and implementation of EU legislation on maritime safety, pollution by ships and maritime security (http://www.emsa.europa.eu/about.html)

IMO: The International Maritime Organization is the United Nations specialized agency with responsibility for the safety and security of shipping and the prevention of marine and atmospheric pollution by ships (http://www.imo.org/en/About/Pages/Default.asp)

Portos dos Açores, S.A. (https://www.portosdosacores.pt/PGRCIC_PA_v01.pdf)

Azores Government Portal: Regional legislation (http://www.azores.gov.pt/Portal/pt/entidades/srtop-drt/textoImagem/Legislacao.htm)

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ENVIRONMENTAL CONSERVATION AND MARINE PROTECTED AREAS

Introduction

The aim of the MarSP (Macaronesian Maritime Spatial Planning) project is to develop concrete actions for the Member States (Portugal and Spain), through regional and national competente entities to build the necessary capacities and tools for the implementation of the European Union (EU) Directive on Maritime Spatial Planning (MSP) (Directive 2014/89/EU, 2014) in the Macaronesia region, including mechanisms for cross-border cooperation.

For the characterization of the existing uses in the Azores maritime space, the main blue sectors and activities need to be considered. Even though environmental conservation and Marine Protected Areas (MPA) are not an economic sector, they have spatial implications and have been increasingly integrated in MSP processes, in order to facilitate an integrated approach to both economic development and the need for conservation of marine natural resources and to facilitate the integration of both economic and conservation activities. Thereby, in this report, marine environmental conservation and MPA in the Azores are analized similarly to the economic sectors identified and, for the context of the MarSP project, marine environmental conservation and MPA include areas subject to any legal classification for nature conservation and/or management purposes or any other area subject to specific measures of nature conservation in the maritime space or terrestrial space bordering the coastline. This approach includes, but is not limited to, MPA (including Island Natural Park (INP) areas with marine extension), Natura 2000 network and other areas with relevance for environmental conservation, such as Biosphere reserves and Ecologically or Biologically Significant Marine Areas (EBSA), OSPAR MPA, Ramsar Areas and areas with constraints to fisheries.

Alongside the global trend of recognizing the importance of ocean conservation, and considering that Portugal has a significant marine area under its sovereignty and jurisdiction, several MPA have been established in the last decade. In Portugal, the network of MPA is recent when compared to other European Union (EU) countries. The protection of the marine environment in Portugal is mainly based on pollution control, in the creation of regulatory instruments for the direct management of resources and in the definition of measures and MPA (PSOEM, 2018).

The location of the Azores archipelago in the middle of the North Atlantic contributes to the thermoregulatory capacity of the surrounding ocean, enabling the archipelago to retain a large part of their ancient vegetation and marine biodiversity (Petit & Prudent, 2008). This isolated position allows marine biodiversity to present a mix of characteristics of cold, temperate and tropical climates (Tittley & Neto, 1995; Ávila, 2000a, 2005 fide (Botelho A. , 2013), increasing the biological, biogeographic and conservation interest of the Azorean marine environment (Briggs, 1974; Ávila et al., 2008 fide (Botelho A. , 2013).

An in-depth characterization of the Azores marine biodiversity (SRRN, Estratégia Marinha para a subdivisão dos Açores. Diretiva Quadro Estratégia Marinha, 2014) was developed in compliance with the Marine Strategy Framework Directive (MSFD) (Directive 2008/56/EC), including habitats, taxonomic groups and most significant or threatened species. Beyond MPA, conservation measures for certain species and/or habitats are also important for the management of the maritime space. In the context of the MarSP project, the spatial distribution of important species and habitats is developed under Deliverable "Spatial distribution maps of species, habitats and impacts" (D.3.5.). For these reasons, the current report is mainly focused on the spatial dimension of the existent MPA and other area-based conservation measures, instead of exploring the values

present in each protected area (PA), as the spatial dimension is what most concerns MSP. Therefore, only frameworks and documents that led to spatial classified areas and other area-based conservation measures are addressed in this report.

Purpose

This sector briefing summarises the current status of the aquaculture sector in the Autonomous Region of the Azores (Portugal), under MarSP project Work Package 2. "Mapping the current conditions and creating a vision for the MSP in Macaronesia" and Task 2.2. "Mapping the maritime uses and activities and defining the MSP current conditions". It includes a characterization of the current situation of marine environmental conservation and MPA in the Azores and the proposed and adopted methodologies for mapping. It also includes a sector diagnosis and its main interactions with the main maritime sectors, the environment and the land-sea interface.

PART I

Sector characterization

The Azores archipelago and its surrounding maritime space are an important repository of biodiversity, with global relevance, needing adequate protection to compensate the natural vulnerabilities resulting from factors such as the small extent of island ecosystems, isolation between islands and inland regions, fragmentation and loss of habitats, the fragility of native species to invasive organisms, resources exploitation, pollution and other anthropogenic impacts. The marine environment of the Azores is, in a general way, conditioned by its regional geographic framework: markedly oceanic, temperate climate, geological youth and small size of the islands and presence of extreme environments associated with hydrothermal vents. The oceanic characteristics of the islands, together with the rugged topography of the seabed, often results in large depths at a short distance from their coasts, which favours the occurrence of large pelagic species (large invertebrate species, fish or cetaceans, which might integrate the coastal dynamics). These conditions allow the existence of different marine ecosystems with particular habitats, originating complex marine food webs. The different habitats (such as pelagic and benthic) serve as reproduction, shelter, growth, feeding and/or resting areas for numerous species with different ecological and geographical affinities (SRRN, Estratégia Marinha para a subdivisão dos Açores. Diretiva Quadro Estratégia Marinha, 2014).
Marine organisms account for c.a. 23% of the total currently known biodiversity of the Azores (Borges, et al., 2010). It is expected that much of the marine fauna of the Azores, especially in deep waters, is still to be catalogued and studied (SRRN, Estratégia Marinha para a subdivisão dos Açores. Diretiva Quadro Estratégia Marinha, 2014).
Portugal has signed and compromised with several international and European agreements to sustain the degradation of ecosystems and preserve and/or recover the ones that are still in relative good conditions or are representative of the most important natural values, such as the Convention on Biological Diversity, the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES), the RAMSAR Convention on Wetlands, Bonn and Bern Conventions, the OSPAR Convention and Birds and Habitats Directives (Natura 2000 network). Consequently, Portuguese autonomous regions (the Azores and Madeira) also have to abide by those conservation objectives, adding to those defined at the national level. Framed by its political and administrative autonomy, the Azores Government can create regional legislation or adapt national legislation to the Region.

In order to adapt and integrate different, and sometimes dispersed, legislation, the Azores Government has developed a regional PA framework, publishing the most recent legislation (Regional Legislative Decree 15/2012/A, of 2 April) establishing the legal regime for nature conservation and protection of biodiversity of the Autonomous Region of the Azores.
Framed by that context, several coastal and offshore PA have already been created in the Azores maritime space and beyond its EEZ. Despite the aim of integrating and simplifying the regional PA network, the system might be complex as specific classifications (e.g. Birds and Habitats Directives) still have to be addressed independently of the Azores PA network and different classifications are often overlaid. A brief characterization of each of these classification systems, as well as other not legally binding systems for nature conservation (e.g. the Convention on Biological Diversity and the United Nations Educational, Scientific and Cultural Organization), applicable in the Azores is explored in the following sub-sections.

Convention on Biological Diversity

The Convention on Biological Diversity (CBD) was inspired by the world community's growing commitment to sustainable development (SCBD, Convention on Biological Diversity, 2019a). It was finalized in Nairobi in May 1992 and entered into force in December 1993. This Convention is currently the main international instrument for addressing biodiversity issues. It provides a comprehensive and holistic approach to the conservation of biological diversity, the sustainable use of natural resources and the fair and equitable sharing of benefits deriving from the use of genetic resources (SCBD, Cartagena Protocol on Biosafety to the Convention on Biological Diversity: text and annexes, 2000).
In Portugal, the CBD was ratified by Decree 21/93, of 21 July, entering into force on 21 March 1994.
Under the CBD, Ecologically or Biologically Significant Marine Areas (EBSA) might be designated, as these areas in the ocean support the healthy functioning of oceans and the many services that they provide (SCBD, Ecologically or Biologically Significant Marine Areas - Special places in the world's oceans, 2019b). EBSAs identification should follow scientific criteria, based on uniqueness or rarity; special importance for life history stages of species; importance for threatened, endangered or declining species and/or habitats; vulnerability, fragility, sensitivity, or slow recovery; biological productivity; biological diversity and; naturalness (SCBD, Azores scientific criteria and guidance for identifying ecologically or biologically significant marine areas and designing representative networks of marine protected areas in open ocean waters and deep sea habitats, 2009).
Concerning the maritime space surrounding the Azores, it is currently under discussion the areas which might be considered as EBSA. An example is the Great Meteor MPA, which is under consideration to be designated as EBSA (PSOEM, 2018).

Food and Agricultural Organization of the United Nations – Vulnerable Marine Ecosystems

The Food and Agriculture Organization (FAO) is a specialized agency of the United Nations that leads international efforts to defeat hunger. Concerned about the negative effects that deep-sea fishing can have in the sea floor, on both living marine resources and ecosystems, and the effects of overfishing and the resulting vulnerability of target stocks, associated species and habitats, the concept of vulnerable marine ecosystem (VME) emerged during discussions at the United Nations General Assembly, and is currently firmly embedded in regimes for the management of deep-sea fisheries in the areas beyond national jurisdiction (FAO, Vulnerable Marine Ecosystems, 2019a).
VME concern groups of species, communities or habitats that may be vulnerable to impacts from fishing activities, including seamounts, hydrothermal vents, cold water corals and sponge fields, in

the high seas. The identification of VME should consider as main criteria the uniqueness or rarity of the ecosystem, its fragility, its structural complexity, the functional significance of the habitat and the life-history traits of component species that make recovery difficult. Once a VME has been designated and potential significant adverse impacts are assessed, the FAO International Guidelines for the Management of Deep-sea Fisheries in the High Seas (FAO DSF Guidelines) recommend specific conservation and management measures (FAO, Vulnerable Marine Ecosystems, 2019a).
VME database (FAO, Vulnerable Marine Ecosystems Database - A global inventory of fisheries measures to protect vulnerable marine ecosystems in areas beyond national jurisdiction, 2019b), identifies VME closed areas (areas within which bottom fishing activities, including exploratory bottom fisheries, are prohibited), other access regulated areas and bottom fishing areas. Within the Portuguese Extended Continental Shelf proposal, close to the Azores subarea of the Portuguese EEZ, three MPA include VME closed areas, the Mid-Atlantic Ridge North of the Azores - MARNA, the Altair and the Antialtair seamounts, until 31 December 2022 and managed by the North-East Atlantic Fisheries Commission (NEAFC).

United Nations Educational, Scientific and Cultural Organization – Biosphere Reserves

The United Nations Educational, Scientific and Cultural Organization (UNESCO) seeks to build peace through international cooperation in Education, the Sciences and Culture. Its programmes contribute to the achievement of the Sustainable Development Goals defined in Agenda 2030. Under the UNESCO's Man and the Biosphere Programme, The World Network of Biosphere Reserves consists of a dynamic and interactive network of sites of excellence, fostering the harmonious integration of people and nature for sustainable development through participatory dialogue, knowledge sharing, poverty reduction and human well-being improvements, respect for cultural values and society's ability to cope with change. This Network is one of the main international tools to develop and implement sustainable development approaches in a wide array of contexts (UNESCO, Biosphere Reserves, 2017).
Biosphere reserves are areas comprising terrestrial, marine and coastal ecosystems, promoting solutions to reconcile the conservation of biodiversity with its sustainable use and ensure environmental, economic and social (including cultural and spiritual) sustainability (UNESCO, Biosphere Reserves, 2017).
In the Azores, four Biosphere Reserves were designated, each comprising the whole island and a surrounding marine area: Corvo, Flores, Graciosa and São Jorge Islands. The reserves are composed by different zoning areas, according to UNESCO zoning schemes: (i) core areas (securely protected sites for conserving biological diversity, monitoring minimally disturbed ecosystems, and undertaking non-destructive research and other low-impact uses), (ii) buffer zones (usually surrounding or adjoining the core areas and used for cooperative activities compatible with sound ecological practices, including environmental education, recreation, ecotourism, and applied and basic research) and/or (iii) transition areas (with a central function in sustainable development which may contain a variety of agricultural activities, settlements and other uses for the sustainable management and development of the area's resources).

Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES)

The Convention on International Trade in Endangered Species of Wild Fauna and Flora (also known as CITES or Washington Convention) is an international agreement between governments, aiming at ensuring that international trade of specimens of wild animals and plants does not threaten their survival (CITES, 2019).

This Convention was approved in Portugal and ratified through the Decree 50/80 of 23 June and the measures necessary for its compliance and application in national territory were published through the Decree-Law 211/2009, of 3 September. In the Azores, the Regional Legislative Decree 15/2012/A, of 2 April, established the necessary measures for compliance and application of the CITES Convention in regional territory.

RAMSAR Convention on Wetlands

The RAMSAR Convention, the Convention on Wetlands, adopted in 1971 and coming into force in 1975, is an intergovernmental treaty providing the framework for the conservation and wise use of all wetlands and their resources, through local and national actions and international cooperation, as a contribution towards achieving sustainable development throughout the world. Wetlands, within the Convention, include all lakes and rivers, underground aquifers, swamps and marshes, wet grasslands, peatlands, oases, estuaries, deltas and tidal flats, mangroves and other coastal areas, coral reefs, and all human-made sites such as fish ponds, rice paddies, reservoirs and salt pans (RAMSAR, RAMSAR, 2014a).
Since 1981, when the Convention entered into force in Portugal, 31 sites have been designated in Portugal as Wetlands of International Importance (Ramsar Sites), amongst which 13 are located in the Azores and two are coastal or offshore areas: *Fajãs da Caldeira de Santo Cristo e Cubres* (São Jorge island) and *Ilhéus das Formigas e Recife Dollabarat* (RAMSAR, Ramsar Sites Information Service, 2014b).

Bonn Convention

The need for international cooperation aiming the protection of migratory species whose migrations cross more than one border or area of national jurisdiction resulted in the Convention on the Conservation of Migratory Species of Wild Animals, known as the Bonn Convention. The Convention lays the legal foundation for internationally coordinated conservation measures throughout a migratory range, acting as a framework Convention. As the only global convention specializing in the conservation of migratory species, their habitats and migration routes, the Bonn Convention complements and co-operates with a number of other international organizations, Non-Governmental Organisations (NGO) and partners in the media as well as in the corporate sector (UNEP/CMS Secretariat, 2018). The Convention integrates two appendices listing migratory species to which the Convention applies (I – Endangered migratory species and; II – Migratory species conserved through Agreements).
Portugal signed as Party and ratified the Convention through the Decree 103/80, of 11 October (subsequent alterations to annexes I and II were approved by Decree 34/2002, of 5 November).

Bern Convention

The Bern Convention, Convention on the Conservation of European Wildlife and Natural Habitats, is a binding international legal instrument in the field of nature conservation, covering most of the natural heritage of the European continent and extending to some States of Africa. The main objective is to conserve wild flora and fauna and their natural habitats, as well as to promote European co-operation in this field, taking also into account the impact that other policies may have on natural heritage and recognising the intrinsic value of wild flora and fauna, which needs to be preserved and passed to future generations (Council of Europe, 2018). It includes four annexes: I – species of flora strictly protected; II – species of fauna strictly protected; III – species of fauna protected and; IV – prohibited means and methods of capture.

In Portugal, the Convention was ratified through Decree-Law 95/81, of 23 July and its enforcement was regulated by Decree-Law 316/89, of 22 September (modified by Decree-Law 196/90, of 18 June).

OSPAR Convention

The Convention for the Protection of the Marine Environment of the North-East Atlantic (OSPAR Convention) is in force since 1998 and has 16 Contracting Parties, amongst which Portugal is included. The Convention has worked, since 1972, to identify threats to the marine environment and has organised, across its maritime area, programmes and measures to ensure effective national action to combat them. It contains a series of Annexes dealing with specific areas contributing to the preservation of marine ecosystems: prevention and elimination of pollution from land-based sources and by dumping or incineration; or from offshore sources; assessment of the quality of the marine environment and; protection and conservation of the ecosystems and biological diversity of the maritime area (OSPAR, OSPAR Commission Protecting and conserving the North-East Atlantic and its resources, 2019a).
Under the OSPAR Convention, the North-East Atlantic is divided into five regions: (I) Arctic Waters, (II) Greater North Sea, (III) Celtic Seas, (IV) Bay of Biscay and Iberian Coast and (V) Wider Atlantic. The Azores archipelago, which comprises the only human population in the region, is included in the Wider Atlantic Region, which represents the deep waters of the North-East Atlantic extending across the abyssal plain and the Mid-Atlantic Ridge, and including many seamounts. There have been recent discoveries of a number of different fragile deep-sea habitats (such as hydrothermal vents, carbonate mounds, coral gardens and sponge communities) (OSPAR, OSPAR Commission Protecting and conserving the North-East Atlantic and its resources - Region V: Wider Atlantic, 2019b).
Several MPA have been created under the OSPAR Convention for the Wider Atlantic Region and are located inside the Azores subarea of the Portuguese EEZ and outside the EEZ but included in the Portuguese proposal for the Extended Continental Shelf. There are four designated MPA in the geographical area of the Extended Continental Shelf (Rainbow, Mid-Atlantic Ridge North of the Azores - MARNA, Altair and Antialtair), three in the EEZ (D. João de Castro Seamount, Lucky Strike Hydrothermal Vent Field, Menez Gwen Hydrothermal Vent Field) and two sites are in territorial waters (Faial-Pico channel and Corvo Island). These MPA are included in the Marine Park of the Azores and are also presented in the Situation Plan (Characterization report of the Extended Continental Shelf) of the Portuguese National MSP (PSOEM, 2018).

Natura 2000 Network (Birds and Habitats Directives)

Natura 2000 is an ecological network of PA, including core breeding and resting sites for rare and threatened species, and some rare natural habitat types, across all the 28 EU countries, both on land and at sea. The aim of this network is to ensure the long-term survival of Europe's most valuable and threatened species and habitats, listed under both the Birds Directive (Directive 79/409/EEC, amended by Directive 2009/147/EC, to protect all of the 500 wild bird species naturally occurring in the European Union) and the Habitats Directive (Directive 92/43/EEC, to protect a wide range of rare, threatened or endemic animal and plant species and rare and characteristic habitat types).
Accordingly, individual sites can be designated either under the Birds Directive, under the Habitats Directive or under both directives (geographically overlapped). Under the Birds Directive, Member States can propose the designation of Special Protection Areas (SPA) for the 194 particularly threatened species and all migratory bird species listed in the Directive. Under the Habitats Directive, Member States can propose the designation of Special Areas of Conservation (SAC) or Sites of Community Importance (SCI) to ensure the favourable conservation status of each habitat

type and species throughout their range in the EU (EEA, Natura 2000 Network Viewer - Sobre, 2018; European Commission, 2019a).
The Habitats and Birds Directives, along with the MSFD, are the environmental pillars of the wider Integrated Maritime Policy (European Commission, 2019b). The marine Natura 2000 network has played a key role in improving MPA coverage in the EU's seas (EEA, Marine protected areas in Europe's seas - An overview and perspectives for the future - EEA Report No 3/2015, 2015). The Birds Directive lists a further 60 bird species whose conservation requires marine site protection whilst the Habitats Directive lists nine marine habitat types and 16 species for which marine site designation is required (European Commission, 2019b).
Portugal transposed both Directives by the Decree-Law 140/99, of 24 April, amended and republished by the Decree-Law 49/2005, of 24 February. The Azores archipelago is included in the Macaronesia biogeographic region and has its own legal regime for nature conservation and protection of biodiversity of the Region, the Regional Legislative Decree 15/2012/A, of 2 April, which transposed the Directives to the Regional legal framework.
In the Azores, amongst the areas designated under Birds and Habitats Directives, some are exclusively terrestrial, others have both a terrestrial and a marine component, and others are exclusively located in the maritime space (e.g. Menez Gwen, Lucky Strike and Baixa do Sul (Faial-Pico Channel)). As the MSP process also takes into consideration land-sea interactions, it is also relevant to consider the exclusively terrestrial areas, which boundaries coincide, in part, with the coastline.

Marine Strategy Framework Directive

The aim of the Marine Strategy Framework Directive (Directive 2008/56/EC) is to protect more effectively the marine environment across Europe. It is the first EU legislative instrument related to the protection of marine biodiversity, aiming at achieving the Good Environmental Status (GES) of the EU's marine waters by 2020 and to protect the resource base upon which marine-related economic and social activities depend. To achieve that goal, the Directive establishes European marine regions and sub-regions on the basis of geographical and environmental criteria.
In the context of the Directive, each Member State is required to develop a strategy for its marine waters (or Marine Strategy), including an initial assessment of the conservation status of their waters, definition of targets to be achieved and implementation of monitoring programmes and measures to ensure that the GES will be achieved or maintained, according to the risks and impacts of human activities. These programmes aim to collect scientific information and knowledge as well as to follow up the trends of the environmental status of the 11 descriptors of the MSDF; the latter focus on the issues of biodiversity of coastal and oceanic communities, marine bio-invasions or biology and assessment of fishing resources. In addition, because the Directive follows an adaptive management approach, the Marine Strategies must be kept up-to-date and reviewed every six years.
In the Azores, the implementation of the MSFD is coordinated by the Regional Directorate for Sea Affairs (DRAM) in collaboration with the other competent authorities at regional level and in partnership with the University of the Azores, regional research centres as well as with regional non-governmental organisations.

Network of Protected Areas of the Azores

The Azores network of PA is published in the Regional Legislative Decree 15/2012/A, of 2 April, (i) establishing the legal regime for nature and biodiversity conservation, (ii) contributing to protect biodiversity through the conservation or restoration of natural habitats and of wild flora and fauna and the regulation of its exploitation, (iii) contributing to regulate growing or breeding in captivity

and the introduction of species of flora and fauna that do not occur naturally in the Azores and defining suitable measures for control and eradication of invasive or threatening alien species, (iv) transposing into the regional legal framework the Birds and Habitats Directives and (v) establishing measures for accomplishing and applying in the regional territory other international and European treaties.
The current legal regime for nature and biodiversity conservation established a regional network of PA, standardizing the previous heterogeneous classification and management regime into a new, more homogeneous management system, based on the International Union for Conservation of Nature (IUCN) categories (Calado, Lopes, Porteiro, Paramio, & Monteiro, 2009). The category assigned to each area depends on its management goals and generally represents its level of naturalness (Dudley, 2008).

Island Natural Park

The Azores network of PA is composed of three different management units: (a) Island Natural Park (INP), (b) Azores Marine Park and (c) PA of local significance.
The INP is defined at the island scale including inland, coastal and marine areas (within the limits of the territorial sea) and resulting in nine INP in the Azores, one per island. Based on the IUCN classification system, which classifies one area based on its identified conservation objectives (Dudley, 2008), the INP can include nature reserves, natural monuments, PA for habitat/species management, protected landscapes, and/or PA for resource management.
Each IUCN category can be identified in terrestrial, strict marine and/or coastal areas. In the Azores, 124 areas are identified and integrated in the INP, amongst which 35 are areas with marine component (total or in part) and 55 are exclusively terrestrial areas which boundaries coincide, in part, with the coastline. The small size of the Azores islands results in a significant importance of PA, with a large number of areas located in the maritime space or in terrestrial areas with relevance for land-sea interaction analysis in the context of MSP.

Table 55. Description and objectives of the Azorean protected areas network (adapted from Regional Legislative Decree 15/2012/A).

Category	Description	Objectives
Nature reserve	Natural and semi-natural habitats, as well as threatened species of fauna and flora, with high scientific interest. Ecosystems with no permanent or significant human occupation, unchanged or slightly altered by human intervention, or where human intervention causes no impacts or impacts likely to be corrected	To preserve natural and semi-natural habitats and species of fauna and flora, to maintain the natural or semi-natural condition of the area, to restore or correct its ecological balance, to develop scientific research and environmental monitoring
Natural monument	One or more natural or cultural feature with unique value, due to the rarity of their characteristics in terms of geology, palaeontology, aesthetics and culture	Conservation and maintenance of natural features' integrity
Protected area for habitat/species management	Areas particularly important for specific natural or semi-natural habitats or species of fauna and flora	Adoption of measures aimed at the recovery of natural or semi-natural habitats and species of fauna and flora
Protected landscape	Areas where the interaction between man and nature produced an area of distinct character, with aesthetic, ecological and cultural values	Adoption of measures for landscape preservation, through the maintenance and valorisation of natural or semi-natural scenic values and the maintenance and promotion of economic activities compatible with the existing values

Protected area for resource management	Areas containing natural or semi-natural habitats and species of fauna and flora with favourable conservation status	Preservation of natural or semi-natural habitats and species of fauna and flora and adoption of management measures for sustainable use of resources compatible with the maintenance of their ecological quality

Table 56. Total number of protected areas and number of marine and/or coastal protected areas within each Island Natural Park in the Azores (T: total; M: marine; C: terrestrial, delimited at the coastline; islets are included as terrestrial areas).

INP/IUCN Category	Nature reserve			Natural monument			PA for habitat/species management			Protected landscape			PA for resource management		
	T	M	C	T	M	C	T	M	C	T	M	C	T	M	C	T	M	C
Corvo	2	1	1	-	-	-	-	-	-	1	-	1	-	-	-	1	1	-
Flores	9	1	5	3	-	1	1	-	-	3	-	3	1		1	1	1	-
Faial	14	5	5	3	1	1	-	-	1	4	-	2	2	-	1	4	4	-
Pico	22	3	13	4	-	1	1	-	-	8	-	7	6	-	5	3	3	-
São Jorge	13	4	8	-	-	-	1	-	1	7	-	6	1	-	1	4	4	-
Graciosa	8	4	3	2	2	-	1	-	-	3	-	3	-	-	-	2	2	-
Terceira	20	6	5	3	-	-	2	-	-	7	-	4	1	-	1	7	6	-
São Miguel	23	6	8	2	-	-	3	-	1	11	1	7	2	-	-	5	5	-
Santa Maria	13	5	7	2	2	-	1	-	1	4	-	3	3	-	3	3	3	-
Total	124	35	55	19	5	3	10	-	4	48	1	36	16	-	12	30	29	-

Azores Marine Park

The Azores Marine Park consists of the marine areas under management of the Autonomous Region of the Azores located beyond the limits of the territorial sea, integrating a single management unit. Its involves the adoption of measures focused on the protection of hydrothermal vents, seamounts and other underwater structures, as well as resources, communities and sensitive marine habitats; and the management of hydrothermal vents, seamounts and other classified (or to be classified) underwater structures and surrounding regions. The Azores Marine Park is structured by the Regional Legislative Decree 28/2011/A, of 11 November, amended by the Regional Legislative Decree 13/2016/A, of 19 July, which added four more MPA. Also based on the IUCN categories (Calado, Lopes, Porteiro, Paramio, & Monteiro, 2009), it can include marine nature reserves, marine PA for habitat/species management and marine PA for resources management within the 200 nautical miles and other MPA beyond the 200 nautical miles. The marine areas located in the territorial sea are not included in the Azores Marine Park, rather included in the corresponding INP.

Currently, five marine nature reserves (one of them beyond 200 mn), six MPA for habitat/species management (three of them beyond 200 mn), and four MPA for resources management (two of them are partially beyond 200 mn) are created in the Azores Marine Park.

Table 57. Description and objectives of the Azores Marine Park categories (adapted from Regional Legislative Decree 28/2011/A, of 11 November, amended by the Regional Legislative Decree 13/2016/A, of 19 July).

Category	Equivalence to IUCN category	Objectives
Marine nature reserve	I	Preserve habitats, ecosystems and species in favourable status Maintain ecological processes Protect structural features of marine landscape and its geological elements Preserve examples of natural marine environment for scientific study, monitoring and environmental education Conserve the reference natural conditions for scientific studies and on-going projects Define limits and constraints to free public access
Marine protected area for habitat/species management	IV	Ensure habitats reference conditions necessary for the protection of significant species, sets of species, biotic communities or physical conditions of the marine environment, when human intervention is needed to optimize its management Rule uses and activities that can threaten habitats or species sustainability Enhance socio-economic benefits resulting from the MPA when compatible with its management objectives Promote scientific research and environmental monitoring as fundamental activities for sustainable management Create and delimitate marine areas for knowledge and dissemination of habitats features
Marine protected area for resources management	VI	Promote the effective management aiming the sustainable use of resources, namely fisheries and other extractive activities focusing on biodiversity or other environmental conditions Protect and maintain at the long term the biodiversity and other natural values Contribute to the sustainable socio-economic development

Protected areas of local significance

Currently, in the Azores, there are no areas classified as protected areas of local significance.

Table 58. Overlapping of marine protected areas and terrestrial protected areas relevant for land-sea interactions in the Azores (note: different overlapping classifications might have different geographic boundaries; EBSA: ecologically or biologically significant marine areas; VME: vulnerable marine ecosystems; SAC: special areas of conservation; SPA: special protection areas; SCI: sites of community importance).

PA/MPA	Azores EEZ	Classification							
		CBD	FAO	UNESCO	RAMSAR	OSPAR	Natura 2000	Azores INP	Azores Marine Park
Rainbow hydrothermal vent (strict marine)	Outside					Designated			**Marine nature reserve** PMA04
MARNA (strict marine)	Outside		VME closed area			Designated			**MPA for habitat/species management** PMA10
Altair seamount (strict marine)	Outside		VME closed area			Designated			**MPA for habitat/species management** PMA08
Antialtair seamount (strict marine)	Outside		VME closed area			Designated			**MPA for habitat/species management** PMA09
Great Meteor (strict marine)	Inside and outside	EBSA				To be designated			**MPA for resources management** PMA12
D. João de Castro seamount (strict marine)	Inside					Designated	**SAC:** PTMIG0021 1 habitat (annex I of the Directive); 2 species (annex II of the Directive)		**Marine nature reserve** PMA01 **MPA for resources management** PMA11
Menez Gwen hydrothermal vent field (strict marine)	Inside					Designated	**SCI:** PTMAZ0001 1 habitat (annex I of the Directive)		**Marine nature reserve** PMA02
Lucky Strike hydrothermal vent (strict marine)	Inside					Designated	**SCI:** PTMAZ0002 1 habitat (annex I of the Directive)		**Marine nature reserve** PMA03
Sedlo seamount (strict marine)	Inside					Designated			**Marine nature reserve** PMA05
Princesa Alice Bank (strict marine)	Inside								**MPA for habitat/species management** PMA15
Condor Bank (strict marine)	Inside*								**MPA for resources management** PMA14

PA/MPA	Azores EEZ	Classification				OSPAR	Natura 2000	Azores INP	Azores Marine Park
		CBD	FAO	UNESCO	RAMSAR				
Hydrothermal fields at the Southwest of the Azores (strict marine)	Inside and outside								**MPA for resources management** PMA13
Oceanic Marine Protected Area of Corvo (strict marine)	Inside								**MPA for habitat/species management** PMA06
Corvo Island (marine and/or coastal)	Inside*			Biosphere reserve		Designated (strict marine)	**Costa e Caldeirão SAC:** PTCOR0001 14 habitats (annex I of the Directive); 18 species (annex II of the Directive) **Costa e Caldeirão SPA:** PTZPE0020 4 species	**PA for resource management** COR02 (strict marine)	
								PA for habitat/species management COR01	
Flores Island (marine and/or coastal)	Inside*			Biosphere reserve			**Costa Sul e Sudoeste das Flores SPA:** PTZPE0021 5 species	**PA for habitat/species management** FLO07	
							Costa Nordeste das Flores SPA: PTZPE0022 5 species **SAC:** PTFLO0003 10 habitats (annex I of the Directive); 9 species (annex II of the Directive)	**PA for habitat/species management** FLO05 **PA for resource management** FLO09 (strict marine)	
								PA for habitat/species management FLO06 **Protected landscape** FLO08	
Oceanic Marine Protected Area of Faial (strict marine)	Inside								**MPA for habitat/species management** PMA07

PA/MPA	Azores EEZ	Classification							
		CBD	FAO	UNESCO	RAMSAR	OSPAR	Natura 2000	Azores INP	Azores Marine Park
Faial Island (marine and/or coastal)	Inside*						**Caldeira do Faial e Capelinhos** **SPA:** PTZPE0023 6 species **SAC:** PTFAI0004 20 habitats (annex I of the Directive); 18 species (annex II of the Directive)	**Natural monument** FAI03-A **PA for habitat/species management** FAI05 **PA for resource management** FAI12 (strict marine)	
							Ponta do Varadouro **SAC:** PTFAI0006 6 habitats (annex I of the Directive); 3 species (annex II of the Directive)	**PA for habitat/species management** FAI05	
							Morro de Castelo Branco **SAC:** PTFAI0007 7 habitats (annex I of the Directive); 7 species (annex II of the Directive)	**Nature reserve** FAI03 **PA for habitat/species management** FAI06 **PA for resource management** FAI11 (strict marine)	
								PA for resource management FAI13 (strict marine)	
						Designated (strict marine)	**SAC:** PTFAI0005 9 habitats (annex I of the Directive); 6 species (annex II of the Directive)	**Nature reserve** FAI01 **Protected landscape** FAI08 **PA for resource management** FAI10 (strict marine)	
Faial-Pico channel (marine and/or coastal)	Inside*						**Baixa do Sul — Canal do Faial** **SAC:** PTPIC0008 (strict marine) 1 habitat (annex I of the Directive); 2 species (annex II of the Directive)		
							Ilhéus da Madalena **SAC:** PTPIC0012 6 habitats (annex I of the Directive); 4 species (annex II of the Directive)	**PA for resource management** PICO22 (strict marine)	
Pico Island	Inside*						**Costa das Lajes do Pico**	**PA for habitat/species management**	

PA/MPA	Azores EEZ	Classification				OSPAR	Natura 2000	Azores INP	Azores Marine Park
		CBD	FAO	UNESCO	RAMSAR				
(marine and/or coastal)							**SPA:** PTZPE0024 5 species **SAC:** PTPIC0011 8 habitats (annex I of the Directive); 5 species (annex II of the Directive)	PIC007 **PA for resource management** PIC020 (strict marine)	
							Ponta da Ilha SPA: PTZPE0025 4 species **SAC:** PTPIC0010 7 habitats (annex I of the Directive); 7 species (annex II of the Directive)	**Protected landscape** PIC014 **PA for resource management** SJO21 (strict marine)	
							Furnas de Santo António e Costa Adjacente **SPA:** PPTZPE0026 3 species	**Nature reserve** PIC004 **PA for habitat/species management** PIC008	
								PA for habitat/species management PIC009 PIC010 PIC011 PIC012 PIC013 **Protected landscape** PIC015 PIC016 PIC017 PIC018	
São Jorge Island (marine and/or coastal)	Inside*			Biosphere reserve			**Ponta dos Rosais SAC:** PTJOR0013 7 habitats (annex I of the Directive); 5 species (annex II of the Directive)	**Natural monument** SJO01 **PA for resource management** SJO10 (strict marine)	
							Ilhéu do Topo e Costa Adjacente **SPA:** PTZPE0028 7 species **Costa Nordeste e Ponta do Topo** **SAC:** PTJOR0014 21 habitats (annex I of the Directive);	**PA for habitat/species management** SJO07 SJO08 (strict marine) **PA for resource management** SJO13 (strict marine)	
					'Fajãs' of Caldeira and Cubres Lagoons			**Protected landscape** SJO09 **PA for resource management**	

PA/MPA	Azores EEZ	Classification				OSPAR	Natura 2000	Azores INP	Azores Marine Park
		CBD	FAO	UNESCO	RAMSAR				
							20 species (annex II of the Directive)	SJO12 (strict marine)	
								PA for habitat/species management SJO02 SJO03 SJO04 SJO06 **PA for resource management** SJO11	
Graciosa Island (marine and/or coastal)	Inside*			Biosphere reserve			**Ilhéu de Baixo e Ponta da Restinga** **SPA:** PTZPE0029 8 species **SAC:** PTGRA0015 6 habitats (annex I of the Directive); 6 species (annex II of the Directive)	**Nature reserve** GRA01 (strict marine) **PA for habitat/species management** GRA04 **PA for resource management** GRA07 (strict marine)	
							Ilhéu da Praia SPA: PTZPE0030 (strict marine) 9 species	**Nature reserve** GRA02 (strict marine)	
							Ponta Branca SAC: PTGRA0016 3 habitats (annex I of the Directive); 2 species (annex II of the Directive)	**PA for habitat/species management** GRA05	
								PA for habitat/species management GRA06 **PA for resource management** GRA08 (strict marine)	
Terceira Island (marine and/or coastal)	Inside*						**Ponta das Contendas** **SPA:** PTZPE0031 3 species	**PA for habitat/species management** TER06 **PA for resource management** TER16 (strict marine)	
							Ilhéu das Cabras SPA: PTZPE0032 (strict marine) 3 species	**PA for habitat/species management** TER07 (strict marine) **PA for resource management** TER17 (strict marine)	
							Serra de Santa Bárbara e Pico Alto **SAC:** PTTER0017 19 habitats (annex I of the Directive);	**PA for habitat/species management** TER11	

PA/MPA	Azores EEZ	Classification							
		CBD	FAO	UNESCO	RAMSAR	OSPAR	Natura 2000	Azores INP	Azores Marine Park
							20 species (annex II of the Directive)		
							Costa das Quatro Ribeiras **SAC:** PTTER0018 7 habitats (annex I of the Directive); 7 species (annex II of the Directive)	**PA for habitat/species management** TER10 **PA for resource management** TER15 (strict marine)	
								Protected landscape TER13 **PA for resource management** TER18 (strict marine) TER19 (strict marine) TER20 (strict marine)	
São Miguel Island (marine and/or coastal)	Inside*						**Caloura e Ponta da Galera** **SAC:** PTMIG0020 7 habitats (annex I of the Directive); 4 species (annex II of the Directive)	**PA for resource management** SMG19 (strict marine)	
								Natural monument SMG05 **PA for habitat/species management** SMG06 (strict marine) SMG09 SMG10 SMG11 SMG12 SMG13 SMG14 SMG15 **PA for resource management** SMG20 (strict marine) SMG21 (strict marine) SMG22 (strict marine) SMG23 (strict marine)	
Formigas bank and Dollabarat recife (strict marine)	Inside*				Formigas islets and Dollabarat Recife	Designated	**SAC:** PTSMA0023 1 habitat (annex I of the Directive); 2 species (annex II of the Directive)	**Nature reserve** SMA01	
Santa Maria Island	Inside*						**Ilhéu da Vila e Costa Adjacente** **SPA:** PTZPE0034	**Nature reserve** SMA02 (strict marine)	

PA/MPA	Azores EEZ	Classification				OSPAR	Natura 2000	Azores INP	Azores Marine Park
		CBD	FAO	UNESCO	RAMSAR				
(marine and/or coastal)							6 species	**PA for habitat/species management** SMA04	
							Ponta do Castelo SAC: PTSMA0022 5 habitats (annex I of the Directive); 7 species (annex II of the Directive)	**PA for habitat/species management** SMA05 **PA for resource management** SMA13 (strict marine)	
								Natural monument SMA03 **PA for habitat/species management** SMA06 **Protected landscape** SMA08 SMA09 SMA10 **PA for resource management** SMA11 (strict marine) SMA12 (strict marine)	

Azores Geopark and geosites

The Geoparks initiative was launched by UNESCO in response to the perceived need for an international initiative that recognises sites representing an earth science interest (European Environmental Agency, 2019). A Geopark is defined (Geopark Azores, s.d.) as an area with well-defined territorial expression and boundaries, where an exceptional geological heritage exists and is the basis for a strategy promoting well-being of populations while maintaining the respect for the environment. The Global Geoparks Network includes geoparks formally established that might integrate, simultaneously, regional networks such as the European Geoparks Network and the Asia-Pacific Geoparks Network. The Global Geoparks Network, established in 2004, includes, currently, 87 Geoparks across 27 countries worldwide.

The Azores archipelago has a rich and vast geodiversity, and an important geological heritage composed by several sites of scientific, educational and touristic interests. Based on that richness, besides from the Azores Geopark were identified 121 geosites, which correspond to geological occurrences of scientific, didactic, cultural and/or aesthetical value that are not yet classified under any legal framework, dispersed by the nine islands and the surrounding seafloor. There comprise a network that i) ensures the representativeness of the geodiversity that characterizes the Azorean territory, ii) reflects its geological and eruptive histories, iii) relies on common conservation and promotion strategies , and iv) is based on a decentralized management structure with support in all the islands (Geopark Azores, s.d.).

Table 59. Azores geosites located in the marine space or in terrestrial areas bordering the sea (based on (Geopark Azores, s.d.).

Corvo	Flores	Faial	Pico	São Jorge
COR 2 **Fajã lávica de Vila do Corvo** **COR 3** **Ponta do Marco** **COR 4** **Coroínha e arriba de Pingas**	**FLO 3** Fajã Grande e Fajãzinha **FLO 5** Ponta da Rocha Alta e Fajã de Lopo Vaz **FLO 7** Costa Nordeste **FLO 8** Filão dos Frades **FLO 9** Litoral de Santa Cruz **FLO 10** Ponta do Albernaz - Ponta Delgada **FLO 11** Vale da Ribeira da Cruz e Pta da Caveira **FLO 12** Vale das Ribeiras da Badanela e Além da Fazenda **FLO 13** Vale e fajã lávica das Lajes **FLO 14** Ilhéu de Monchique	**FAI 3** Monte da Guia e Porto Pim **FAI 4** Morro do Castelo Branco **FAI 6** Vulcão dos Capelinhos e Costado da Nau **FAI 7** Arriba fóssil da Praia do Norte **FAI 8** Arriba fóssil do Varadouro **FAI 9** Ponta Furada	**PIC 1** Arriba fóssil Santo António - São Roque **PIC 2** Fajã lávica das Lajes do Pico **PIC 4** Ilhéus da Madalena **PIC 5** Lajido de Santa Luzia **PIC 8** Ponta da Ilha **PIC 10** Fajã lávica de São Mateus **PIC 11** Fajã lávica das Ribeiras **PIC 15** Lajido da Criação Velha **PIC 17** Ponta do Mistério **PIC 18** Cabeço Debaixo da Rocha	**SJO 1** Arriba da Fajã dos Vimes - Fajã de São João **SJO 3** Fajãs do Ouvidor e da Ribeira da Areia **SJO 4** Fajãs dos Cubres e da Caldeira do Sto Cristo **SJO 5** Morro de Velas e Morro de Lemos **SJO 6** Ponta dos Rosais **SJO 7** Mistério da Urzelina **SJO 8** Ponta e ilhéu do Topo
3	10	6	10	7

Graciosa	Terceira	São Miguel	Santa Maria	Exclusively marine
GRA 3 **Ponta da Barca e Ilhéu da Baleia** **GRA 4** **Porto Afonso e Redondo** **GRA 5** **Pontas do Carapacho e da Restinga e Ilhéu de Baixo** **GRA 6** **Arribas da Serra Branca e Baía do Filipe** **GRA 7** **Baía da Vitória** **GRA 8** **Erupção do Pico Timão** **GRA 9** **Santa Cruz da Graciosa**	**TER 5** Monte Brasil **TER 7** Ponta da Serreta e escoadas traquíticas **TER 8** Fajã da Alagoa - Biscoito das Calmeiras **TER 9** Graben das Lajes **TER 10** Ilhéus das Cabras **TER 13** Biscoitos - Matias Simão	**SMG 6** Ilhéu de Vila Franca **SMG 8** Ponta da Ferraria e Pico das Camarinhas **SMG 10** Vale da Ribeira do Faial da Terra e Fajã do Calhau **SMG 13** Fajã lávica e arriba fóssil da Caloura **SMG 14** Fajã lávica e ilhéus dos Mosteiros **SMG 15** Morro das Capelas **SMG 16** Morro de Sta Bárbara, praias e Bandejo **SMG 18** Pisão - Praia (Água d'Alto) **SMG 19** Ponta do Cintrão - Ladeira da Velha **SMG 20** Praias do Pópulo, Milicias e São Roque e Ilhéu de São Roque **SMG 21** Rocha da Relva **SMG 22** Salto da Farinha **SMG 24** Vale da Ribeira Quente **SMG 26** Fontanário da Ribeira Seca	**SMA 1** Barreiro da Faneca **SMA 2** Pedreira do Campo **SMA 3** Poço da Pedreira **SMA 4** Ponta do Castelo **SMA 5** Ribeira do Maloás **SMA 6** Baía da Cré **SMA 7** Baía de São Lourenço **SMA 8** Baía do Raposo **SMA 9** Baía do Tagarete e Ponta do Norte **SMA 10** Baía dos Cabrestantes **SMA 11** Barreiro da Malbusca **SMA 12** Cascata do Aveiro **SMA 13** Figueiral **SMA 14** Porto de Vila do Porto **SMA 15** Praia Formosa e Prainha	**Marine 1** Banco D. João de Castro **Marine 2** Dorsal Atlântica e Campos hidrotermais **Marine 3** Canal Faial-Pico **Marine 4** Ilhéus das Formigas e Recife Dollabarat
7	6	14	15	4

Other conservation measures with spatial expression

The concept of **BirdLife's Important Bird and Biodiversity Area** (IBA) has been applied for several decades and is currently defined both in terrestrial and marine environments. IBA are (i) places of international significance for the conservation of birds and other biodiversity, (ii) recognised world-wide as practical tools for conservation, (iii) distinct areas amenable to practical conservation action, (iv) identified using robust, standardised criteria, (v) sites that together form part of a wider integrated approach to the conservation and sustainable use of the natural environment (BirdLife International, 2019a). In Portugal, the BirdLife Partner is Portuguese Society for the Study of Birds (SPEA). In the Azores 41 IBA have been identified, amongst which 38 are marine areas or terrestrial areas bordering the maritime space (BirdLife International, 2019b).

In Portugal, the integrated management of coastal zones aims at promoting development models that favour (i) the protection and improvement of their social and cultural resource value of the ecosystems and natural re-sources; (ii) the coastal environments (natural, urban, rural, forested,

seaside), and (iii) the quality of life of their population. The **plans for the management of coastal zones** (POOC) are sector-based plans defining the conditions, endowments and main uses, the location of their supporting infrastructures and guiding specific activities on coast, intending to safeguard fundamental ecosystems, ecologically sensitive areas and the existing resources. The intervention area is defined between 30m bathymetry and a land protection zone with a maximum width not exceeding 500 m from the seashore limit line (Veloso-Gomes & Taveira-Pinto, 2003). In the Azores, the elaboration of POOC is defined in the Regional Legislative Decree 35/2012/A, of 16 August. There are 10 POOC approved, which include several specific conservation areas: areas of nature conservation and protection (Corvo, Flores, Graciosa and Santa Maria islands), areas of special environmental interest (São Miguel South Coast and São Jorge and Terceira islands), marine environment protection areas (São Miguel North Coast), or areas of special natural, cultural and landscape interest (Faial and Pico islands).

The **Ecological Reserve** (Decree-Law 166/2008, of 22 August, amended and republished by the Decree-Law 239/2012, of 02 November and the Decree-Law 124/2019, of 8 August) was created in 1983, aiming at protecting essential areas to ensure the ecological stability of the environment, the rational use of natural resources and the correct spatial planning of the territory. The areas included in the Ecological Reserve are identified and delimited at the municipal scale and are approved in each municipal master plan. These areas should include the marine space up to 30m deep.

The Azores archipelago has a vast and diverse speleological heritage, due to its volcanic origin, with c.a. 270 natural terrestrial or submarine underground cavities. These structures constitute unique habitats, with a valuable geological and biological heritage, including a unique concentration of troglobite endemic species and several relevant geological structures. Recognizing the importance of that natural heritage and the threats to which some are subject, the Azores Government published the Regional Legislative Decree 10/2019/A, of 22 May, approving the regime of protection and classification of the **volcanic cavities of the Autonomous Region of the Azores**. The approved classifying regime defined four categories of volcanic caves (A, B, C and D), according to the degree of knowledge and their geological, biological, aesthetic and integrity importance. Class A is the category that includes caves of high conservation interest, characterized by the presence of unique geological and biological heritage features, namely the occurrence of endemic or troglobic species or very rare geological formations, as well as their large size or high integrity, showing no signs of destruction or anthropic interference. The legal regime also defines that caves included in category A are integrated in the corresponding INP.

The natural evolution of Santa Maria Island resulted in the existence of unique marine fossils, in the regional and national contexts, and their fossil deposits are a truly open-air laboratory of international relevance, according to recent scientific studies. Recognizing the uniqueness of Santa Maria geological and paleontological heritage, the Azores Government published the Regional Legislative Decree 11/2018/A, of 28 August, creating the **Paleopark of Santa Maria**, aiming at protect and maintain those natural values.

'Collecting' means any method of fishing that is characterized by an individual activity in whereas hands and small utensils play a key role in capturing and collecting marine species'. This is an activity with great representativeness in the Region, representing the livelihood of many families and, at the same time, a way of reorienting and diversifying fishing towards alternative activities or species and creating supplementary income. In order to contribute to the preservation of the Azorean ecosystems, the Government published the Decree order 57/2018, of 30 May, amended by the Decree order 69/2018, of 22 de June, approving **the legal regime for the collection of marine species** in the Azores sea, which is also part of the fisheries regional legal framework. This document identifies, for the nine islands, reserve areas where catching is prohibited. Additionally, there are few areas with **constraints to commercial and recreational fishing**, implementing spatial measures for the conservation of fishing stocks, which are important in the general framework for

the protection of marine ecosystems. These areas are located around Faial and Pico islands, around Graciosa island, around Santa Maria island, in Quatro Ribeiras (Terceira island), in Ribeira Quente (São Miguel island) and at the hidrothermal vent field Luso. Additionally, with constraining implications to commercial and recreational fishing, the Condor Bank is also restricted for the exercise of fishing and access and permanence of vessels, in order to ensure the full execution of scientific projects in that Bank.

Legal framework and constraints

The Azores political and administrative autonomy (defined by the Law 2/2009, of 12 January) defines that environmental fields are legislative competences of the Region, including environmental protection, promotion of the ecological balance and nature and resources protection and management, as well as monitoring and surveillance.
The Azores Government Agencies are divided into several regional secretariats and directorates. The Regional Secretariat for Energy, Environment and Tourism (SREAT) includes, amongst others, the Regional Directorate for the Environment (DRA). DRA's main competences are contributions to the definition of regional policies in what concerns the environment, land and water resources, terrestrial spatial planning, as well as guiding, coordinating and surveilling its implementation (DRA, Direção Regional do Ambiente, 2019). The Regional Secretariat for the Sea, Science and Technology (SRMCT) includes, amongst others, the Regional Directorates for Fisheries (DRP) and the DRAM. DRAM's main competences are contributions to the definition of regional policies in what concerns the valorization of the Azorean sea, the integrated and sustainable management of maritime space, ocean exploration, licensing of uses of the sea and the seafloor, the coastal planning and protection, as well as guiding, coordinating and surveilling its implementation (DRAM, 2019).
The nine INP created in the Azores are under competence of DRA, for the terrestrial component, and of DRAM, for the marine component. The Azores Marine Park is under competence of DRAM. Some PA, for example OSPAR MPA and areas of the Natura 2000 network with marine spatial component, are also under competence of DRAM.

Normative basis

In the Azores, marine environmental conservation and PA are ruled by specific legislation.

Table 60. Main legal documents ruling marine environmental conservation and MPA in the Azores.

International and European legislation	Observations
Decree 50/80, of 23 June **Decree-Law 121/2017, of 20 September**	Ratifies the CITES Convention Ensures the implementation in the national territory of the Convention on International Trade in Endangered Species of Wild Fauna and Flora by adapting it to the amendments to Regulations
Decree 103/80, of 11 October	Ratifies the Bonn Convention
Decree-Law 95/81, of 23 July **Decree-Law 316/89, of 22 September**	Ratifies the Bern Convention
Decree 59/97, of 31 October	Ratifies the OSPAR Convention
OSPAR Commission document, OSPAR 07/6/6-E	Rainbow hydrothermal vent field MPA
OSPAR Decision 2010/6 **OSPAR Recommendation 2010/17**	Decision on the establishment and Recommendation on the management of the Mid-Atlantic Ridge North of the Azores High Seas MPA (MARNA)

OSPAR Decision 2010/3 **OSPAR Recommendation 2010/14**	Decision on the establishment and Recommendation on the management of the Altair Seamount High Seas MPA
OSPAR Decision 2010/4 **OSPAR Recommendation 2010/15**	Decision on the establishment and Recommendation on the management of the Antialtair Seamount High Seas MPA
OSPAR MPA	Other OSPAR MPA, identified in the Regional Legislative Decree 15/2012/A, of 2 April (Annex VI) and included in the Azores Marine Park: O-PT-COR0001 (Corvo) O-PT-MIG0022 (Banco D. João de Castro O-PT-FAI0005 (Canal Faial-Pico) O-PT020001 (Banco das Formigas (Formigas e Recife Dollabarat) O-PT020005 (Campo Hidrotermal Lucky Strike) O-PT020006 (Campo Hidrotermal Menez Gwen) O-PT020007 (Campo Hidrotermal Rainbow) O-PT020008 (Monte Submarino Sedlo)
Directive 79/409/EEC, of 2 April, amended by Directive 2009/147/EC, of 30 November	Birds Directive, establishing a framework for the conservation and management of wild birds in Europe and the human interactions with this group
Directive 92/43/EEC, of 21 May	Habitats Directive, contributing towards ensuring bio-diversity through the conservation of natural habitats and of wild fauna and flora in the European territory of the Member States to which the Treaty applies
Directive 2008/56/EC, 17 June	Marine Strategy Framework Directive, establishing the framework for community action in the field of marine environmental policy
National legislation	**Observations**
Resolution of the Council of Ministers 55/2018, of 7 May	Approves the National Strategy for Nature Conservation and Biodiversity 2030 (ENCNB 2030)
Law 19/2014, of 14 April	Defines the basis of the environmental policy
Resolution of the Council of Ministers 143/2019, of 29 August	Approves the strategic guidelines and recommendations for the implementation of a National Marine Protected Areas Network
Decree-Law 108/2010, of 13 October	Establishes the legal regime for the necessary measures to ensure the good environmental status of the marine environment by 2020, transposing the EU Directive 2008/56/EC, of the European Parliament and of the Council, of 17 June
Decree-Law 166/2008, of 22 August, amended and republished by the Decree-Law 239/2012, of 2 November and the Decree-Law 124/2019, of 8 August	Establishes the legal regime of the National Ecological Reserve
Decree order 419/2012, of 20 December	Defines the conditions and requirements for the uses and actions concerning the National Ecological Reserve
Regional legislation	**Observations**
Resolution of the Council of the Government 123/2011, of 19 October	Approves regional strategy for climate change
Regional Legislative Decree 18/2002/A, of 16 May	Adapts to the Region the Decree-Law 140/99, of 24 April, which transposes into national law the

	Directives on the conservation of wild birds (Birds Directive) and the conservation of natural habitats and wildlife (Habitats Directive)
Regional Legislative Decree 15/2012/A, of 2 April	Establishes the legal regime for nature conservation and protection of biodiversity of the Autonomous Region of the Azores, including the transposition of Birds and Habitats Directive (Natura 2000 Network)
Resolution of the Council of Government 56/2010, of 10 May	Approves SCI in the RAA under the Natura 2000 Network
Regional Legislative Decree 20/2006/A, of 6 June, amended by the Regional Legislative Decree 7/2007/A, of 10 April	Approves the Sectoral Plan of the Natura 2000 Network in the Azores
Regional Legislative Decree 28/2011/A, of 11 November, amended and republished by the Regional Legislative Decree 13/2016/A, of 19 July	Creates the Marine Park of the Azores
Regional Legislative Decree 47/2008/A, of 7 November, amended and republished by Regional Legislative Decree 39/2012/A, of 19 September	Creates the Island Natural Park of Santa Maria
Regional Legislative Decree 19/2008/A, of 8 July	Creates the Island Natural Park of São Miguel
Regional Legislative Decree 11/2011/A, of 20 April	Creates the Island Natural Park of Terceira
Regional Legislative Decree 45/2008/A, of 5 November	Creates the Island Natural Park of Graciosa
Regional Legislative Decree 10/2011/A, of 28 March	Creates the Island Natural Park of São Jorge
Regional Legislative Decree 20/2008/A, of 9 July	Creates the Island Natural Park of Pico
Regional Legislative Decree 46/2008/A, of 7 November, amended and republished by the Regional Legislative Decree 7/2019/A, of 27 March	Creates the Island Natural Park of Faial
Regional Legislative Decree 8/2011/A, of 23 March	Creates the Island Natural Park of Flores
Regional Legislative Decree 44/2008/A, of 5 November	Creates the Island Natural Park of Corvo
Regional Legislative Decree 11/2018/A, of 28 August	Creates the Paleopark of Santa Maria
Regional Regulatory Decree 15/2008/A, of 25 June	Coastal Zone Spatial Plan (POOC) of Santa Maria
Regional Regulatory Decree 6/2005/A, of 17 February	Coastal Zone Spatial Plan (POOC) of North Coast of São Miguel
Regional Regulatory Decree 29/2007/A, of 5 December	Coastal Zone Spatial Plan (POOC) of South Coast of São Miguel
Regional Regulatory Decree 3/2019/A, of 2 April (partial suspension) **Regional Regulatory Decree 1/2005/A, of 15 February**	Coastal Zone Spatial Plan (POOC) of Terceira
Regional Regulatory Decree 13/2008/A, of 25 June	Coastal Zone Spatial Plan (POOC) of Graciosa
Regional Regulatory Decree 24/2005/A, of 26 October	Coastal Zone Spatial Plan (POOC) of São Jorge
Regional Regulatory Decree 24/2011/A, of 23 November	Coastal Zone Spatial Plan (POOC) of Pico
Regional Regulatory Decree 4/2017, of 17 March (annex of Declaration 5/2016) **Declaration 5/2016, of 14 September (first amendment to the synthesis plant)** **Regional Regulatory Decree 19/2012/A, of 3 September**	Coastal Zone Spatial Plan (POOC) of Faial
Regional Regulatory Decree 24/2008/A, of 26 November	Coastal Zone Spatial Plan (POOC) of Flores

Regional Regulatory Decree 14/2008/A, of 25 June	Coastal Zone Spatial Plan (POOC) of Corvo
Regional Legislative Decree 10/2019/A, of 22 May	Approves the regime of protection and classification of the volcanic cavities of the Autonomous Region of the Azores
Decree order 57/2018, of 30 May, amended by the Decree order 69/2018, of 22 de June	Legal regime for collection of marine species in the Azores sea
Decree order 87/2014, of 29 December	Regulation for the use of PA in the maritime zone of Santa Maria Island
Decree order 53/2016, of 21 June	Regulation of the exercise of fishing in the maritime area of Faial and Pico islands
Decree order 54/2016, of 21 June	Regulation of the exercise of fishing in the maritime area of Ribeira Quente, São Miguel island
Decree order 55/2016, of 21 June, amended and republished by the Decree order 70/2016, of 1 July	Regulation of the exercise of fishing in the maritime area of around the Graciosa island
Decree order 97/2018, 6 August	Regulation of the exercise of fishing in the maritime area of Quatro Ribeiras, Terceira island
Decree order 94/2017, of 28 December	Approves the regulation of specific access to fishing and access and permanence of vessels at Condor Bank, in order to ensure the full execution of the scientific projects in that Bank
Decree order 68/2019, of 26 September	Regulation of the exercise of fishing in the marine area of the Luso hydrothermal vent field
Resolution of the Council of the Government 72/2006, of 29 June	Creates the Azores Cetacean Throwing Network (RACA)

Other legal documents with implications for nature conservation

Recognizing the need to regulate the access to genetic resources, Portugal approved the Nagoya Protocol, within the Convention on Biological Diversity, through the Decree 7/2017, of 13 March (PSOEM, 2018) and the Decree-Law 122/2017, of 21 September. The Azores Government has also adapted to its legal framework the access to genetic resources, as well as remaining natural resources for scientific purposes, through the Regional Legislative Decree 9/2012/A, of 20 March, which concerns (a) the access to natural resources for scientific purposes, which include biological and genetic resources, their derivatives and by-products, air, water, minerals and soil; (b) the transfer of the natural resources collected and/or accessed, for scientific purposes and; (c) the fair and equitable sharing of benefits resulting from of the use of natural resources collected and/or accessed, for scientific purposes. The Regional Regulatory Decree 20/2012/A, of 5 November, develops and regulates the legal regime for access and use of natural resources of the Azores for scientific purposes. The Government authority with competences to issue authorizations for the access to natural resources for scientific purposes in the Azores is currently Regional Directorate for Science and Technology (DRCT). The Government authority with competences to issue licences for study and handling of marine wild animals for educational or conservation purposes is currently DRAM.

Areas designated for nature conservation are ruled by legislation and are also considered as administrative easements and restrictions of public utility. Administrative easements result from legal impositions, or administrative acts, which have public utility as purpose, and which may result in prohibitions or limitations, or compel the practice of actions. Public utility restrictions are distinct from administrative easements as they derive directly from the law and do not dependent on any administrative act, and they concern any limitations over the private use and occupation of the maritime space, thus preventing full enjoyment of private use rights.

In the Azores, the areas for environmental conservation that are administrative easements and restrictions in the maritime space are: marine areas included in each INP, Azores Marine Park, Natura 2000 Network, areas with legal rules for fisheries, marine species collection reserves and marine areas included in the Ecological Reserve.

Stakeholder's perception on the legal framework

The stakeholders' consultation developed in the context of the MarSP project aims to gather information on stakeholder's perceptions about the legislative context of environmental conservation and MPA applicable in the Azores. Selected stakeholders included representatives of the regional and/or local administration and researchers. The consultation process was performed through individual interviews (eight interviews with stakeholders from the in the Azores). Stakeholders were asked if they agreed with the legislative context for environmental conservation and MPA or what type of changes would they recommend. In a general way, stakeholders referred the need to clarify and simplify the already existing legislation. There is the need to create more efficient protection measures and to develop Management Plans for PA and to revise the prohibited and restricted activities, namely for strengthening and increasing restrictions to accessing fishery resources, specifically in PA for resources management, located in the maritime space. Additionally, there is the need for a regime of management and / or visitation for the PA and an administrative regime for these rules of visitation. Stakeholders also referred that surveillance in MPA is deficient.

PART II

Methodology for mapping the sector

Environmental conservation and MPA are not an economic sector in its pure concept. However, they have been increasingly incorporated in MSP processes and analysed in a similar way to economic maritime sectors because they have a spatial dimension (spatial delimitation of areas) and often require conflict harmonization with other maritime sectors.

Current spatial distribution

The methodology for mapping the current situation of the environmental conservation and MPA sector in the Azores is based on existing and available databases on the areas with significance for environmental conservation and MPA, occurring in the maritime space. Additionally, considering the importance of land-sea interaction analysis, in the context of MSP and especially for environmental conservation (e.g. ecological connectivity needs), mapping of the current situation of the environmental conservation in the Azores also includes terrestrial areas bordering the coastline for reference. Databases for this sector can be provided by administrative institutions of the Azorean Government, including the entities with competences in environmental conservation and sea affairs, namely DRA and DRAM.
According to the methodology for mapping the economic sectors adopted in the MarSP project, the stakeholders' consultation and engagement process also addressed the spatial distribution of environmental conservation and MPA to discuss the areas identified.

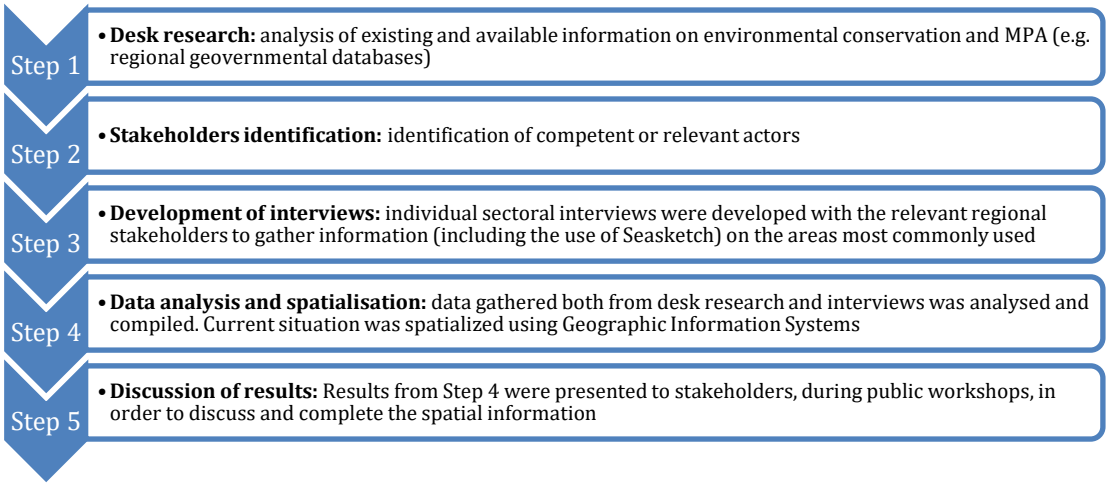


Figure 166. Methodological scheme for the stakeholders' consultation and engagement process used for the characterization of the existing situation of environmental conservation and MPA in the Azores.

The current spatial distribution of areas for environmental conservation and MPA in the Azores should include at least the following:
- EBSA under CBD
- VME under FAO
- Biosphere reserves under UNESCO
- Areas under Ramsar Convention
- OSPAR MPAs
- Natura 2000 areas under Birds and Habitats Directives
- Maritime or terrestrial areas bordering the coastline included in the Azores Island Natural Parks
- Areas included in the Azores Marine Park
- Coastal areas classified as protected areas of local importance
- IBA under BirdLife International/SPEA
- Geosites
- UNESCO Azores Park
- Volunteer areas of 'no take'
- Azores classified volcanic cavities
- Areas under the legal regime for the collection of marine species
- Fisheries restriction areas
- Azores paleoparks
- Marine areas for nature protection from POOCs, up to the 30m bathymetric
- Marine areas from the Ecological Reserve

In the Azores, coastal areas classified as protected areas of local importance do not yet exist. Moreover, cartographic information of some of the above categories is not available and further mapping efforts should be developed to cover all the categories. The information that was not available included EBSAs, UNESCO Azores Park, classified volcanic cavities. In what concerns IBAs, they are not represented in the figures below, as many are already included in INP and there were some inconsistencies in the coordinates system from the original shape file.

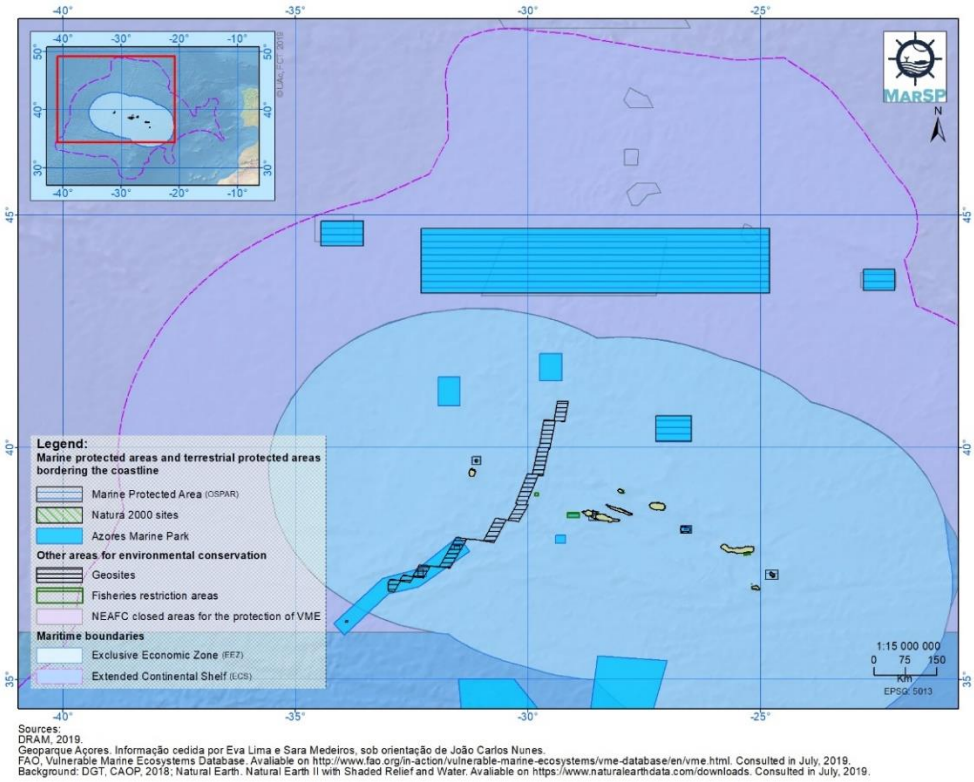


Figure 167. Areas integrated in environmental conservation and MPA in the Azores at the archipelago scale.

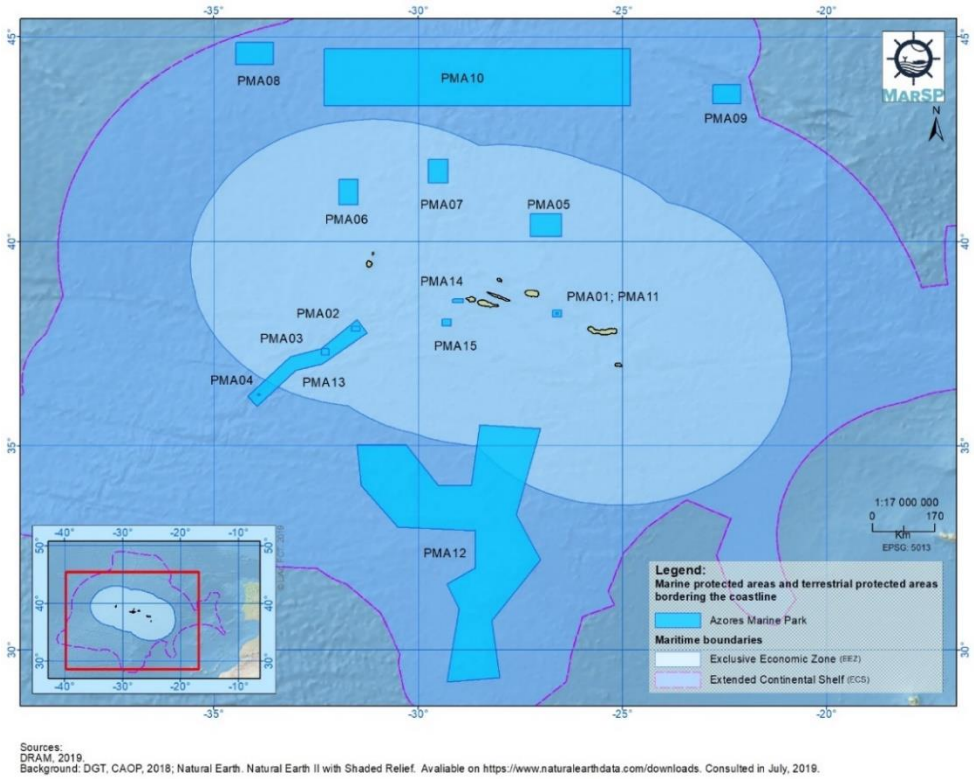
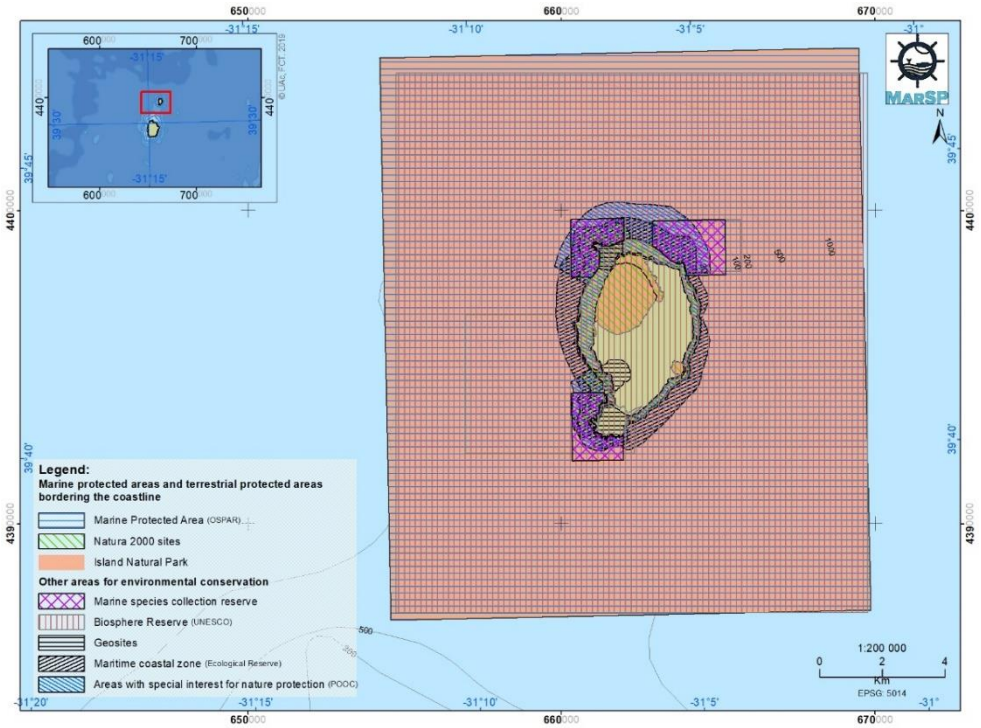
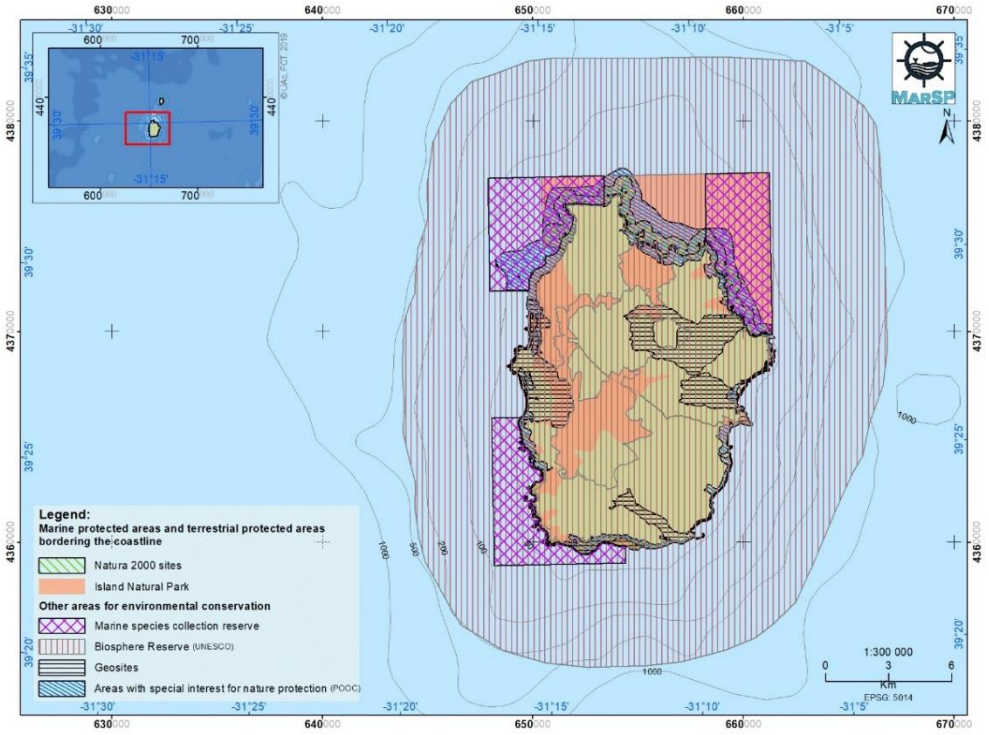


Figure 168. Areas integrated in the Azores Marine Park (Regional Legislative Decree 28/2011/A, of 11 November, amended and republished by the Regional Legislative Decree 13/2016/A, of 19 July) at the archipelago scale.



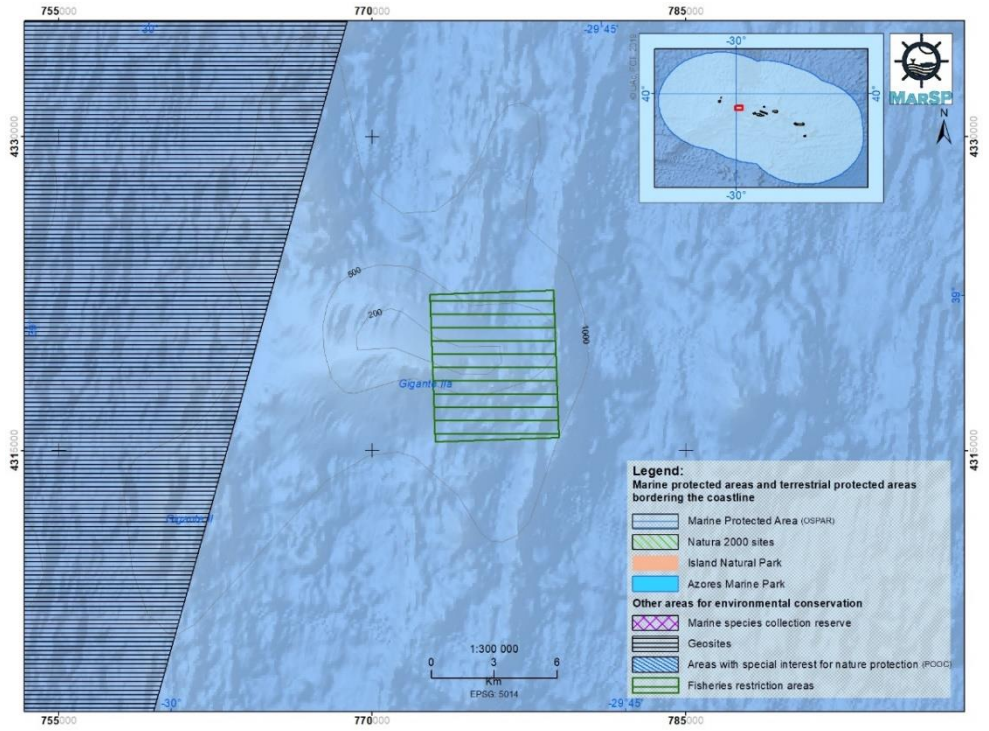
Sources:
DRAM, 2019
Geoparque Açores. Informação cedida por Eva Lima e Sara Medeiros, sob orientação de João Carlos Nunes.
Background: IH, 2019; DGT, CAOP, 2018.

Figure 169. Areas integrated in environmental conservation and MPA in Corvo Island.



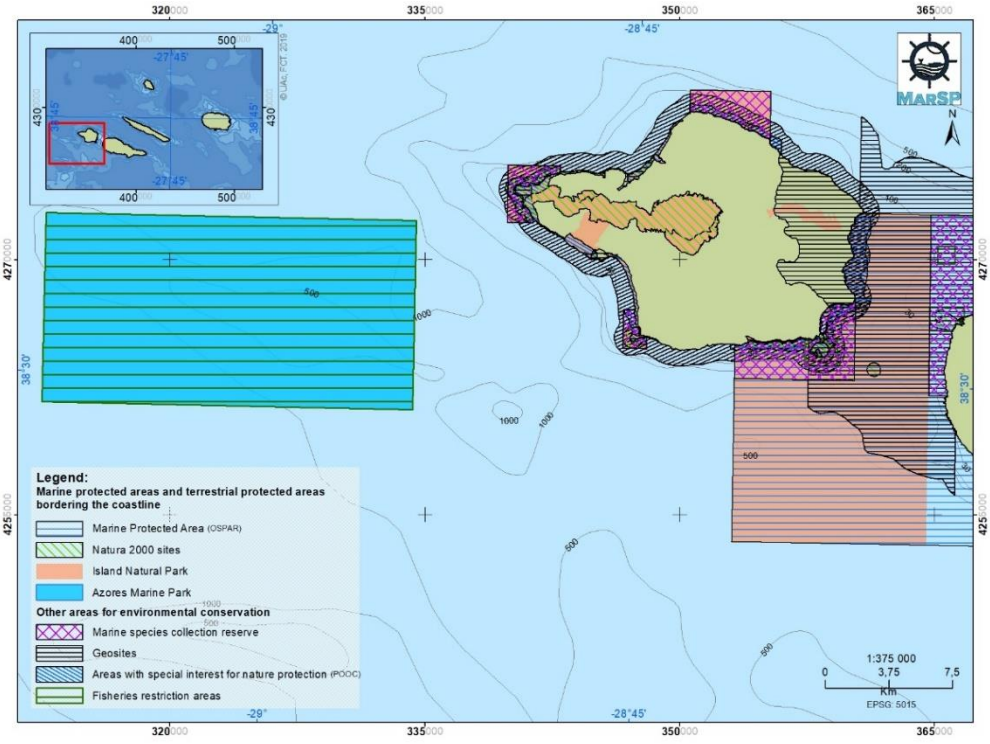
Sources:
DRAM, 2019
Geoparque Açores. Informação cedida por Eva Lima e Sara Medeiros, sob orientação de João Carlos Nunes.
Background: IH, 2019; DGT, CAOP, 2018.

Figure 170. Areas integrated in environmental conservation and MPA in Flores Island.



Sources:
DRAM, 2019
Geoparque Açores. Informação cedida por Eva Lima e Sara Medeiros, sob orientação de João Carlos Nunes.
Background: IH, 2019; DGT, CAOP, 2018; EMODnet Bathymetry WMS, Mean depth (DTM release 2016).

Figure 171. Areas integrated in environmental conservation and MPA (Luso hydrothermal vent field).



Sources:
DRAM, 2019
Geoparque Açores. Informação cedida por Eva Lima e Sara Medeiros, sob orientação de João Carlos Nunes.
Background: IH, 2019; DGT, CAOP, 2018.

Figure 172. Areas integrated in environmental conservation and MPA in Faial Island and Faial-Pico Channel.

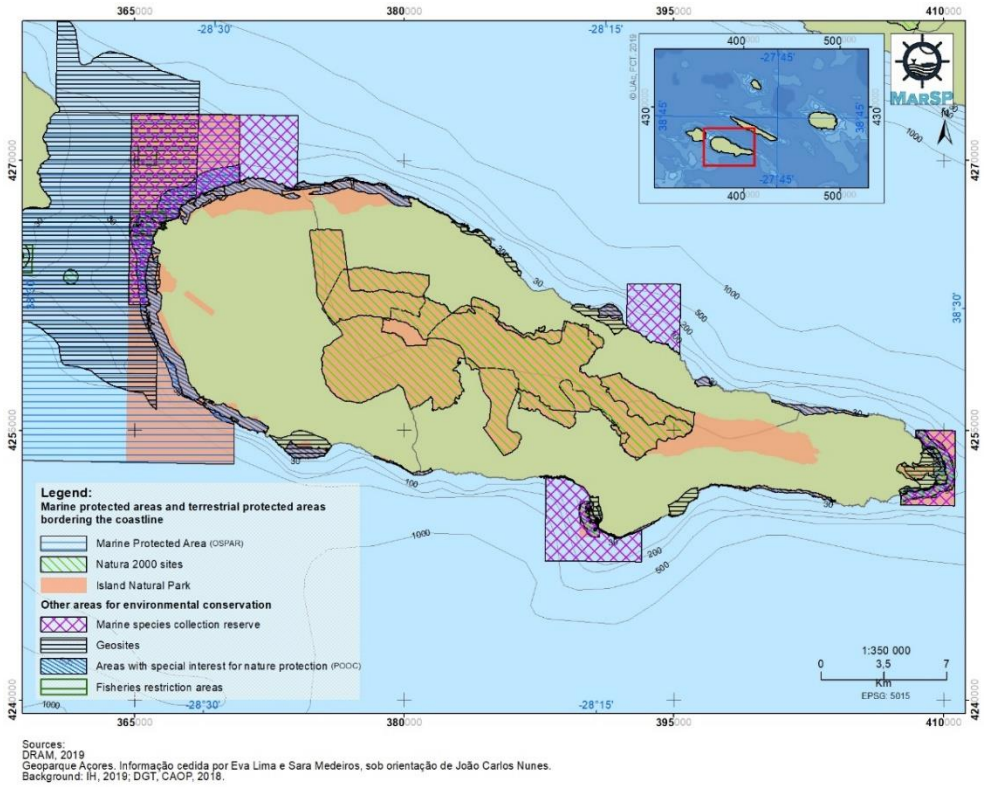


Figure 173. Areas integrated in environmental conservation and MPA in Pico Island and Faial-Pico Channel.

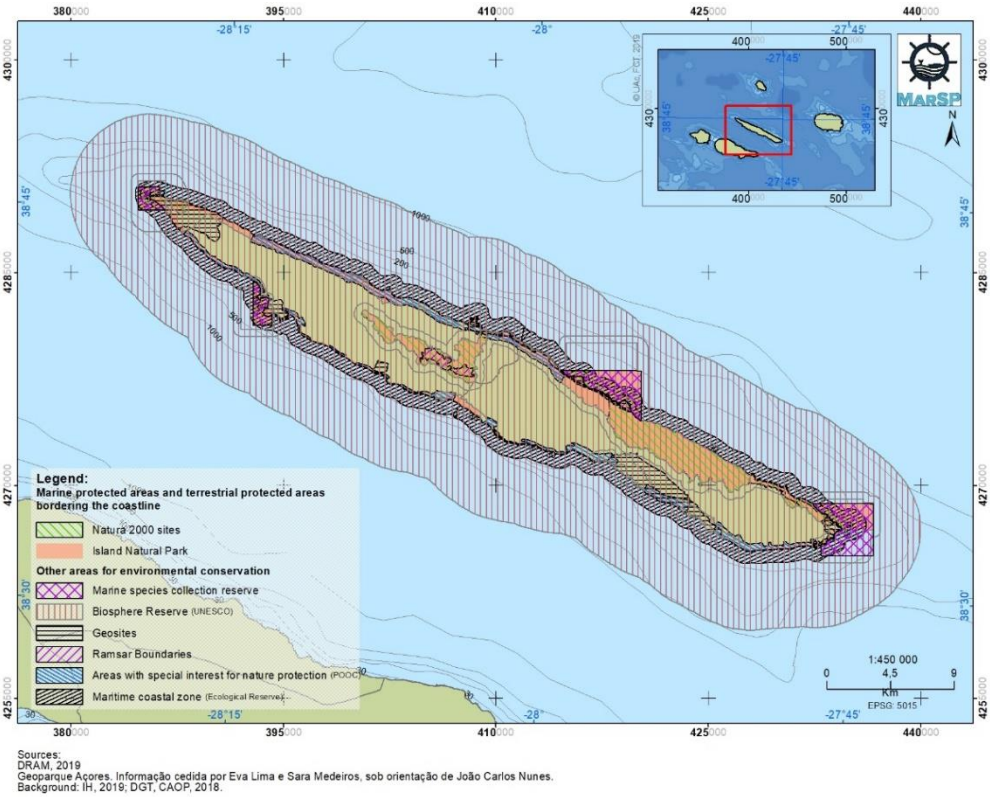
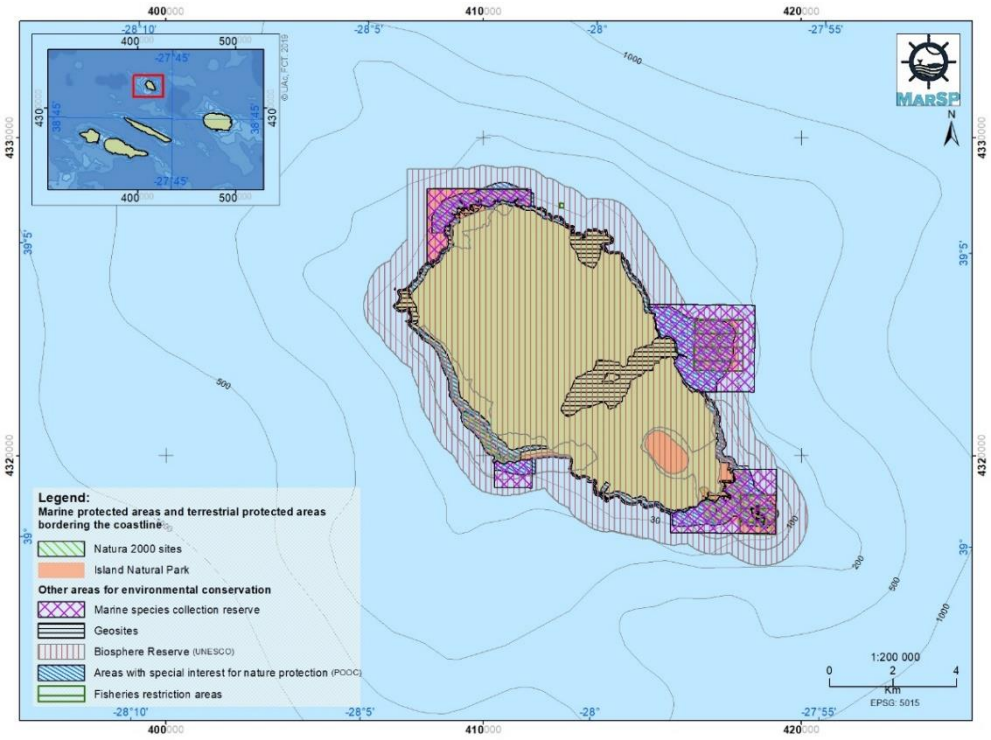
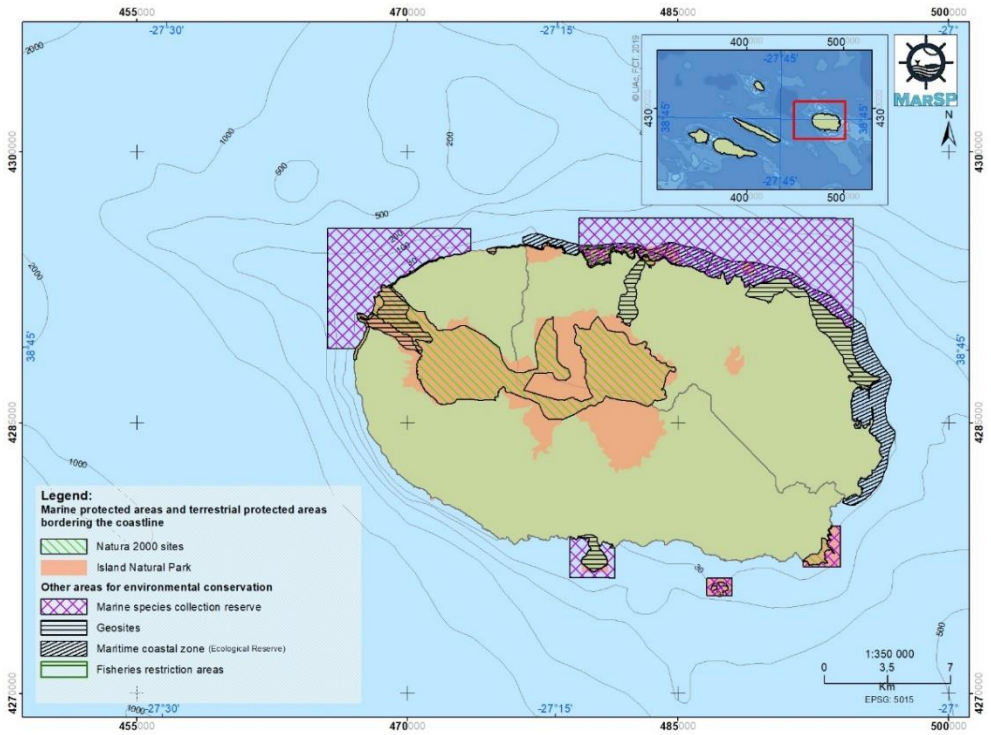


Figure 174. Areas integrated in environmental conservation and MPA in São Jorge Island.



Sources:
DRAM, 2019
Geoparque Açores. Informação cedida por Eva Lima e Sara Medeiros, sob orientação de João Carlos Nunes.
Background: IH, 2019; DGT, CAOP, 2018.

Figure 175. Areas integrated in environmental conservation and MPA in Graciosa Island.



Sources:
DRAM, 2019
Geoparque Açores. Informação cedida por Eva Lima e Sara Medeiros, sob orientação de João Carlos Nunes.
Background: IH, 2019; DGT, CAOP, 2018.

Figure 176. Areas integrated in environmental conservation and MPA in Terceira Island.

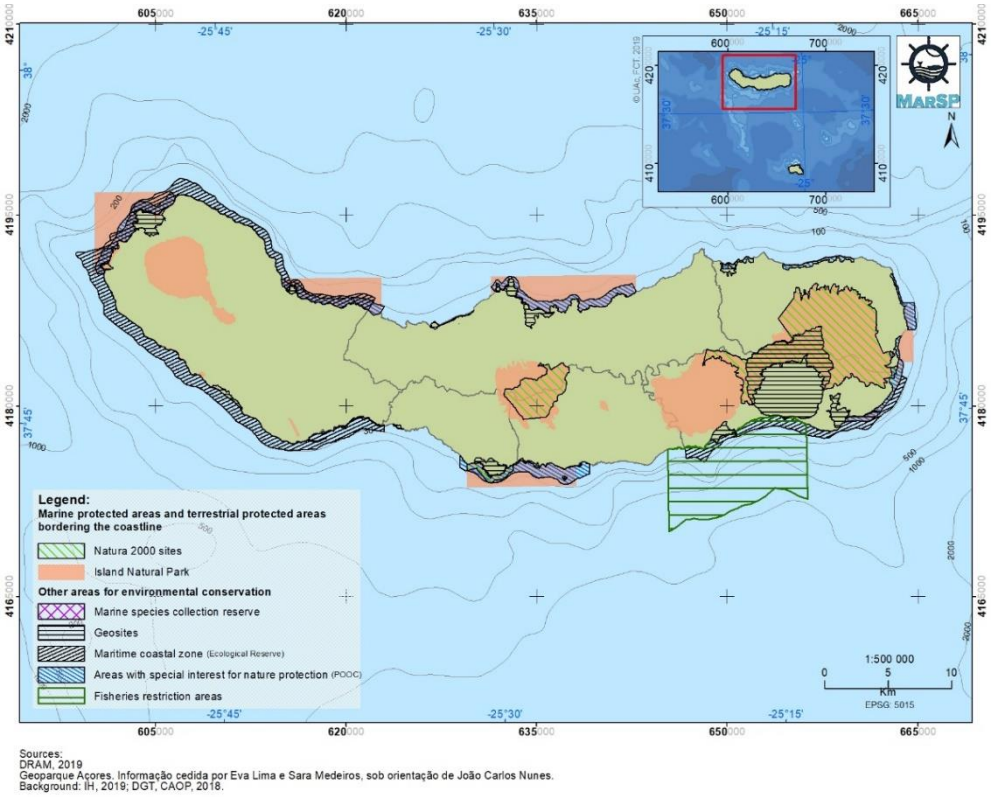


Figure 177. Areas integrated in environmental conservation and MPA in São Miguel Island.

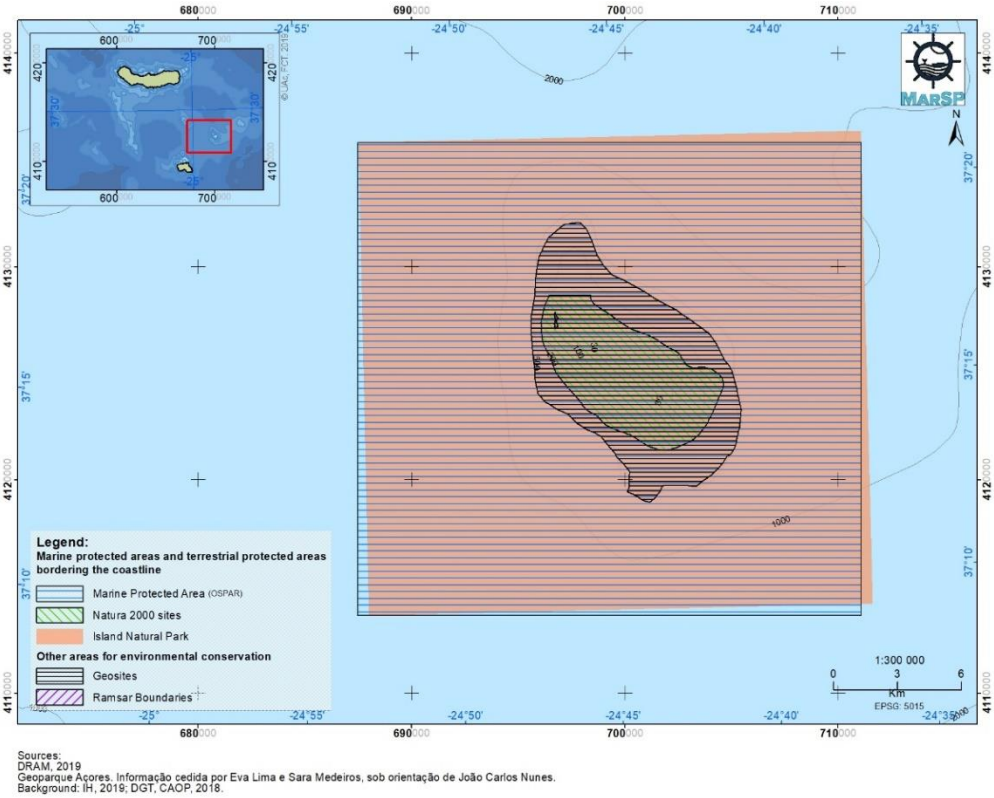


Figure 178. Areas integrated in environmental conservation and MPA in Formigas Islets.

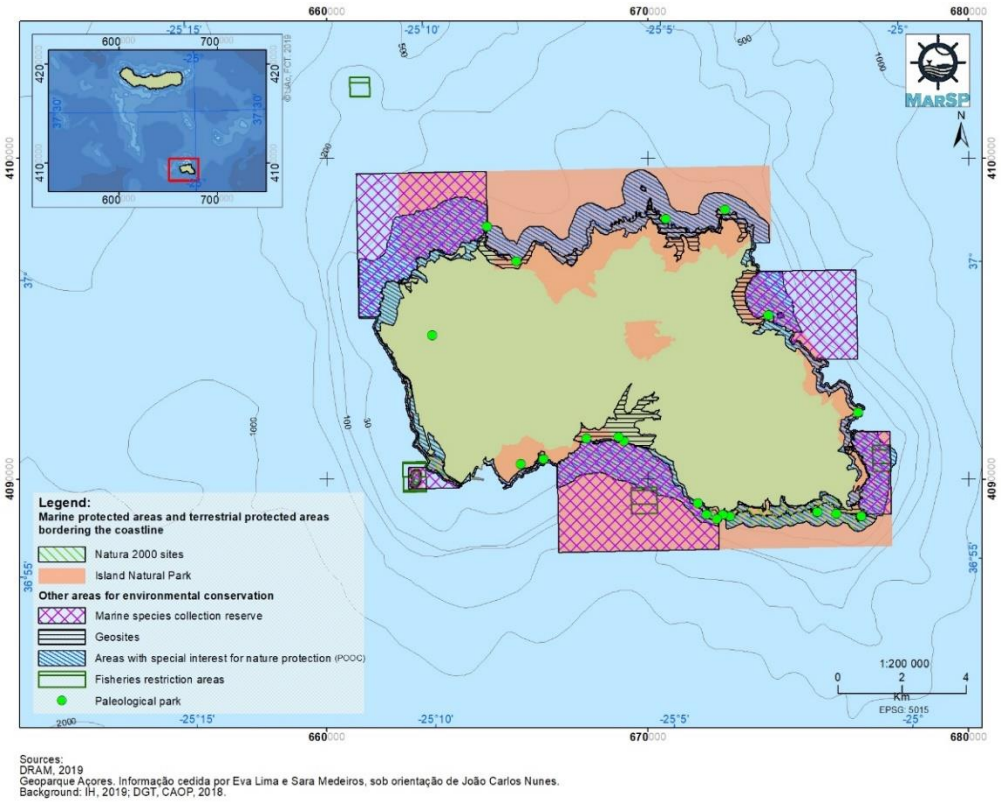


Figure 179. Areas integrated in environmental conservation and MPA in Santa Maria Island.

PART III

Sector diagnosis

The sector diagnosis presented in this section includes a SWOT analysis and the analysis of sectoral interactions (sector-sector, land-sea interactions, sector-environment). The methodological approach for all analysis was similar and mainly based on regional stakeholders' consultation.

The first step to develop the analysis was based on sectoral representative stakeholders' consultation, through individual interviews. Stakeholders were asked to give their technical opinion on the fulfilment of each analysis for the sector they represent. For environmental conservation and MPA, eight representative regional stakeholders accepted to participate in the individual interviews. The analyses resulting from this step were reviewed during the 2nd MarSP Regional Stakeholders Workshop (developed in April 2019), which had the participation of 78 stakeholders distributed in three Azores Islands: São Miguel, Terceira and Faial. In the workshop, stakeholders were grouped according to the sectors they represent and were asked to comment on and complement the analyses for those sectors. The analysis for each sector includes consensual results from both regional stakeholders' consultation (individual interviews and the workshop) and additional topics from literature review for the sector.

SWOT Analysis

A SWOT analysis was developed for each maritime sector identified for the Azores and for marine environmental conservation and MPA. Stakeholders were asked to identify the strengths, weaknesses, opportunities and threats they consider as the most important for the sector they represent.
The final SWOT analysis for environmental conservation and MPA in the Azores is presented in **Table 61** (topics highlighted in bold were considered by stakeholders as most important).

The validation of the SWOT analysis resulting from the personal interviews was generally consensual in the stakeholders workshop. During personal interviews, it was referred that the existence of monitoring systems for some species, although still insufficient, should be considered as an opportunity instead of a strength.
Main strengths of marine environmental conservation and MPA in the Azores are related to the intrinsic marine features and ecosystems that contribute for the archipelago natural uniqueness. Additionally, stakeholders consider and recognize that the legal and management system created for the Azorean MPA is an important strength for the environmental conservation of the Region. Having all those natural assets as maximum priority in the Government agenda and investing in the conservation status of the marine ecosystems to promote the Azores as a natural spot is consider to be an opportunity to the nature conservation itself.
The threats that MPA are facing and might result in the degradation of the ecosystems are one of the main stakeholders' concerns when asked about weaknesses and threats to marine environmental conservation and MPA. Stakeholders also referred some areas should have more restrictive rules and that MPA are lacking effective regulation systems and management plans.

Table 61. SWOT analysis resulting from regional stakeholders' consultation for environmental conservation and MPA in the Azores (topics highlighted in bold were considered by stakeholders as most important; topics in blue were added from literature review).

	Positive factors	Negative factors
Internal factors	**Strengths** **- Atlantic isolation shaping unique features;** **- Azorean sea richness, with biological and geomorphological singularities;** **- General good environmental quality of the Azores;** **- Pioneering scheme of the PA system;** **- All the work already done in terms of definition of MPA and the representative network that has already been created;** **- Existence of legal basis for the PA network of the Azores;** **- Although still insufficient, there is already monitoring for some species;** - General accessibility of the islands; - Good ability of species to recover with conservation and protection measures; - Search for unified parks (INP); - Involvement of the scientific community; - Involvement of international organizations and programmes; - Good representativity of coastal and offshore MPA[14].	**Weaknesses** **- Absence or weak implementation of management, monitoring and surveillance plans;** **- Lack of information about MPA for populations and tourists in general;** **- Lack of regulation for already existent areas;** **- Few areas classified as IUCN I category ("no-take");** - Lack of modern technology to access information; - Geographical dispersion between islands; - Lack of clarity in the criteria used in the definition/ classification of areas; - Rigidity of legal documents and management tools; - Heterogeneity and legal inconsistencies in the MPA regulations; - IUCN VI areas (PA for habitat or species management) are not sufficiently restrictive; - Few MPAs have a dimension that allows wider protection of biodiversity (> 10 km²); - Inadequate protection of some critical habitats; - Multiplicity of AMP designations.
External factors	**Opportunities**	

[14] A few stakeholders, during interviews, referred that representativity is not ensured for many MPA.

	- **Compatibilize economic development and habitat conservation;** - **Implementation of an effective MPA network, with an effective participatory process;** - **Environmental conservation as top priority, placing the Azores as a reference in the conservation panorama;** - **International political incentives and international agreements for the establishment of MPA;** - **Sustainable practices of commercial fisheries;** - Political will; - Economic valorization of fish, reducing overexploitation; - Economic valorization of diving, reducing the number of people; - Environmental education projects for stakeholders and populations; - Increase of tourism, natural spaces and wildlife observation in the Azores; - Application of a precautionary principle to economic activities impacting the marine ecosystem; - Partial protection of migratory and bird species and protection of marine ecosystems; - VMS and AIS technologies in monitoring maritime activities; - Research progress can help improve design and assist in the management of MPAs.	**Threats** - **Invasive alien species** and lack of invasive species monitoring and mitigation programs**;** - **Marine pollution and climate change (e.g. ocean acidification);** - **Prevarication and lack of training and integrity from the various stakeholders;** - **Commercial fisheries and over-exploitation of resources;** - **Lack of funds to implement management measures and leading to the loss of natural values;** - **Increased economic pressure to develop extractive activities at sea;** - **Activities threatening the good environmental status, devaluing the image of the Azores as a sustainable archipelago;** - Increasingly mass tourism; - Unique and special ecosystems that are at risk of being destroyed before being well studied; - Government not fully aware of natural values, not defining conservation as a top priority; - Poor dissemination and difficult interpretation of regulations and low levels of compliance; - Low levels of interdisciplinary research and lack of scientific knowledge; - Reduced expression of the social sciences; - Inadequate governmental and legal structure for marine issues; - Conflict within different government sectors; - Low human and material resources for monitoring.

Analysis of interactions

The development of a certain activity in the maritime space is usually linked to interactions with the remaining uses and maritime sectors. The analysis intended to identify if interactions exist and the level of intensity of the interactions using the following scale: negative values for negative interactions, positive values for positive interactions and zero for absence of interactions. In the resulting matrices, the column "C" represents the negative impacts induced or suffered by the sector, identified as conflicts, while the column "S" represents the induced or suffered positive interactions, deemed as synergies.

Sector-sectors interactions analyses whether there is any type of conflict and/or synergy between each of the maritime sectors identified and the other sectors. The resulting matrix reflects only the analysis of interactions occurring beyond the 30m bathymetry, not including coastal areas within less than 30m bathymetry (the protection maritime zone of protection defined by the coastal zone spatial Plan - POOC).

Land-sea interactions analyses whether there is any type of conflict and/or synergy between each of the maritime sectors identified and coastal activities (up to the 30m bathymetry) developed in the various areas identified in the POOC.

Interactions with the environment analyses if there is any kind of negative and/or positive effect of each of the maritime sectors in the environment, specifically considering the descriptors of the good environmental status, and respective criteria, as defined by the MSFD.

During the individual interviews, stakeholders were asked to identify the levels of conflicts and/or synergies of environmental conservation and MPA with other sectors. The final values were calculated using the tendency of answers and represent the stakeholders' perception trend. As this first analysis is based on inputs from stakeholders representing the maritime sector, to avoid or

decrease possible bias in the results, during the Workshop, stakeholders were asked to comment and, when in disagreement, to propose a different value to classify the level of conflict/synergy. The final values from the workshop were calculated using the mean of all values resulting from all discussion tables. Literature review was also used to complement the characterization of the interactions, identifying if a conflict or a synergy is existing in the Azores or on other contexts.

Interactions with other sectors

The characterization of the interactions of environmental conservation actions and MPA with key maritime sectors in the Azores is represented below.

Table 62. Characterization of the interactions between environmental conservation and MPA with key maritime sectors in the Azores.

Sector-Sectors	Environmental conservation and MPA					
	Sectoral interviews		2nd Workshop		Literature review	
	C	S	C	S	C	S
Fisheries	-3	1	-2.4	2.2		
Aquaculture	-1	1	-1.4	1.2		
Extraction of non-metallic mineral resources	-3	0	-2.2	0		
Energy	0	0	-0.4	0.2		
Maritime security, defence, surveillance and civil protection	0	2	-0.6	1.8		
Navigation and maritime transportation	-1	0	-1	0		
Infrastructures	0	0	-0.6	0.2		
Coastal and maritime tourism	-1	3	-1.4	2.4		
Scientific research and marine biotechnology	0	3	-0.4	3		
Underwater cultural heritage	0	3	-0.2	2.8		
Legend	**C** – Conflict; **S** – Synergy; **X** – Existent **-3** – High conflict; **-2** – Moderate conflict; **-1** – Low conflict **0** – Without conflict/synergy **1** – Low synergy; **2** – Moderate synergy; **3** – High synergy **"-"** – Does not answer				Conflict scale low high Synergy scale	

Results from sectoral interviews and from the workshop were quite similar, with main conflicts being identified for fisheries and aggregate extraction. Fisheries is an ancient maritime sector in the Azores with high pressures in ecosystems, mainly if not sustainably managed. In many PA fisheries are highly restricted or even prohibited, creating conflicts with fishers, specially if in those areas other activities (e.g. diving) are allowed. Aggregate extraction has impacts on the seafloor and benthic communities, which directly conflicts with environmental conservation objectives and restrictions imposed by PA hinder the economic activity. Aquaculture, navigation and maritime transports, infrastructures and tourism were also identified as having conflicts with environmental conservation and MPA. Conflicts with aquaculture result, for example, from the possibility of development of diseases that can affect local species, of algae blooms and bacteria and the contamination with pharmaceutical products. Navigation increases the risk of collisions with wildlife and contributes to increase pollution and non-native species through contaminated water from ballast tanks. Conflicts with infrastructures are mainly occurring during constructions and implementation of those infrastructures. Tourism creates conflicts with environmental

conservation and MPA when too many licences are emitted or when those licenced activities may harm ecosystems or species and disturb animal welfare (e.g. whale watching and swimming with dolphins). Additionally, despite being identified as without conflict, it was referred that marine wind energy might have negative impacts on sea birds.
Main synergies were identified for scientific research and marine biotechnology and for tourism and underwater cultural heritage (UCH), as scientific research results can help increase knowledge about ecosystems and their functioning and can help identify best measures and actions to preserve and restore them. Tourism, including UCH visitation, in the Azores, is deeply connected to the naturalness and to wildlife of the archipelago and this results in acting as promoter of the need to preserve nature and ecosystems. However, this is dependent on the sustainable development of tourist activities. Synergies with maritime security, defence, surveillance and civil protection are related, for example, to the possibility of improving surveillance in MPA. Fisheries and aquaculture also represent opportunities for synergies with environmental conservation, because it is becoming recognized by fishers that MPA can contribute to the restoration and maintenance of fish stocks and fishers can contribute to monitoring. Similarly, aquaculture, if well managed, can contribute to decrease fisheries pressures. Even if no synergies were identified, it was yet referred during interviews that navigation and maritime transports could have observers on board to also contribute to monitoring.

Uses compatibilization and Multi-uses

Ocean multi-use (MU) is an emerging concept which responds to the increasing demand for marine resources and space. It has been defined as the intentional "joint use of resources in close geographic proximity by either a single user or multiple users. It is an umbrella term that covers a multitude of use combinations in the marine realm and represents a radical change from the concept of exclusive resource rights to the inclusive sharing of resources and space by one or more users" (*in* (Schupp, et al., 2019).
A study has already been developed in the Azores (Vergílio, Calado, & Caña Varona, MUSES Project Case study 3B: Development of tourism and fishing in the Southern Atlantic Sea (Azores archipelago – Eastern Atlantic Sea, 2017) to identify opportunities of MU development. The study included sectoral stakeholders' consultation to ensure representatives and practitioners of the main sectors were heard and involved. The study also presented a first approach to drivers, barriers, added values and negative impacts of the main MU identified. The concept, however, is still barely known in the Region.
Existing MU identified in the Azores are mainly related to "soft" or traditional uses of maritime space, such as fisheries associated with tourism. The MU combinations identified in the Azores involving environmental conservation and MPA were:
- Tourism & Underwater Cultural Heritage & Environmental Protection;
- Tourism & Environmental Protection;
- Scientific Research & Environmental Protection;
- Aquaculture & Environmental Protection.

<u>Tourism & Underwater Cultural Heritage & Environmental Protection</u>

Due to its location in the middle of the Atlantic Ocean, the Azores has been, for a long time, a strategic stopover point during the Atlantic crossings. This resulted in many shipwrecks around the Azorean islands. Many of them are accessible for visitation but many others were not found and remain submerged. The combination of Tourism & Underwater Cultural Heritage & Environmental Protection was identified in the Azores as existent. This MU is characterized by touristic and recreational activities in relation with UCH taking place on environmental protection areas. UCH

benefits from the conservation management measures of environmental protection areas while tourism benefits from both sectors.

Tourism & Environmental Protection

The combination of Tourism & Environmental Protection was identified by MUSES stakeholders as existent in the Azores and consists of the development of touristic activities inside designated marine areas, managed with the goal of preserving natural resources. Existence of financial incentive systems, the increasing of eco-tourism and the increasing number of designated/managed sites to be explored are the main drivers to develop this MU in the Azores. The activities should, however, be monitored to ensure marine ecosystems and natural resources are not damaged or degraded.

Scientific Research & Environmental Protection

The combination of Scientific Research & Environmental Protection was identified as existent in the Azores, since research is developed inside designated areas, classified or managed with goals of environmental conservation, beyond the research objectives strictly necessary to accomplish the needs of the same designated area. Availability of funds for scientific research and demand for new marine scientific research are significant drivers to the MU.

Aquaculture & Environmental Protection

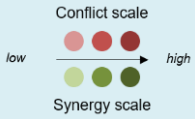
MU combinations including aquaculture might be developed in the Azores if technological barriers, more related to the single use than to the MU (namely resistance to natural and weather conditions during the Azorean winter), are overcome in the future. If this happens, Aquaculture & Environmental Protection has potential to be developed in the Azores. This MU refers to aquaculture facilities being developed within designated areas managed with the goal of preserve natural resources, and might also refer to aquaculture development with species that might improve environmental conditions of spots where they are located (e.g. some species of mussels and algae). These activities should, however, be monitored to ensure marine ecosystems and natural resources are not damaged or degraded.

Land-sea interactions

The characterization of the land-sea interactions of environmental conservation and MPA in the Azores is represented in the table below.

Table 63. Characterization of the land-sea interactions of environmental conservation and MPA in the Azores.

Land-sea		Environmental conservation and MPA					
		Sectoral interviews		2nd Workshop		Literature review	
		C	S	C	S	C	S
Critical areas for the sustainable coastal use	Natural, cultural and scenic special area	0	3	-0.3	3		
	Bathing zones	-2	1	-1.8	1		
	Built-up areas in risk zones	-3	0	-3	0		
Environmental protection	Marine environmental protected areas	0	3	0	3		
	Land environmental protected areas	0	3	0	3		
Coastal protection areas	Built-up areas	-3	0	-2.8	0		
	Agricultural, forestry and other uses	-3	0	-3	0		
	Touristic potential areas	-1	2	-1.5	2		
Infrastructures	Airport	-3	0	-1.8	0		
	Road	-1	0	-1	0		
Navigation	Ports	-3	0	-2.8	0		
	Marinas, 'portinhos'	-2	0	-2.3	0		
Legend	**C** – Conflict; **S** – Synergy; **X** – Existent **-3** – High conflict; **-2** – Moderate conflict; **-1** – Low conflict **0** – Without conflict/synergy **1** – Low synergy; **2** – Moderate synergy; **3** – High synergy **"-"** – Does not answer						



Both during interviews and the workshop, conflicts were identified for all POOC categories that imply mainly economic activities and goals and human intensive use, i.e. edified areas and built infrastructures, bathing areas and touristic zones and agricultural and forestry areas, as these activities have impacts on ecosystems.

On the other hand, synergies between environmental conservation and MPA and coastal activities were only identified for the cases where conservation objectives are present or where naturalness is required for the classification, such as natural, cultural and scenic special areas, areas of environmental protection and touristic potential areas.

Interactions with the environment

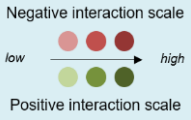
The analysis of the effects of environmental conservation actions and MPA in the environment, using as reference the descriptors to evaluate the GES, according to the MSFD, is also presented through a matrix.

Table 64. Characterization of the effects of environmental conservation and MPA in the environment in the Azores.

Interactions with the environment	Environmental conservation and MPA					
	Sectoral interviews		2nd Workshop		Literature review	
	N	P	N	P	N	P
Biodiversity	0	3	0	3		
Non-indigenous species	0	2	0	2.3		
Exploited fish and shellfish	0	3	0	3		
Food-webs	0	2	0	2.8		
Human-induced eutrophication	0	2	0	2.5		
Sea floor integrity	0	3	0	3		
Hydrographical conditions	0	2	0	2.5		
Contaminants (water, sediments, biota)	0	2	0	2.5		
Contaminants in fish and seafood	0	2	0	2.5		
Litter	0	3	0	3		
Level of noise	0	3	0	3		

Legend

N – Negative effect; **P –** Positive effect; **X –** Existent
-3 – High negative effect; **-2 –** Moderate negative effect; **-1 –** Low negative effect
0 – Without negative/positive effect
1 – Low positive effect; **2 –** Moderate positive effect; **3 –** High positive effect
"-" – Does not answer



For the specific case of marine environmental conservation and MPA, it was expected that negative effects on the environment were non existent. Regional stakeholders, both during interviews and the workshop confirmed this perception. On the other side, measures and actions to be taken and developed under environmental conservation goals and within MPA are deeply related and contribute to the recovery, improvement and maintenance of the GES. For this reason, positive interactions for all descriptors were identified as having moderate or high positive effects.

Additional documents and links

ICES Database: International Council for the Exploration of the Sea (ICES) (http://vme.ices.dk/map.aspx)
Natura 2000 Viewer: an on-line tool that presents all Natura 2000 sites, provides key information on species and habitats for which each site has been designated, data on their estimated population size, conservation status and allows for various searches (http://natura2000.eea.europa.eu/#)
OSPAR Convention: Convention for the Protection of the Marine Environment of the North-East Atlantic (https://www.ospar.org/)
TOP 100: TOP 100 – as cem espécies ameaçadas prioritárias em termos de gestão na região europeia biogeográfica da Macaronésia (http://www.azoresbioportal.angra.uac.pt/files/noticias_Top%20100%20Cap%203%20portugus.pdf)

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Macaronesian Maritime Spatial Planning

ANNEX II. CURRENT MARITIME USES AND CONSTRAINTS - MADEIRA

List of acronyms

AREAM: Agência Regional da Energia e Ambiente da Região Autónoma da Madeira

APRAM, S.A.: Administração dos Portos da Região Autónoma da Madeira

ARM: Autonomous Region of Madeira

EEZ: Economic Exclusive Zone

OOM: Observatório Oceânico da Madeira

POAMAR: Plano de Ordenamento para a Aquicultura Marinha da Região Autónoma da Madeira

UNCLOS: United Nations Convention on the Law of the Sea

Existing maritime uses, activities and constraints in Madeira

1.Fisheries

Sector characterization

The fisheries sector in the Autonomous Region of Madeira (ARM) is influenced by a set of factors that condition it, such as:

- The environmental characteristics of marine ecosystems and the fishing communities that develop there;
- The abundance of available fishing resources;
- The practice of the activity, restricting fishing methodologies that can be used efficiently by the fishing fleet and, consequently, the type of economically viable fisheries that can develop;
- The fact that the islands are surrounded by oligotrophic waters;
- The volcanic origin of the islands of the archipelago, characterized by the narrowness of the insular platform until the bathymetric of the 200 meters.

The fishing activity is a very old activity in the ARM, being rooted in the island lifestyle that includes fishing communities that depend directly on this activity, as is the case of Câmara de Lobos and Caniçal. The low by-catch rate, the impact of fishing on adult species as well as the low environmental impact due to the ban on trawling, determine their artisanal, selective and sustainable character. In spite of the extensive oceanic area, the oligotrophic waters oblige the fishermen to carry out their activity in other areas, such as the Canaries for example.

In the ARM the fishing is based on two great activities, in the fishing of tunas and the fishing of the black swordfish, being the species more captured. Tuna and similar were the most abundant species in 2016, reaching 2,722.6 tons (corresponding to around 47% of the main species caught) and a catch value of 7.4 million euros (corresponding to around 48% of the main species caught). The black swordfish was the second most caught species, reaching 1 916.5 tons in quantity (corresponding to about 33% of the species caught) and 6.9 million euros in value (corresponding to 44% of the main species caught).

The main species captured in the Region will be presented below.

Deep Sea Fishing (Black Swordfish)

The deep-sea fishing carried out with other more aggressive fishing methods, such as bottom-set gillnets and bottom trawls, are prohibited on the slopes of the Madeira-Canary and Azores area, below 200 m depth, in order to protect coral reefs and deep-sea habitats of the effects of fishing, including those in underwater elevations.

The life cycle of black scabbardfish occurs along the Northeast Atlantic, with immature fishes off the British Isles, France and Portugal (Sesimbra), where the adult reproductive specimens are found off the Macaronesian Islands. Fishing is practiced in an artisanal way with the capture of adult

black swordfish, with by-catch being usually small and consisting mainly of species of no commercial value, with the exception of deep-sea sharks.

By 2015 there were about 23 fishing vessels predominantly dedicated to the "deep species" metier, using the deep-sea longline.

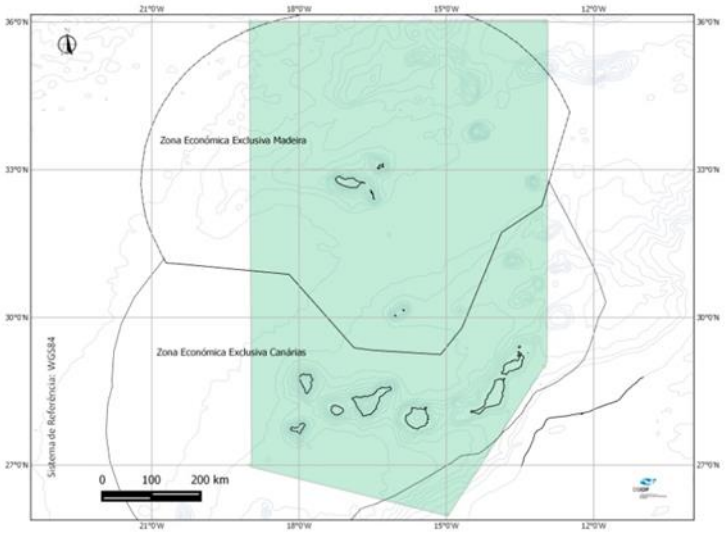


Figure 180. Madeira-Canary Islands (shaded) area, prohibited by the use of bottom-set gillnets and bottom trawls by Community vessels, below the 200 m bathymetric

Tuna fishing

Tuna fishing mainly comprises the fishing of the Patudo tuna by vessels using the live bait. In recent years, it has changed the capture methodology in which it favors the concentration of fish in "stains" which allow a much more efficient use of journeys and sea days, decreasing the time of searching for the tuna schools by the vessels. This method implies a "cooperative" fisheries with several vessels fishing the common shoal. They are an important resource of traditional fisheries in the ARM, constituting as an economic activity of the primary sector traditionally developed in the region and contributing to local consumption of fishing and to the socio-economic value created in the fishing row.

Characterized by pronounced inter-annual fluctuations of their catches, strongly influenced by the variability of environmental oceanic conditions that, directly or through their influence on the abundance of food determine the routes Migratory characteristics of these species and their greater or lesser accessibility to the fishing fleet in this Atlantic area.

The harvest of tuna in Madeira is seasonal, usually starting in March of each year, with the appearance of the *Thunnus obesus* that reaches the maximum capture around the month of May. From June these catches decrease significantly due to the lower abundance of bigeye in the area.

At this time of year the katsuwonus pelamis becomes the target species of the fishery, with maximum concentrations in September and October.

Purse seine

Is an activity carried out by a small number of vessels. Its main target is the capture of a set of fish species, small pelagic, designated locally by "Ruama", in which they stand out, depending on the quantities captured and the economic value provided such the Trachurus picturatus or the scomber colias.

The fishing of siege is carried out in fisheries located in the coastal strip, as a rule at distances from 1 to 2 miles, especially on the south coast of Madeira, being particularly important in front of Cabo Girão and the area between Calheta and Paul do Mar.

The fencing net can reach a height and maximum length of 120 m and 700 m respectively, with mesh size never less than 16 mm, except for the onboard enclosure with mesh size equal to or greater than 8 mm and length up to 400 m, measured in the tenements and maximum height of 70 m.

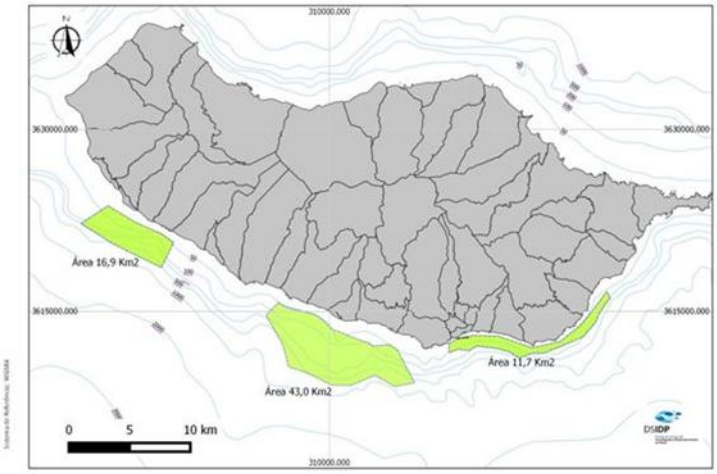
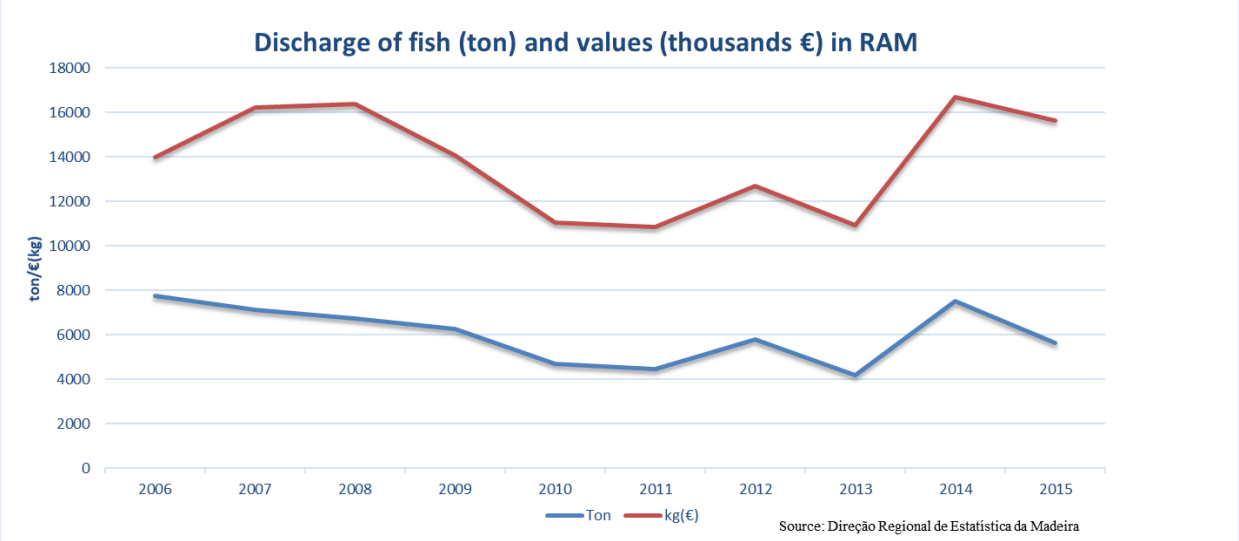


Figure 181 - Geographical distribution of the main fishing areas of purse-seine fishing by the fleet registered in Madeira in 2015
Source: Secretaria Regional da Agricultura e Pescas – Direção Regional das Pescas

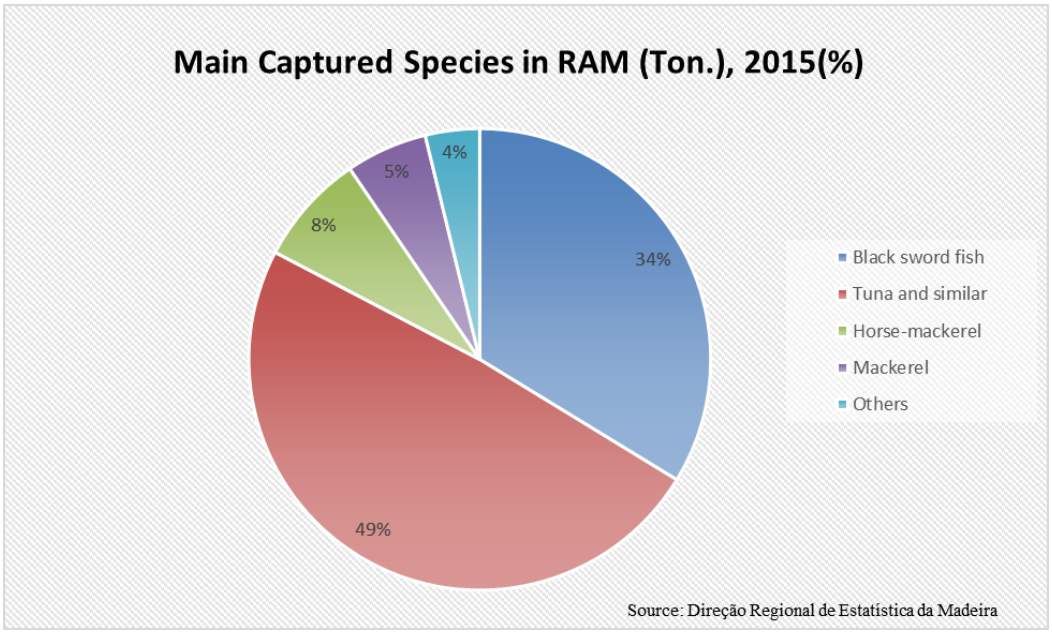
1.1. Statistical information

In 2015, 5641 tonnes of fresh and chilled fish were traded with an average value of € 2.84 kg, corresponding to € 15.6 million.

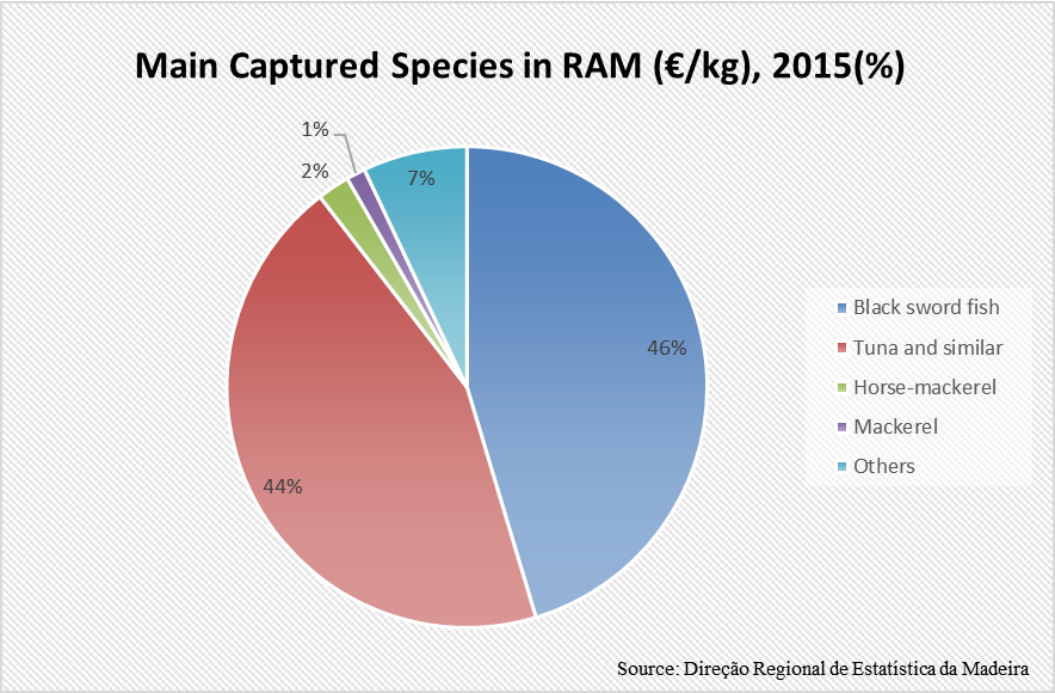


Graphic 1 - Discharge of fish (ton) and values (thousands €) in RAM
Source: Direção Regional de Estatística da Madeira

The following graphs correspond to the landing of several dozen marine species in 2015, in the three auctions (Funchal, Caniçal and Porto Santo) and four fish reception stations (Câmara de Lobos, Madalena and Paul do Mar and Porto Moniz). Currently operating in the islands of Madeira and Porto Santo.



Graphic 2 - Main captured species in RAM (ton) 2015 (%)
Source: Direção Regional de Estatística da Madeira



Graphic 3 - Main captured species in RAM (€/kg), 2015 (%)
Source: Direção Regional de Estatística da Madeira

1.2. Legal framework and constraints

1.2.1. Competent institutions for sector management

The responsible entity for this activity in the Region is the Secretaria Regional da Agricultura e Pescas - Direção Regional de Pescas.

1.2.2. Normative basis and instruments

- Council Regulation (EC) No 1568/2005 of 20 September 2005
- Common Fisheries Policy

1.3. Current spatial distribution

This activity is permitted throughout the regional maritime space, with the exception of places where this activity is prohibited and conditioned by other activities or protection of natural, cultural or other values.

1.4. Analysis of interactions

1.4.1. Interaction with other sectors

The fisheries activity is not compatible with activities that depend of infrastructures (e.g. aquaculture).

1.4.2. Land-sea interaction

This activity is dependent of some terrestrial infrastructures such ports areas.

1.4.3. Interaction with the environment

Once this activity is developed in an artisanal, selective and sustainable way, doesn't have implications with the fishing stock species or with the seabed.

1.5. Additional documents and links

Direção Geral de Recursos Naturais, Segurança e Serviços Marítimos, https://www.dgrm.mm.gov.pt/legislacao-pescas

Instituto de Florestas e Conservação da Natureza, http://www2.icnf.pt/portal/pesca

2. Aquaculture

Sector characterization

Aquaculture should be defined as the production in captivity of animals or plants which have a predominantly aquatic habitat in at least one stage of their life and which have undergone some form of human intervention. The main objective is to increase production through practices such as compound feeding, protection against predators, integration with other species or population control.

According to the FAO (2014) aquaculture production has shown a remarkable growth in the last three decades - increase of 7% to 8% per year - having in 2012 reached a contribution of about 50% for the production of aquatic species used in food. It recognizes that, given the impossibility of increasing catches of wild fish that have stabilized over the last two decades, aquaculture is the best way to meet fish needs for a growing world population. Aquaculture, in addition to contributing to food security, has a vital role to play in creating jobs and developing coastal communities and their economic resilience.

In 2009, the European Commission in its Communication to the European Parliament, *Building a sustainable future for aquaculture - A new impetus for the strategy for the sustainable development of aquaculture, assesses the major constraints to the development of the activity in the European Union*, recommend and appeal to the various European governments to focus on the activity.

Subsequently, in 2013 the European Commission will again provide strategic guidelines for the strategic development of aquaculture in the EU (EC, 2013), proposing to Member States the implementation of Multiannual Strategic Plans, which served as reference for the implementation of the Strategic Plan for Portuguese Aquaculture 2014 -2020 (DGRM, 2014), which is essential for the approval of the National Operational Program and for the implementation of the European Maritime and Fisheries Fund (EMFF).

2.1. Present Situation

The ARM has great potential for the development of aquaculture, due to excellent physical and environmental conditions such as average sea temperature, higher than in continental Europe (monthly averages between 18 and 24°C), stable salinity (between 36.6 ‰ and 36.8 ‰) and weak to moderate undulation on the south coast of the island of Madeira (Torres and Andrade, 2010). In addition to these favorable conditions, ARM has a maternity and research center, qualified personnel, good port infrastructures, good terrestrial accessibility and ease of disposal of the product (Andrade and Gouveia, 2008; Torres e Andrade, 2010).

The activity of marine aquaculture in the region began in 1996, through a pilot aquaculture project in floating cages in Baia d'Abra, in Caniçal for the cultivation of *sparus aurata*. This project aimed to assess the technical and financial viability of offshore aquaculture production.

The South coast of Madeira, due to environmental and physical conditions, presents great potential for the development of aquaculture in floating culture systems.

Aware that the access and use of maritime space for aquaculture and its integration into the various coastal socio-economic activities are fundamental aspects for the sustainable development of the

activity, the Madeira Regional Government has developed the *Plano de Ordenamento para a Aquicultura Marinha da Região Autónoma da Madeira* (POAMAR in Portuguese).

POAMAR follows the ecosystem principles recommended by the FAO (Soto *et al.*, 2008) and was based on a scientific article entitled *Process of decision of spatial analysis in the selection of optimal areas for marine aquaculture: the example of Madeira Island*, which identified the areas with the greatest potential for marine aquaculture in the ARM open sea (Torres and Andrade, 2010).

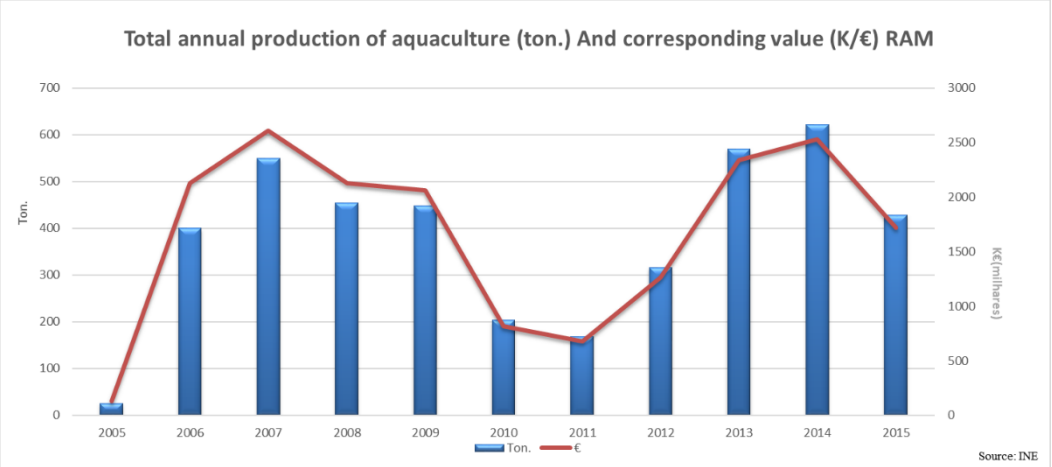
The areas created through POAMAR and placed in the Situation Plan for the installation of floating fish farms in the open sea also allow the cultivation of other species in integrated systems and seem to correspond to the interest of potential investors.

At POAMAR there are five areas of interest for aquaculture on the south coast of Madeira, which are subdivided into several licensing areas: Baía d'Abra, Cabo Girão, Anjos, Arco da Calheta, Calheta - Jardim do Mar / Paul do Mar. The delimitation of these areas took into account the following assumptions:

- Divisions are between the 20 m and 80 m deep bathymetry and are close to the coast (mostly less than 1 000 m)
- These areas consist of divisions of about 1 km², including the navigation corridors to move to the cages and a safe area for aquaculture production
- The areas are not located in areas that coincide with other uses and activities that use the seabed (e.g. aggregate extraction)
- The areas are not in corridors for access to ports and marinas
- Some of the areas are close to the Centro de Maricultura da Calheta, which allows for the development of research activities
- Areas do not coincide with relevant fishing areas or identified as being of vital importance by local fishing communities.

2.2. Statistical information

In the next graph, it is possible to observe the evolution of the aquaculture activity in the ARM since the beginning of the production, in tons (ton.) and per unit value (€ / kg).



Graphic 4 - Total annual production of aquaculture (ton) and corresponding value (kg/€) in the RAM Source:INE

2.3. Legal framework and constraints

2.3.1. Competent institutions for sector management

The responsible entity for this activity in the Region is the Secretaria Regional da Agricultura e Pescas - Direção Regional de Pescas.

2.3.2. Normative basis and instruments

Plano de Ordenamento para a Aquicultura Marinha da Região Autónoma da Madeira (POAMAR) - Resolution no. 1025/2016, JORAM of December 28, 2016

2.4. Current spatial distribution

Figure 182 – Aquaculture áreas. Source: DRP.

2.5. Analysis of interactions

2.5.1. Interaction with other sectors

The compatibility of the aquaculture activity with other activities of common use is also one of the objectives of the planning of the maritime space.

At POAMAR, aquaculture are compatible with the following activities:

- Diving

- Maritime-tourist activities (visitation and observation of cages)
- Wind energy (floating platforms are used in wind energy which, by their dimensions, allow the simultaneous installation of fish production structures without harming the buoyancy and safety of the platforms)
- Scientific investigation

At POAMAR, aquaculture are incompatible with the following activities:

- Extraction of other mineral resources
- Anchorage areas
- Navigation Routes
- Cableways outfalls and underwater pipelines

2.5.2. Land-sea interaction

This activity is dependent of some terrestrial infrastructures such ports areas and also a investigation center, the Centro de Maricultura da Calheta.

2.5.3. Interaction with the environment

Location

The location of an aquaculture unit on the open sea, by its impact, can make the difference between a strong challenge from local communities and an environmentally and socio-economically sustainable unit. However, a good site does not replace good farm management and proper regulation but is rather a key part of an environmentally friendly marine aquaculture.

For this to happen it is necessary:

- Analyze potential conflicts with potential ocean users for commercial, recreational or other
- Assess the area's capacity to disperse or assimilate excess nutrients and other effluents from a production unit in real time, but also taking into account its possible accumulation
- Assess their proximity to sensitive habitats, including marine protected areas
- Consider the potential risk of leakage and its interaction with wild populations
- Assess the risk of disease dispersion between production units and of these to wild populations
- Assess interaction with marine life

Escapes

In order to minimize the impact of this occurrence, aquaculture units must:

- Use localization criteria and the most appropriate operating management procedures in order to minimize the risks to the ecosystem of possible animal leakage or release of viable gametes and to support and promote studies aimed at minimizing these risks

Diseases

In order to control and prevent outbreaks of serious diseases, shall be:

- Establish and maintain a database on pathologies and parasites in the marine environment to support decision-making
- To carry out a sanitary classification of aquaculture areas in the open sea
- Assess the location of the units so as to eliminate or reduce the impact of pathologies in aquaculture and wild populations whenever possible
- Minimize the use of drugs and therapeutic chemicals and, when necessary, their prescription should be made by competent personnel
- Support and strengthen studies to improve the health management of farms and the implementation of mitigation and control strategies for pathogens

Effluents

The criteria and limit values for the emission of the various effluents from aquaculture should be clear and take into account the possible expansion of the activity on a national scale. The regulation and implementation of water quality standards and the emission of effluents by the units should ensure that the impact of such pollution is sustainable by the ecosystem in a long-term perspective and activity expansion.

Activity control

Aquaculture monitoring and regulation should:

- Ensure that this activity does not exceed the load capacity limits of the ecosystems where it is installed
- Be flexible and adaptable in order to respond to the evolution of cultivation methods and techniques or to environmental changes
- Operators should be held accountable for possible environmental repairs, restoration and possible economic losses.

2.4. Additional documents and links

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3.Marine Biotechnology

Sector characterization

Under the Convention on Biological Diversity, ratified by Portugal in 1993, biotechnology means any technological application using biological systems, living organisms or their derivatives, to produce or modify products or processes for specific use.

The economic importance of this activity, taking into account the geographical context of Portugal and the proposed extension of the platform presented to the United Nations, should increase to the extent that the regulated intensification of marine bioprospecting and the development of modern biotechnologies will increasingly enrichment of the communities involved.

Portugal, within the framework of the evaluation process and the necessary studies to support the proposal to extend the platform(EMEPC,2009), the recent focus on blue economy development (DGPM, 2017) and the framework provided by the National Strategy for the Sea (ENM2013-2020), has gathered the knowledge and means to be on the forefront of ocean biotechnology exploration.

3.1. Legal framework and constraints

3.1.1. Competent institutions for sector management

The responsible entity for this activity in the Region is the Secretaria Regional da Agricultura e Pescas - Direção Regional de Pescas.

3.1.2. Normative basis and instruments

This activity is under development so until this moment, the Region don´t have normative basis or instruments.

3.2. Analysis of interactions

3.2.1. Interaction with other sectors

Biotechnology is compatible with the following activities:

- Diving
- Scientific investigation

This activity is incompatible with the following activities:

- Extraction of other mineral resources
- Areas of anchorage
- Navigation Routes
- Fishing
- Submarine cables, outfalls and underwater pipelines

3.2.2. Land-sea interaction

This activity is dependent of some terrestrial infrastructures such port areas.

3.2.3. Interaction with the environment

Following the adoption of the Nagoya Protocol and the national regulations of the measures provided for therein and subsequent Community regulations, through Decree-law no. 122/2017, Portugal has established standards and defined the national authority responsible for implementing them.

The rules set out are intended to ensure that users exercise due diligence in accessing, transferring and using genetic resources, that safe conditions for public health are safeguarded and that the conditions necessary for effective monitoring and control by the competent authority are created. Norms for the holding and registration of collections, as well as good practices, including recognition, are also laid down.

In Community terms, the Guidance Document, published under no. 2016/C 313/01, in the Official Journal of the European Union on 08/27/2016, which sets out the obligations and conditions for the application of Regulation) no 511/2014 of 16 April and of Implementing Regulation (EU) 2015/1866 of 13 October laying down guidelines for good practice on the part of those concerned to obtain benefits arising from genetic Community area.

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4.Mineral extraction

Sector characterization

Since the middle of the 20th century it became clear the existence of new resources in the oceanic domains. The main exploration effort was focused on the search for hydrocarbons in continental geological platforms at depths below 200 m and mineral occurrences in coastal or platform areas. The remaining deeper oceanic realms remained totally inaccessible with existing technology. The development of new technologies applicable to the exploitation of the sea, especially in the second half of the century. XX, made it possible to make vast areas of ocean basins accessible, especially in regions of great depth. The exploration of these unknown territories, especially since the 1970s, has revealed a wealth of new resources whose economic potential is still immeasurable, making these areas of soil and subsoil a new patrimony for the coastal State.

At present, and on a global scale, there is a growing interest in the metallic and non-metallic mineral resources in the soil and subsoil, accompanied by concrete initiatives for the exploration and in some cases exploitation of these resources. For example, it is noted that the safe distribution of drinking water to populations or the development of technologies capable of supplying energy from renewable sources increasingly require the use of metals which are in some cases scarce or difficult to and others are a monopoly of a small number of countries that control the international market.

Thus, the sustainable exploitation of existing resources in the maritime space requires, in a fundamental way, the deepening of the knowledge of marine geodiversity. This knowledge can be obtained either through academic-scientific studies or through exploration and research actions, aiming at the eventual exploration of a given resource. As far as mineral resources are concerned, no systematic prospective study has yet been carried out with a view to assessing the existing economic potential and any reservations contained in the Portuguese continental shelf. However, at the scientific level, and within the scope of the process of extension of the continental shelf by the Mission Structure for the Extension of the Continental Shelf (EMEPC), with the allocation of the national hydrographic vessels of specific equipment for the characterization of the bottom morphology as well as for magnetic and gravimetric surveys and all the scientific work developed by EMEPC, LNEG and IPMA, it was possible to acquire very relevant data about seabed geology and consequently its resources.

The existence of metallic mineral resources in the Portuguese EEZ has been known for several decades. Among the known resources are polymetallic sulphides, polymetallic nodules and cobalt-rich ferromanganese crusts. With the extension of the Portuguese continental shelf, the estimates of the types of known metallic resources are widely increased, opening doors for the discovery of new types of potential resources (EMEPC, 2014).

In this document are presented the main metallic mineral resources already recognized in the national maritime space, or that are associated with a geological context favorable to its occurrence. It should be noted that, in this context, classification as a resource does not include

any implicit consideration of the feasibility of its exploitation at present, nor its constitution as a reserve with economic value.

According to the available data, the main known metallic mineral resources occur in deep oceanic areas, located essentially in continental shelf areas beyond 200 nautical miles, as well as in some areas of the economic exclusive zone (EEZ).

Also included in this sheet are the heavy minerals of detrital origin, originated from the breakdown of all types of rocks. The study of these minerals has been carried out at the level of several areas of geology, of which economic geology stands out, since its concentration can become economically viable for exploration.

Polymetallic Sulphides

Current occurrences of polymetallic sulphides result from the precipitation of metals from the discharge of hydrothermal fluids into the ocean floor, in particular along the young oceanic crust, created in divergent boundary plate regions (oceanic crests). The sea water, when crossing the oceanic crust, gradually heats and reacts with the rocks through which it circulates. This interaction results in chemical exchanges between rock and sea water, which becomes progressively enriched in metals and silica. These fluids, with temperatures that can reach 400°C, are expelled from the black smokers. Contact with the cold sea water enhances the precipitation of metals. These occurrences contain base metals (iron, copper, zinc and lead), and precious metals (gold and silver), with high potential in high-tech metals (eg indium, selenium and tin).

During the last two decades, the Mid-Atlantic Ridge in the Azores region has been targeting international campaigns aimed at finding active hydrothermal systems. In the Azores region five hydrothermal fields, Menez Gwen, Lucky Strike, and Saldanha, located inside the EEZ, and the Moytirra and Rainbow fields, located on the continental shelf beyond 200 nautical miles, have been discovered so far. After its discovery, some of these fields have been studied in a multidisciplinary way and systematically mapped.

These mineral deposits, depending on their age and geological location, can occur on the surface of the marine soil or the small depth, being this important factor in the eventual economic feasibility of the deposit. Until a few years ago it would be economically impossible to exploit mineral resources at 1500 m depth in the seabed, however, gold, copper and silver extraction is in the process of being made at the bottom of the Pacific Ocean. Thus, the economic viability for the mining of this resource can be proven, at least as long as the growing tendency for its demand continues (EMEPC, 2014).

Explorable metals are the base metals (iron, copper, zinc and lead), precious metals (gold and silver) and high-tech metals (indium, selenium and tin). The probable sites for its occurrence are the Atlantic-Middle Crest north of the Azores - Maxwell Fracture Zone, the Mid-Atlantic Crest south of the Azores - Hayes Fracture Zone, and the Rift da Terceira.

The possible exploitation of these deposits will have different impacts, depending on whether the systems are active or inactive, but the most common will be the impact of the removal of the

organisms, the feathers generated by the extraction equipment, the ore washing water, the potential leaching and solubilization of the metals that make up the minerals making them toxic, light, noise and, indirectly, the reduction of populations, the reduction or breakdown of connectivity between populations and the reduction of ecosystem functions and services (Colaço *et al*. 2017).

Polymetallic Nodules

Manganese-rich polymetallic nodules are concretions formed by concentric layers of iron and manganese hydroxides resulting from the combination of the precipitation of metals from seawater and the incorporation of metals present in the sediments where the nodules are formed. They have growth rates of a few millimetres per million years. Typically, the nodules have dimensions between 5 and 10 cm in diameter, and can reach 20 cm. Polymetallic nodules occur in a wide variety of underwater geological environments, being more common in the abyssal plains and ocean platforms between 4000 and 6000 m in depth and may occur, depending on their age and geological location, on the surface of the marine soil or the small depth, being this important factor in the eventual economic feasibility of the deposit.

Occurrences of polymetallic nodules arise in the abyssal plain of Madeira and in the areas adjacent to the Great Meteor underwater mound. There are more areas under Portuguese jurisdiction with great potential, but not yet characterized, this being the metallic resource on which less knowledge is held.

The exploitable metals are nickel, cobalt and copper as major metals, and platinum, tantalum and rare earth elements (REE) as by-products, with abyssal plains having depths greater than 3500 m likely to occur.

The eventual exploitation of this resource, which involves the extraction of the nodules in very extensive areas, raising a thin layer of abyssal sediments, usually referred to as plume, leads to the consequent precipitation of the fine particles that make up the sediment on the bottom, feel many miles away. The deposition of these feathers on the organisms that live in the affected environments, as well as the sediment compaction by the machines, are two of the great environmental impacts that this activity will have in large extensions of the seafloor (Colaço *et al.*, 2017).

Cobalt-rich ferromanganese crusts

Cobalt-rich ferromanganese crusts (Fe-Mn crusts) are formed by the direct precipitation of the metallic elements present in the water column after transport in an oxygen-rich environment (hydrogen-organic precipitation). They can reach about 250 mm thick and the crusts most enriched in metals of economic interest occur preferably in the depth range between 800 and 2500 m, deposited on the rocky substrate on the flanks of seamounts and oceanic ridges.

Hydrogenic precipitation is characterized by very slow growth rates, 1-10 mm / Ma (mm per million years), which enhances the concentration of metallic elements of economic interest, such as cobalt, copper, REE, tellurium, molybdenum, titanium, vanadium and elements of the platinum

group. Hydrogenic deposits are thus considered potential resources for iron and manganese, but especially for those metallic elements.

The recognized occurrences of cobalt-rich Fe-Mn crusts are located in the seamounts south of the Azores and in the Madeira-Tore crest between approximately 700 and 4600 m depth. The deposits of the Madeira-Tore Crest (Muiños *et al*., 2013) show values in metals, such as cobalt, cerium, tellurium, platinum and nickel, comparable to the values of Fe-Mn deposits in the Central Pacific Ocean and which are considered potentially exploitable (Hein *et al*., 2009).

The exploitable metals are cobalt, nickel and manganese, as major metals and REE, platinum, tellurium and platinum, as by-products. The areas where potential can occur are seamounts south of the Azores, including the Great Meteor chain (EMEPC, 2014), and Madeira-Tore Crest (Muiños *et al*., 2013; EMEPC, 2014).

The high levels of cobalt in the Fe-Mn crusts, which are about ten times higher than the concentrations found in terrestrial ores, enhance the economic interest of these crusts.

The possible exploitation of this resource causes, as it does in the eventual extraction of the nodules, the need to extract the crusts in a large area of the seabed. The technology that may be developed in the future for crust exploitation will determine the type of impact on the marine environment. However, some authors argue that the burial caused by the precipitation of sediments from the plumes and the ore washing waters are some of the potential impacts that, due to the physiography of the bottom and the hydrodynamic regime, may have effects in a very extensive area (Colaço *et al*. al., 2017). This is the type of resource in which the development of exploitation technology is more delayed, and there is still no efficient technology for its extraction. The great technological complexity is due to the reduced thickness of the crusts (less than 20 cm), and to the difficulty of separating the crusts from the substrate where they are deposited (Hein & Koschinsky, 2014).

Heavy minerals

Heavy minerals are detrital minerals, with a density of more than 2.85 g / cm3, originating from the disintegration of all types of rocks, and can become economically viable for exploitation, when they constitute the deposits commonly known as placers. These sedimentary accumulations include several minerals of economic interest, among which diamond, gold, silver, platinum, cassiterite, ilmenite, rutile, zircon, monazite and magnetite. These minerals are sources of titanium, thorium, zinc, tin, among other strategic metals of economic interest.

The minerals that come most easily to the coastal zones are ilmenite, rútilo, zircon, monazite and magnetite (Silva, 2000), all these minerals known in the mineralogical procession of the rocks of the Portuguese territory. When there is potential mining in the geological lands crossed by rivers, the economic potential of the platforms for this type of deposits can become significant. In this perspective, the sedimentation of the Douro, Mondego, Tejo, Sado and Guadiana rivers is highlighted for the continental shelf, which for millions of years has dismantled not only a varied range of rocks but also mineral deposits there, sectors of the river mouths and coastal strips south of them (in the case of the west coast), a greater potential for pleasure-type deposits.

There is currently no assessment of the potential of our platform in terms of heavy minerals. However, studies have recently begun under the MINEPLAT project, which will allow an assessment of the potential of these minerals on the continental shelf off the Alentejo (Noiva *et al.*, 2017).

It should be noted that, in this context, the potential in heavy minerals can be regarded as a potential resource of pleasure type, as an economic interest per se or as a by-product of inert holdings, as referred to in the non-metallic mineral chapter.

4.1. Legal framework and constraints

4.1.1. Competent institutions for sector management

The responsible entity for this activity in the Region is the Secretaria Regional do Ambiente e Recursos Naturais – Direção Regional de Pescas

4.1.2. Normative basis and instruments

This activity is under development so until this moment, the Region don´t have normative basis or instruments.

4.2. Current spatial distribution

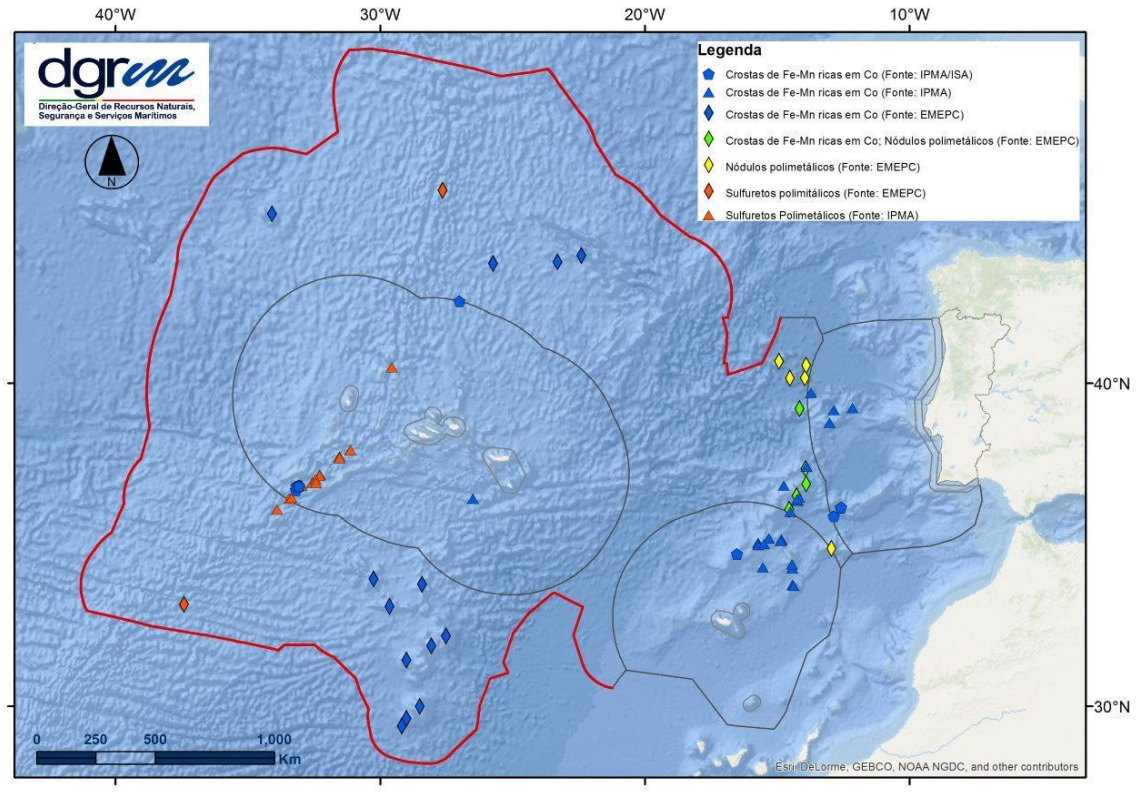

Figure 183 - Occurrence of metallic minerals in the national maritime space.

4.3. Analysis of interactions

4.3.1. Interaction with other sectors

This activity can hardly be compatible with others. Probably the dredging and the exploitation of nonmetallic resources may in theory be seen. However, it must be borne in mind that the exploitation of metallic mineral resources is carried out in marine areas which, because of their depth and distance to the coast, would be difficult to access either by immersing dredgers or by exploiting sands and gravels which are generally the resources.

4.3.2. Land-sea interaction

With the port areas.

4.3.3. Interaction with the environment

In order to understand the potential impacts of marine mining, EU-funded projects (EU-FP7): MIDAS (Managing Impacts of Deep Sea Resource Exploitation; www.eu-midas.net) and JPI-Oceans (Ecological Aspects of Deep-Sea Mining; www.jpi-oceans.eu).

In the particular case of Polimetallic Sulphides, Nautilus Minerals carried out a study of the potential mining impacts for the Solwara 1 deposit, which can be found at http://www.cares.nautilusminerals.com/irm/content/solwara-1-project.aspx?RID=339

It is also worth mentioning that the International Marine Minerals Society (IMMS), advised by ISA, has developed the IMMS Code for Environmental Management of Marine Mining, which can be consulted at http://www.immsoc.org/IMMS_code.htm

ISA also makes available on its website the regulations already approved for the prospection of marine mineral resources www.isa.org

GRID-Arendal established between Norway and the United Nations Environment Program, which provides environmental information, communication and capacity-building services, with the aim of making scientific knowledge comprehensible to the general public and supporting the sustainable development, it also makes relevant information available on its website http://www.grida.no

4.4. Additional documents and links

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5.Non-Metallic Mineral Resources

Sector characterization

Non-metallic mineral resources include minerals whose potential interest as raw material is not motivated by their metallic content, although they have metals in their composition. Examples of non-metallic mineral resources are sand and gravel, kaolin, clay, gypsum and salt. Depending on its economic potential, the content of constituent metal minerals, for example sands, may be regarded as a by-product of the aggregate's extraction.

In the Portuguese continental shelf, in the Madeira subdivision, a study was carried out by the Hydrographic Institute on the south coast of the island of Madeira and Porto Santo regarding the geomorphology of the sea bottoms that includes the nonmetallic mineral resources.

5.1. Present Situation

In the ARM the aggregate´s extraction is carried out by dredging the seabed on the south coast of the island of Madeira, being unloaded in the maritime terminal of Porto Novo and in the Anjos terminal.

There are also records of discharges at the Ribeira Brava, at the Porto Moniz and, in very exceptional situations, at the ports of Funchal and Caniçal. The volumes handled decreased significantly in recent years, accompanying the reduction in activity in the construction of large public works in the region.

Aggregate´s extraction is carried out in the seabed on the south coast of the island of Madeira, particularly in the western sector, between Paul do Mar and Cabo Girão - Ponta do Leão, Madalena do Mar and Lugar de Baixo / Tabua. The extractive zones of Campanário and Ribeira Brava were decommissioned after the establishment of the fish farm and the construction of the Ribeira Brava bathing area, respectively. These zones were reactivated for emergency reasons briefly in 2010.

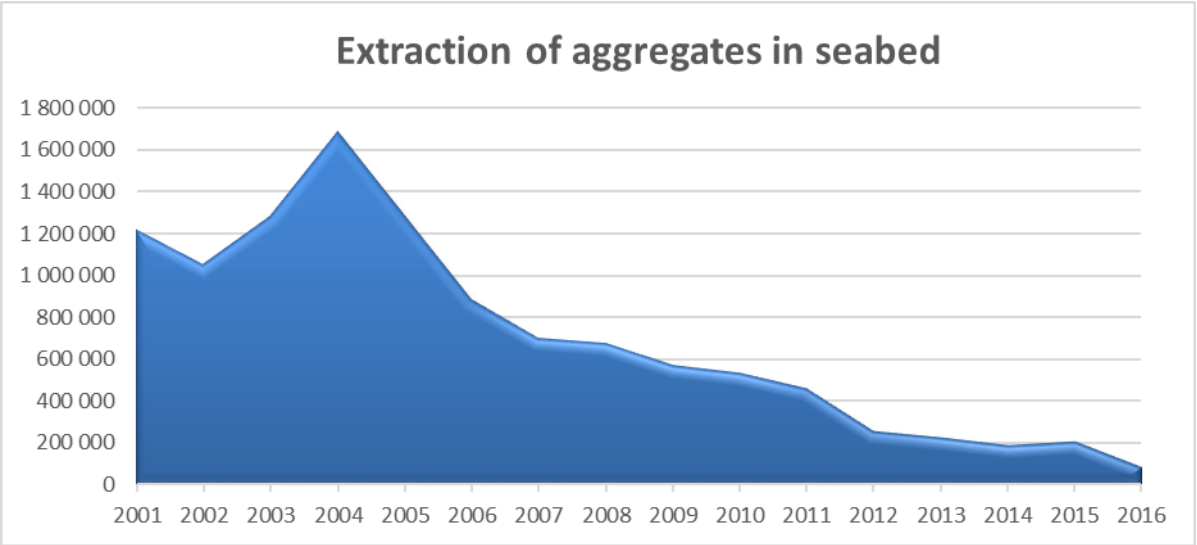
Experimental zones (Ponta da Galé / Jardim do Mar / Paul do Mar) and emergency zones were also used due to the extreme winter weather events of 2009/2010 (Caniço, Gaula and Caniçal areas).

The extraction of aggregates is monitored by the Secretaria Rgional do Ambiente e Recursos Naturais – Direção Regional do Ordenamento do Território e Ambiente, through AIS devices installed on board and an own computer platform that allows to see the geographical location of the vessels.

The Regional Legislative Decree no. 22/2018 / M, of December 12, establishes the legal regime for the commercial extraction of aggregate´s materials in the bed of coastal waters, territorial waters and inland waters subject to the influence of the ARM tides.

5.2. Statistical information

The aggregates volumes have declined substantially in recent years, following the boom in public works witnessed at the beginning of this century (Lopes,2016).



Graphic 5 - Extraction of aggregates in seabed
Source: APRAM, S.A.

5.3. Legal framework and constraints

5.3.1. Competent institutions for sector management

The responsible entity for this activity in the Region is the Secretaria Regional do Ambiente e Recursos Naturais – Direção Regional do Ordenamento do Território e Ambiente.

5.3.2. Normative basis and instruments

The normative basis is the following:

- Regional Legislative Decree no. 28/2008 / M, which establishes the legal regime for the protection and extraction and dredging of aggregate materials from the coastal zone in the Autonomous Region of Madeira, on 12th August. Portugal: Autonomous Region of Madeira, Legislative Assembly, Diário da República, 1st series - no. 155, pp. 5528-5531.
- Regional Legislative Decree no. 14/2013/M alters Regional Legislative Decree no. 28/2008/M, of 12th August, which establishes the legal regime for the protection and extraction and dredging of aggregate materials from the coastal zone in the Autonomous Region of Madeira. of 12th of April. Portugal, Autonomous Region of Madeira, Legislative Assembly, Diário da República, 1st series - no. 72, pp. 2151-2153.
- Regional Legislative Decree no. 17/2016/M, second amendment to Regional Legislative Decree no. 28/2008 / M, of 12th August, which establishes the legal regime for protection and extraction and dredging of aggregate´s materials from the coastline in the

Autonomous Region of Madeira. Portugal, Autonomous Region of Madeira, Legislative Assembly, Diário da República, 1st series - No. 58, p.949.

- Regional Legislative Decree 22/2018/M, of 12th December, establishes the legal regime for the commercial extraction of aggregate´s materials in the coastal, territorial waters and inland waters subject to the influence of the tides of the Autonomous Region of Madeira, Diário da República at the. 239/2018, Series I, 2018-12-12.
- Law no. 49/2006, establishes measures of protection of the coast, of 29th of August. Portugal, Autonomous Region of Madeira, Legislative Assembly, Diário da República, 1st Series. No. 166/2006.
- Ordinance no. no 510/2017 fixing the fees payable for the extraction of aggregate´s materials in the seabed and for the collection of rolled pebbles to be in force during the year 2018 of 29th of December. Portugal, Autonomous Region of Madeira, Vice-Presidency of the Regional Government and Regional Secretariat for the Environment and Natural Resources, Official Journal of the Autonomous Region of Madeira, 1st series, n°222, p 2.

5.4. Current spatial distribution

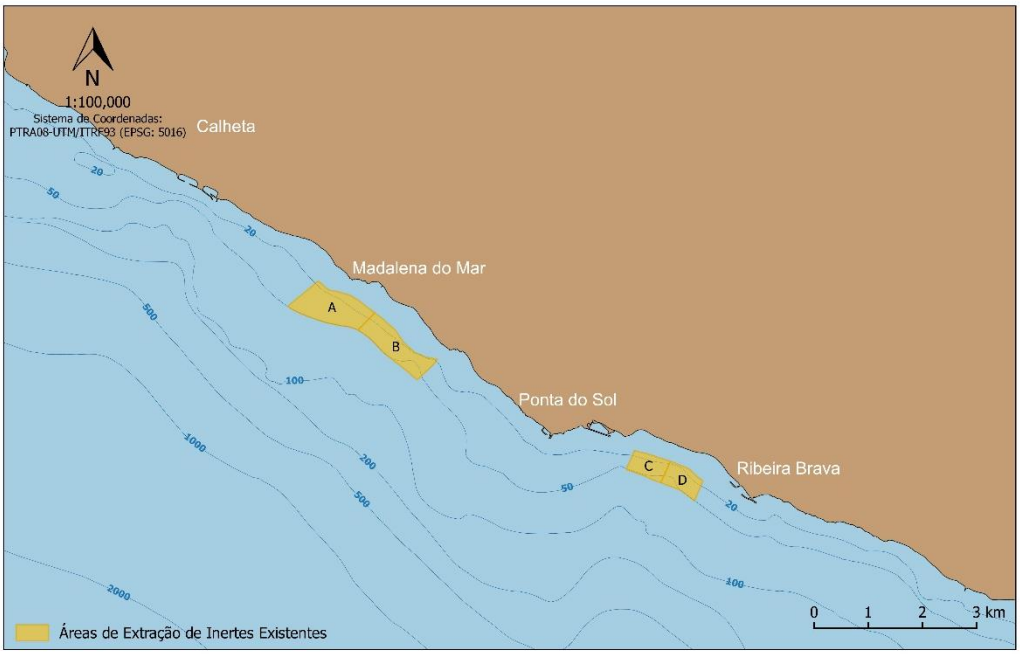


Figure 184 - Location of inert extraction areas. Source: Regional Secretariat for the Environment and Natural Resources - Regional Directorate for Spatial Planning and Environment

5.5. Analysis of interactions

5.5.1. Interaction with other sectors

Regarding the extraction of aggregates, this activity is high incompatible with the aquacultures since it is a physical structure and because and also, the suspended sediments can have harmful effects on aquaculture species.

Also, the aggregate´s extraction is also incompatible with the following activities:

- Underwater cultural heritage
- Artificial reefs
- Marine protected areas
- Cableways, emissaries and underwater pipelines

On the other hand, the aggregate´s extraction is compatible with the following activities:

- Diving (when the boat is not extracting)
- Touristic and sport activities (when the boat is not extracting)
- Navigation (when the boat is not extracting)

5.5.2. Land-sea interaction

This activity is highly dependent of the ports or wharf areas. In this moment, in the Region, the aggregate´s extraction is discharged at port terminal of Porto Novo and Anjos wharf.

5.5.3. Interaction with the environment

The extraction of aggregate´s materials in the seabed can only be carried out as a necessary measure for the economic sustainability of the Region, being only destined to the needs of regional consumption and sustained in studies of sedimentary quantification, qualification and dynamics of the seabed.

The ARM created a set of rules, of a regulatory nature, transposed to the permits that consubstantiate the licenses of extraction of aggregate´s materials, however granted. These allow the environmental parameters to be met, based on the rational and balanced use of existing resources, as well as effective monitoring and management.

The Regional Legislative Decree 28/2008/M of April 12th aims to regulate the economic exploitation of the territorial sea of the ARM, which has a relevant economic interest in the regional market, while creating an indispensable discipline to ensure sustainable management of its resources.

In the island of Porto Santo, the dredging of aggregate´s materials on the beach and sea bed is only destined to artificial feeding of the beach. The extraction of aggregate´s materials is forbidden in the seabed and when carried out from a distance of up to 200 m inland from the baseline.

According to Regional Legislative Decree nº14/2013/M, of April 12th, article 3, paragraph 3, the activities of extraction and dredging of aggregate´s materials are subject to environmental impact assessment under the terms and in accordance with Decree-Law no. 69/2000, of May 3, in its

current version. Licensees shall adopt a monitoring program to be defined by the licensing authority. Charges arising from the installation and operation of the monitoring program are the responsibility of the licensee.

The Regional Legislative Decree no. 22/2018/M, of December 12th, establishes the new legal regime for the commercial extraction of aggregate´s materials in the coastal, territorial and inland water. According with this law, to ensure the sustainable use of aggregate´s resources in conjunction with a high level of protection of the coastline, it is defined annually the overall quota and value for aggregate´s extraction.

Also, regarding the coastal protection, the Hydrographic Institute study, also says, that the exploration of the aggregate´s extraction must be done from the 15 meters bathymetric. In this way, this activity will not interfere with the stability of the coast and the cliffs.

5.6. Additional documents and links

Decreto Legislativo Regional 22/2018/M, de 12 de Dezembro, Estabelece o regime jurídico da extração comercial de materiais inertes no leito das águas costeiras, territoriais e das águas interiores sujeitas à influência das marés da Região Autónoma da Madeira, Diário da República n.º 239/2018, Série I de 2018-12-12.

Decreto legislativo regional n.º 28/2008/M que estabelece o regime jurídico de proteção e de extração e dragagem de materiais inertes da orla costeira na Região Autónoma da Madeira, de 12 de agosto. Portugal: Região Autónoma da Madeira, Assembleia Legislativa, Diário da República, 1.ª série — N.º 155, pp. 5528 – 5531.

Decreto legislativo regional nº14/2013/M, Altera o decreto legislativo Regional nº 28/2008/m, de 12 de agosto, que estabelece o regime jurídico de proteção e de extração e dragagem de materiais inertes da orla costeira na Região autónoma da madeira. de 12 de abril. Portugal, Região Autónoma da Madeira, Assembleia Legislativa, Diário da República, 1.ª série — N.º 72, pp. 2151 – 2153.

Decreto legislativo regional nº17/2016/M, Segunda alteração ao Decreto Legislativo Regional n.º 28/2008/M, de 12 de agosto, que estabelece o regime jurídico de proteção e de extração e dragagem de materiais inertes da orla costeira na Região Autónoma da Madeira de 23 de março. Portugal, Região Autónoma da Madeira, Assembleia Legislativa, Diário da República, 1.ª série — N.º 58, p.949.

Governo Regional da Madeira, Secretaria Regional do Ambiente e Recursos Naturais. Disponível em: https://www.madeira.gov.pt/sra

Instituto Hidrográfico – Divisão de Geologia Marinha (2002) - Levantamento geofísico para caraterização de depósitos sedimentares na Costa Sul da Ilha da Madeira. Projeto GM4102/2002, relatório técnico final, REL.TF.GM.01/02.

Instituto Hidrográfico – DIVISÃO DE GEOLOGIA MARINHA (2003) - Dinâmica sedimentar da costa sul da ilha da Madeira. Projeto GM4103/2003, relatório técnico final. REL.TF.GM.02/03.

Instituto Hidrográfico – DIVISÃO DE GEOLOGIA MARINHA (2007) - Dinâmica sedimentar da costa sul da ilha da Madeira (Cabo Girão à Ponta de S. Lourenço), Projeto GM52OP02, relatório técnico final, REL.TF.GM.02/07.

Instituto Hidrográfico – Divisão de Geologia Marinha (2008) – Caraterização dos depósitos sedimentares da plataforma insular sul da ilha do Porto Santo. Projeto GM 52OP02., REL.TF.GM.01/08.

Lei nº49/2006, Estabelece medidas de proteção da orla costeira, de 29 de agosto. Portugal, Região Autónoma da Madeira, Assembleia Legislativa, Diário da República, 1ª Série. n.º 166/2006.

Lopes, M. I. (2016) - Proposal for the Constitution of a Sea Cluster in the Autonomous Region of Madeira and the Role Performed by the Maritime Spatial Planning, Tese de Mestrado em Gestão do Território – Território e Desenvolvimento, Universidade Nova de Lisboa –Faculdade de Ciências Sociais e Humanas, Lisboa

Portaria n.º 510/2017 que fixa as taxas devidas para a extração de materiais inertes no leito das águas do mar, bem como para a recolha de calhau rolado, para vigorarem durante o ano de 2018, de 29 de dezembro. Portugal, Região Autónoma da Madeira, Vice-Presidência do Governo Regional e Secretaria Regional do Ambiente e Recursos Naturais, Jornal oficial da Região Autónoma da Madeira, 1ª série, nº222, p 2.

6.Renewable Energy

Sector characterization

The ARM as an outermost island region, far from major continental energy networks, has high costs for energy supply and conversion due to transport and the smaller scale of the market.

According to the Madeira Island Sustainable Energy Action Plan and the 2012 Porto Santo Sustainable Action Plan for Energy, ARM is heavily dependent on fossil fuels. Although the region has pursued an energy policy aimed at reducing external dependence and minimizing negative environmental impacts associated with fossil fuels, demand growth has increased in the last decades and is largely supported by imported fossil fuels. In the European Union, one of the measures contemplated in Blue Growth is the enhancement of offshore renewable energies. This sector can contribute to fostering the exploitation of endogenous energy resources, minimizing the use of land by the energy sector and reducing greenhouse gas emissions.

6.1. Present Situation

In this moment, the information about the energy resources in the oceanic environment in the Madeira archipelago are currently very scarce. The *Madeira Waves Atlas*, promoted by the Agência Regional da Energia e Ambiente da Região Autónoma da Madeira (AREAM) in 2005, contains a mapping of the energy of the waves in 33 points of the coast in the islands of Madeira and Porto Santo, in waters of low depth (up to 50 m), based on climate statistics and numerical modeling.

AREAM is currently evaluating the densities of three marine energy resources (ripples, local sea currents and wind) in order to assess the potential available based on the climatic series of the last 30 years around the islands of Madeira and Porto Santo.

6.2. Legal framework and constraints

6.2.1. Competent institutions for sector management

The responsible entity for this activity in the Region is the Agência Regional da Energia e Ambiente da Região Autónoma da Madeira.

6.2.2. Normative basis and instruments

This activity is under development so until this moment, the Region don´t have normative basis or instruments.

However, we can highlight the publication of Madeira Waves Atlas, which reflects the first effort to implement this type of energy in the Region.

6.2.3. Current spatial distribution

In this moment this activity is not developed in the Region.

6.3. Analysis of interactions

6.3.1. Interaction with other sectors

Given the difference in the maturity of systems for producing electricity from renewable sources in the ocean environment, as well as the multiplicity of technological solutions, the use compatibility analysis was carried out in a generic way, based on the knowledge of the most promising technologies in the current context.

As floating offshore wind systems have the highest degree of maturity, the analysis of the compatibility of uses will be indicated mainly for the use of this energy resource, although it may also be applicable to other floating structures. The offshore wind systems and other floating energy structures are compatible with the following activities or uses:

- Aquaculture
- Artificial reefs
- Diving and underwater marine sports

The offshore wind systems and other floating energy structures are weakly compatible or incompatible with the following activities and uses:

- Navigation routes
- Low altitude aerial navigation
- Navigation routes
- Exploration of aggregates or mineral resources

6.3.2. Land-sea interaction

This activity is dependent of some terrestrial infrastructures (e.g. to store the energy produced.

6.3.3. Interaction with the environment

The best practices to be developed in renewable energy research, demonstration and exploitation projects are as follows:

- Design
- Licensing
- Installation and operation
- Decommissioning

As guidelines, in each of the phases, environmental sustainability must be safeguarded, the costs of not using common uses must be safeguarded, the safety of operators and third parties should be guaranteed, and the return of technical and scientific knowledge should be assured.

In this sense and in general terms, the following steps should be considered:

- Ensure the process of technological development complies with international standards of good practice

- To elaborate a study of characterization of the marine zone: biodiversity, physical and chemical characteristics and evaluation of the main impacts resulting from the activity, namely those susceptible to affect the conservation of habitats and species of flora and fauna
- Ensure in each project the safeguarding of the underwater archaeological heritage identified or to be found
- Ensure that the landscape is safeguarded
- Adopt the best maritime reporting practices in each project, considering the existence of other projects and uses in the area
- Prepare the decommissioning phase by ensuring that all works, infrastructures and equipment are removed, except if they are necessary for a new project, or if, in the meantime, the consolidation of the ecological system is more than costs related to its maintenance
- Implement marine monitoring programs
- Try to develop solutions that allow compatible uses to be implemented, in the same area projected to the surface, either in time or space
- Establish system of lessons learned

6.4. Additional documents and links

Agência Regional da Energia e Ambiente da Região Autónoma da Madeira, Direção Regional do Comércio, Indústrias e Energia e Empresa de Eletricidade da Madeira (2012), Plano de Ação para a Energia Sustentável (ilha da Madeira).

Agência Regional da Energia e Ambiente da Região Autónoma da Madeira, Direção Regional do Comércio, Indústrias e Energia e Empresa de Eletricidade da Madeira (2012), Plano de Ação para a Energia Sustentável (ilha do Porto Santo).

AREAM – Agência Regional da Energia e Ambiente da Região Autónoma da Madeira. Available at: https://aream.pt/

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Comissão Europeia, Comunicação da comissão ao Parlamento Europeu, ao Conselho, ao Comité Económico e Social Europeu e ao Comité das Regiões, Crescimento Azul: Oportunidades para um crescimento marinho e marítimo sustentável, Bruxelas, 13.9.2012 COM (2012)494 Final

Comissão Europeia, Comunicação da comissão ao Parlamento Europeu, ao Conselho, ao Comité Económico e Social Europeu e ao Comité das Regiões, Energias Renováveis: Um agente decisivo no mercado Europeu da Energia, COM (2012) 271.

UNDER 2 MOU, Global Climate Leadership memorandum of Understanding. Disponível em: http://under2mou.org/

7.Submarine cables, ducts and outfalls

Sector characterization

Submarine Cables

Submarine cables are a submerged telecommunications infrastructure designed to transmit communications signals (circuits) between land-based telecommunications stations. They may include coaxial cables, fiber optic cables, amplification systems, power systems, and telemetry and management systems.

These cables can not only connect points of the same country but also connect points from different countries located in other continents, for example between Europe and South America or between Portugal mainland and the archipelagos.

These cables provide for the transmission of electronic communications data, in particular the internet, mobile data, as well as fixed-line communications.

The aggressions (cuts) made to submarine cables cause damages in the telecommunications infrastructures, causing the interruption of communications, which may affect not only communications in Portugal but also all intra and intercontinental communications. The submarine cables contain an electrified conductor, whose voltages can amount to thousands of volts, meaning that in case of cutting or drilling, high voltage can be fatal.

The United Nations Convention on the Law of the Sea (UNCLOS) of 10th December of 1982 (ratified by Presidential Decree no. 67 67 A/97 of October14th) establishes, in accordance with Article no. 87, that the high seas are open to all States, inter alia, to lay submarine cables and pipelines. Placement of submarine cables and pipelines on the continental shelf is regulated by Article no. 79 and in which it is established that the route of the line for its installation is subject to the consent of the coastal State.

Outfalls

Outfalls are structures composed of wastewater discharge pipes pre-treated in the ocean. The submarine outfalls seek to mobilize the maximum self-purifying capacity of the medium, moving away the point of discharge from the shore, which ultimately minimizes the degree of pre-treatment required at Wastewater Treatment Stations. The use of properly dimensioned submarine outfalls eliminates the need for tertiary treatment and decreases the required secondary treatment intensity.

The installation of these infrastructures should take into account the Decree-Law no. 38/2015 of March 12th, relative to the issuance of a private use title in the maritime space and Decree-Law no. 226 - A/2007, of May 31th, concerning the use of water resources.

Submarine Ducts

In the ARM, the submarine pipelines are destined to the transport and discharge of fuels and inert ones.

7.1. Present Situation

Submarine Cables

The ARM is equipped with a modern communications network, with high bandwidth and connectivity levels.

Due to its geographical position, Madeira archipelago is a strategic link between several submarine cables that connect the European continent with the American and African continents, which ensures connectivity with the rest of the world.

The ARM is connected to the rest of the world through the following cables:

- The cable Euráfrica, which connects ARM to Portugal mainland (Sesimbra), France (Saint-Ileire de Riez) and Morocco (Casablanca). Created in 1992 has a capacity of 560Mbits (4x140 Mbits)
- The SAT 2 cable connecting ARM to the Canary Islands, South Africa (Cape Town). Created in 1993 has a capacity of 2x560Mbits
- The Atlantis 2 cable is connecting ARM to Portugal mainland, Spain, Senegal, Cape Verde, Brazil and Argentina. Created in 2000 it has a DWDM capability and can be extended as needed
- The cable Continente - Azores - Madeira (CAM). Created in 2003 with DWDM capability and can be expanded as needed
- The cable Madeira - Porto Santo (CAM). Created in 2003 with DWDM capability and can be extended as needed
- The Africa Coast to Europe (ACE) cable that also passes in the ARM economic exclusive zone. It was installed in December of 2012
- The West African Cable System (WACS) cable that also passes the ARM economic exclusive zone. It was installed in May 2012.

Outfalls

On the Madeira island there are the following submarine outfalls:

- Câmara de Lobos outfall
- Funchal outfall
- Caniço outfall
- Santa Cruz outfall

On the Porto Santo island there are the following submarine outfalls:

- Ribeiro Salgado outfall

- Ribeiro Cochino outfall
- Penedo outfall

Submarine Ducts

In the ARM, the existent submarine pipelines are in the Caniçal fuel terminal and in the old terminal of the Anjos. In the first case, the entity responsible for the management of the pipelines is CLCM - Companhia Logística de Combustíveis de Madeira, S.A., and is intended for the discharge of fuels. In the second case, it is destined to the discharge of aggregates and is in the terminal of the Anjos, being a movable structure.

At the Caniçal fuel terminal, there are three submarine pipelines. Each of these pipelines consists of:

- 77m of underwater hoses;
- 1 x Marine Breakaway Coupling - system that is operated in case of overpressure or traction during ship unloading operations - inserted in the subsea hose assembly);
- 1 x Pipeline End Manifold - hydraulically and remotely controlled unit for the actuation of safety and operating valves - unit at 22m depth and which connects the underwater hoses to the carbon steel pipeline. for remote reading of physical characteristics of the products to be operated and instrumented functions of security.

In addition to the submarine pipelines, there are air ducts that, due to their importance or size that occupy in the maritime space, can conditionate the development of some activities or uses. The air pipeline of the Socorridos terminal is in full sea space and is intended for the discharge of cements. Until January 2015, this terminal also served to discharge fuel to the Empresa de Eletricidade da Madeira, S.A. In the Porto Santo island, the existing pipelines are aerial and are destined to the discharge of cement and fuels.

7.2. Legal framework and constraints

7.2.1. Competent institutions for sector management

The responsible entity for this activity in the Region is the Águas e Resíduos da Madeira and the APRAM, S.A. – Administração dos Portos da Região Autónoma da Madeira.

7.2.2. Normative basis and instruments

- Plano de Gestão da Região Hidrográfica do Arquipélago da Madeira (RH10)

7.3. Current spatial distribution

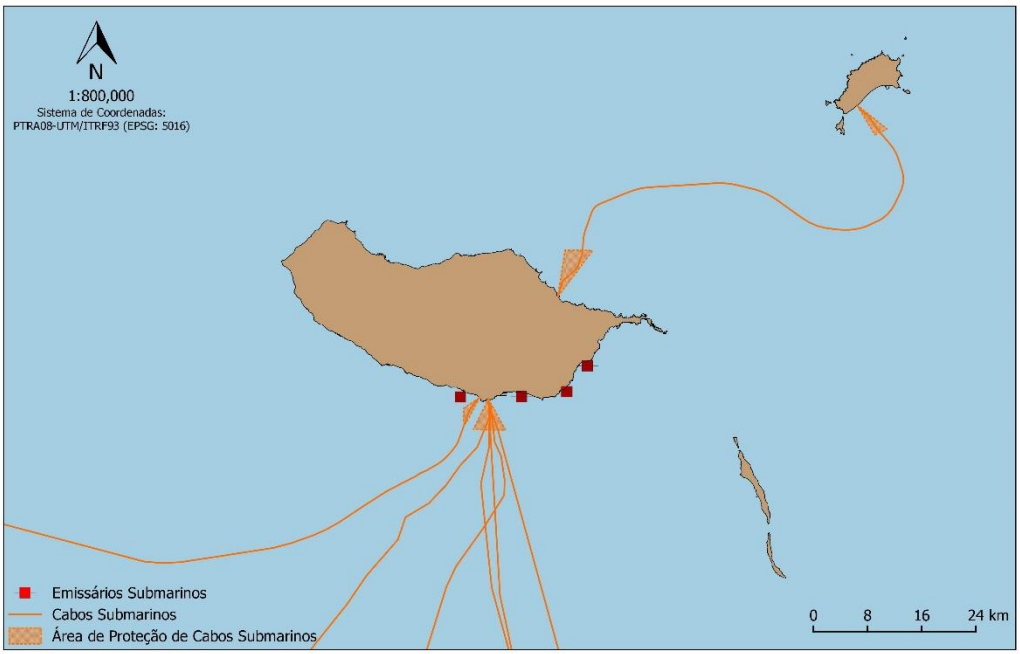

Figure 185 - Outfalls and submarine cables (island of Madeira). Source: PGRH 2016 - 2021 and Hydrographic Institute

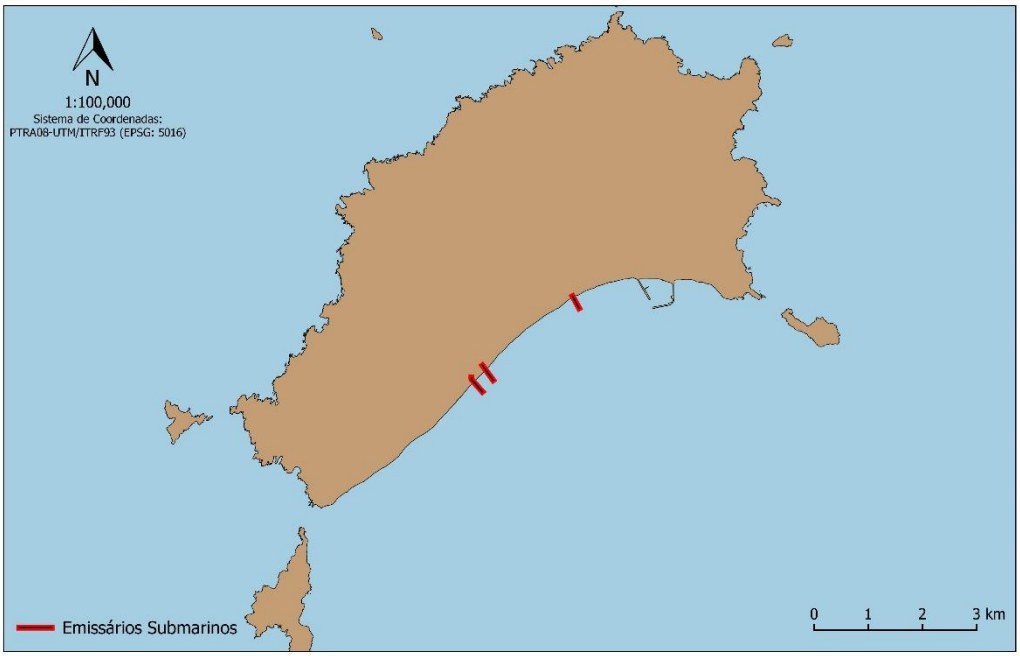

Figure 186 - Existing submarine outfalls on the island of Porto Santo. Source: Water and Waste from Madeira, S.A.

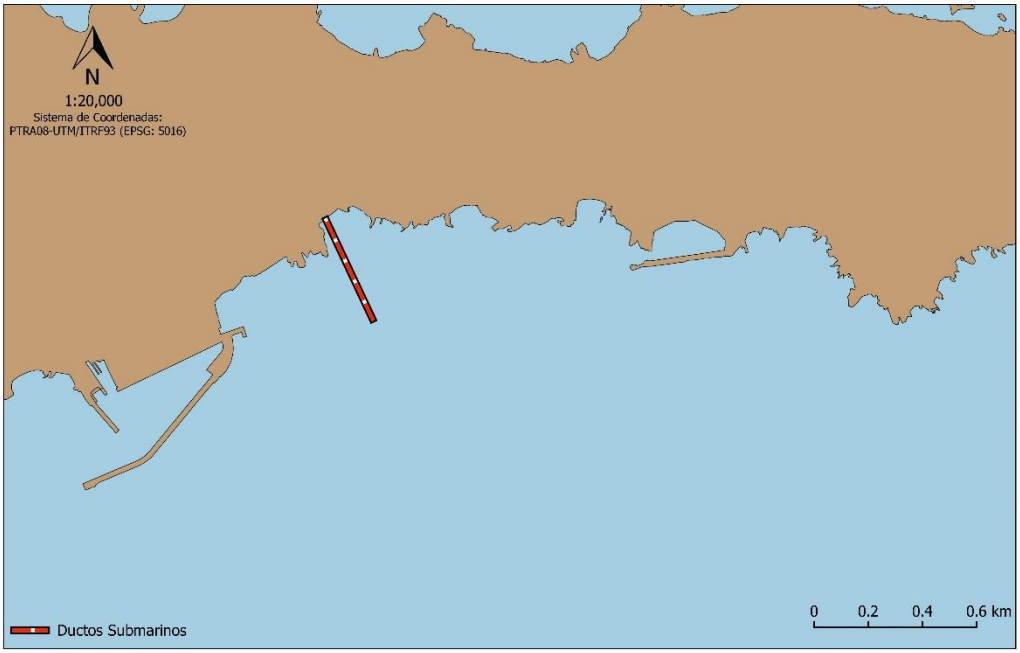

Figure 187 - Location of the submarine pipeline at the Caniçal terminal. Source: APRAM, S.A.

7.4. Analysis of interactions

7.4.1. Interaction with other sectors

Within the area of protection of submarine cables and their area of cables as well as outfalls and ducts, it is prohibited to carry out any activity that may damage submarine cables, such as:

- Aquaculture
- Aggregates extraction
- Dredging material
- Use any nets or fishing gears that reach the seafloor

The following uses and activities with submarine cables and emitters are compatible:

- Navigation and traffic routes
- Sports

7.4.2. Land-sea interaction

This kind of structures are dependent of some infrastructures (e.g. port areas, wastewater treatment).

7.4.3. Interaction with the environment

Submarine Cables

National and international legal regulations impose conditions for the use of the sea in areas where submarine cables pass, providing sanctions for those who violate these conditions and endanger the integrity of submarine cables and pipelines.

At national level, the Decree-Law no. 507/72, of December 12th, seeks to identify the forbidden and sanctionable practices, based on the United Nations Convention on the Law of the Sea.

The Hydrographic Institute has also contributed to the dissemination and enforcement of good practices through nautical charts, including electronic charts where it reproduces cartographically along the coast the maritime marks that indicate the orientation of submarine cables, as well as an area of protection, to a distance where a high depth is registered, from which it is not foreseen to carry out activities that put the integrity of the cables at risk.

The annual warnings to seafarers' groups include special warnings which contain information about submarine cables and the procedures to be followed in the immediate vicinity where they are located. One measure was the creation of zones of protection of the cables that allow to identify the areas more susceptible to the possibility of contact with the submarine cables.

Outfalls

The submarine outfalls are constantly monitored to assess the impacts they may have on the marine ecosystem. The Management Plan of the Hydrographic Region of the Madeira Archipelago analyze the impact of the discharge of the effluents resulting from the wastewater treatment in terms of microbiological contamination and in the trophic state of the marine environment.

Submarine Ducts

At the Caniçal terminal, in order to promote environmental safeguards, CLCM and Maritime Authority has the following means available to reduce the impacts in the ecosystem:

- In each of the mooring buoys were placed two bags with absorbent barriers, 25 meters each (50 meters in total), to close the area between the North buoys and the area between the South buoys, thus providing an even more intervention in case of a spill
- Maritime pollution control barriers placed on land will serve to cover and close the area to the West or the East
- CLCM-owned marine pollution control barriers and all auxiliary offshore equipment (Nofi Boom Bag and RO-BOOM 1300) are in a dedicated container at the end of the South Pier with the North Pier of 40 '). In this container there is also a RO-BOOM 2000 Pollution Control barrier owned by the Maritime Authority
- VHF communication means CLCM / ships and radios of the SIRESP network
- The Marine Breakaway Coupling, which is activated in the event of overpressure or traction during ship unloading operations, is inserted into the underwater hoses, acts as a fuse and is intended to mitigate marine pollution if it is exceeded the maximum pressure established for the unloading operation or the ship having to leave the mooring buoys with urgency without having time to loosen the mooring ropes. This device is actuated by isolating both ends of the hoses attached to it and the ship carries with it part of the hoses, allowing rapid exit from the mooring site
- In all hose handling operations (beginning and end of discharge operations), a team of professional divers accompanies the work
- Every 3 years and in accordance with the manufacturer's recommendations, the Marine Breakaway Coupling, is replaced by a factory refurbished. The hoses are ground tested

(Caniçal dock) and subjected to pressure testing, vacuum testing and electrical continuity testing. After reassembly of the subsea assembly, a new hydraulic test is carried out to check leaks

- The mooring system (buoys and chains) is subject to semi-annual underwater surveys, or whenever necessary and quarterly to dry zone inspections.

7.5. Additional documents and links

Autoridade Marítima Nacional, Capitania do Porto do Funchal. Available at: http://www.amn.pt/DGAM/Capitanias/Funchal/Paginas/Capitania-do-porto-do-Funchal.aspx

Autoridade Nacional de Comunicação, ANACOM. Disponível em: https://www.anacom.pt/

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Decreto-lei nº263/2009 de 28 de setembro. Portugal: Diário da República, 1ª série, nº 188, p.6967-6972

Decreto-lei nº38/2015 de 12 de março. Portugal: Diário da República, 1ª série, nº50, p.1523-1549

Decreto-lei nº45/2002 de 2 de março. Portugal: Diário da República, 1ª série – A, p.1758-1761

Department of foreign affairs and trade, Convention for the Protection of Submarine Telegraph Cables (Paris, 14 march 1884).

ESCA Article "Submarine Power Cables Ensuring the lights stay on!"

ESCA Article "Submarine Telecommunications Cables"

ESCA Guideline "Power Cable Installation Guidelines"

Geoatributo - Plano de Gestão da Região Hidrográfica do Arquipélago da Madeira (RH10), Secretaria Regional do Ambiente e Recursos Naturais.

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8.Scientific research
Sector characterization

The areas of scientific research are intended for the development of pilot projects, test and demonstration zones covering various areas of knowledge. Although scientific research can be developed throughout the regional maritime space, strategically, due to its oceanographic, geographic and proximity characteristics of terrestrial equipment and infrastructures, which foster the development of pilot projects or demonstration and testing zones.

8.1. Present Situation

In this moment, it´s possible to develop this activity in all the Regional maritime space.

Due to the oceanographic, physical and geographic characteristics and mainly logistic, most of the research areas are mainly developed on the south coast of Madeira and Porto Santo and along the coast of the Desertas and Selvagens islands.

8.2. Legal framework and constraints

8.2.1. Competent institutions for sector management

The responsible entity for this activity in the Region is the Observatório Oceânico da Madeira.

8.3. Analysis of interactions

8.3.1. Interaction with other sectors

The scientific research doesn't have any restrictions regarding the other maritime activities.

8.3.2. Land-sea interaction

This activity is dependent of the port areas and investigation units. In the case of the Madeira island, one of the investigation units are near to the coast and to Calheta marina. This is important for the investigation once they quickly arrive to the laboratories to analyse the data, for example.

8.3.3. Interaction with the environment

In view of the existence of significant areas of environmental value which need to be protected, it is important to ensure that potential impacts of research campaigns including removal techniques are minimized, especially if they occur in areas with particularly sensitive habitable habitats irreversible damage.

8.4. Additional documents and links

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9.Recreation, Sports and Tourism

Sector characterization

The geographic and physical characteristics of the region, marked by mild climate, favorable oceanographic conditions throughout the year, as well as by marine ecological values, have provided the development of recreational, sport and tourism activities. These activities have a strong tradition in the region, expressing themselves in the existing infrastructures and in the dynamics associated with the search for these activities.

The maritime space is currently a very sought-after resource for the development of activities linked to the tourism sector, which includes nautical tourism, recreation and leisure.

The *Estratégia para o Turismo 2027* defines nautical tourism and related activities, as priority projects to affirm tourism in the economy of the sea.

Within nautical tourism, the nautical recreation includes all activities related to the practice of water sports (e.g. sailing, kiteboarding, bodyboarding, surfing, windsurfing, skimboarding, paddle surfing, longboarding, diving, rowing, kayaking, sport fishing, motor boating, among others) and tourist cruises. Nautical tourism also includes nautical sports, that is, all kinds of activities whose core is the component of competition, regardless of whether your mother is amateur or professional.

However, where it is necessary to reserve a certain area or volume of the maritime space for a certain period of time, which may be prolonged or temporary, intermittent or seasonal, the use ceases to have characteristics of common use and enjoyment and becomes have characteristics of private use. Examples of private uses of maritime space are the following uses and activities:

- Playgrounds, moorings for nature observation
- Sports competitions of various types, such as regattas, surfing championships or other sports, where the area in which the test is being conducted is unequivocally delimited
- Another activity that requires the establishment or construction of a structure in the sea, such as sport fishing when associated with a structure built for this purpose, submerged hotels, artificial islands, etc.

9.1. Present Situation

Recreational Boating

Recreational boating is an important activity that has grown in recent years in the Region due to the natural conditions, landscape and safety offered in the berthing areas for the development of its practice. Recreational boating is a complementary product of sun and beach tourism, promoting the creation of differentiated employment and the emergence of upstream and downstream

activities, and also, contributes to the defense of environmental values, to a greater connection of the population to the sea and to the dynamism of local communities

The recreational boating is a concept that promotes the contact with the sea, by which it includes the sport activity, recreational navigation, maritime-tourist activities. The existence of a potential regional market for the development of this activity, gives it a significant role in the development of the regional blue economy and allows territorial development with tourism potential.

Recreational leisure activities at the ARM are mainly concentrated on the south coast of Madeira and Porto Santo, where rippling conditions are more favorable to the development of this activity.

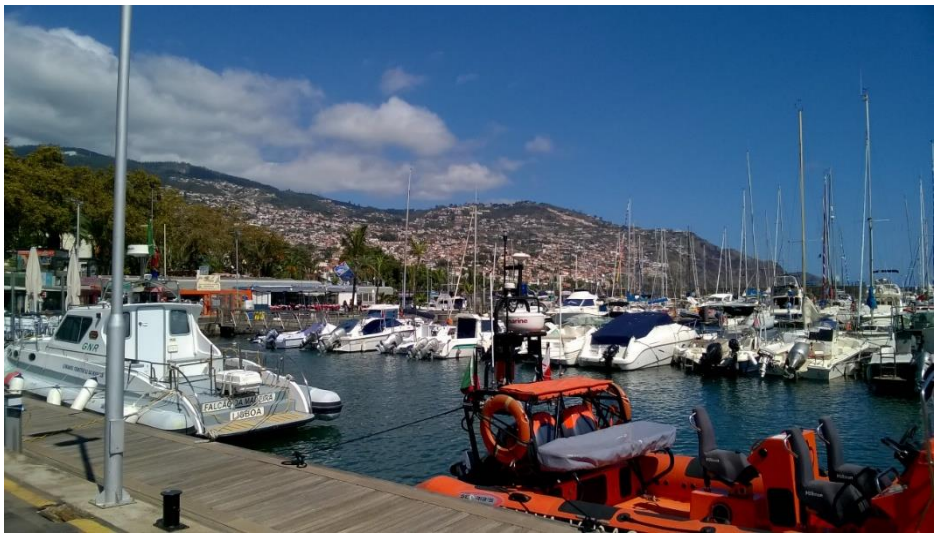


Figure 188 - Funchal marina
Isabel Lopes

International ship registry of Madeira (RINM-Mar in Portuguese)

The International Ship Registry of Madeira (RINM-Mar) was established with the aim of avoiding the process of flagging out ships for other flags, attracting new ship owners and ensuring that ship safety standards were met.

The registration offers an attractive tax regime applicable to vessels and shipping companies duly licensed to operate within the scope of the International Business Center of Madeira. As an EU register, the RINM-MAR allows full access to community waters and ensures the supervision of all registered vessels.

RINM-Mar is the second Portuguese registry and is among the highest quality international registrations. All international conventions to which Portugal is a signatory are fully applicable and respected by RINM-Mar.

RINM-Mar accepts registration of commercial vessels, oil rigs, commercial or private yachts and recreational craft.

All the measures and efforts employed by RINM-Mar have led to a positive development in the register of ships.

Water sports activities (sports activities)

In the Basic Law of the Regional Sports System, article 30 states that the regional public administration and public and private sports entities should encourage the practice of physical and sports activities in the open air, in contact and in respect for nature. In measure 54 of the XII Program of the Regional Government of Madeira, it is mentioned that a new framework strategy should be developed for sport in nature, valorization of natural resources (sea and mountain), in order to promote activities carried out in the open air, in contact with nature and in their defense and protection.

The physical, climatological (mild climate) and oceanographic conditions (extensive coastal border, water temperature) Region that provide sports activities, as well as the great enthusiasm of the young population, explains to a considerable extent to the dynamics associated with sea sports.

To this end, future strategies should include investments in port infrastructures (ports e.g.) that do not provide adequate safety conditions for the development of sport, investment in sports education, encouraging the general population to practice sport for the development of a greater number of national and international sports events and championships in the Region.

In the Region, the main sports activities related to the sea are the following:

• Open water activities - Corresponds to the swimming activity, practiced in the open sea, on the south coast of the island of Madeira and Porto Santo, where the sea is more conducive to the development of this activity. In the Region there is a swimming championship between the island of Madeira and the Desertas islands, usually held annually.

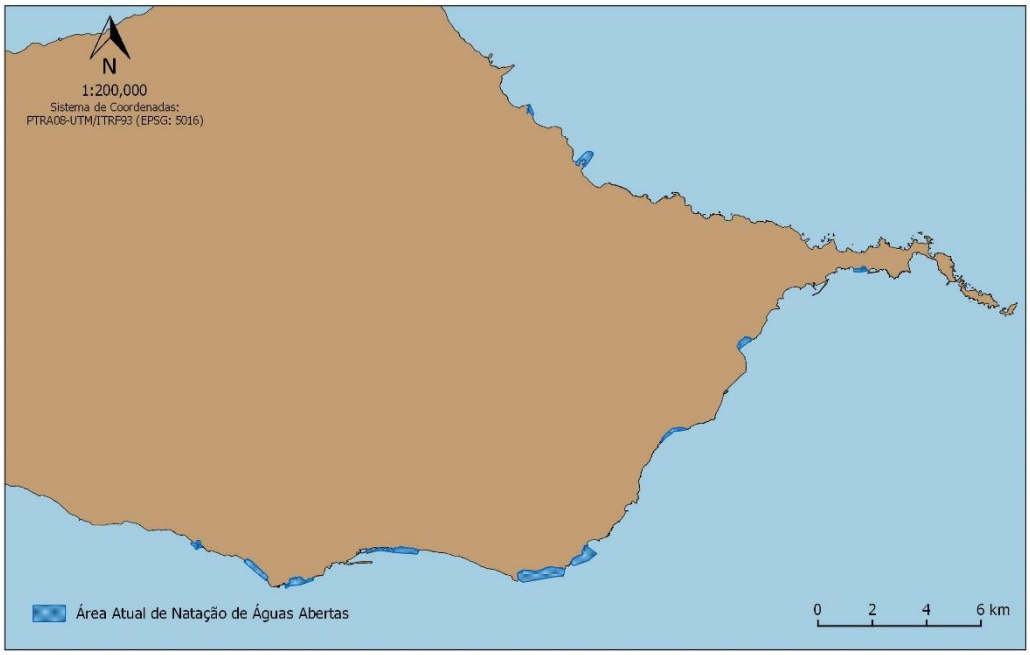


Figure 189 - Open water swimming area – current area (Madeira island)
Source: Secretaria Regional da Educação -Direção Regional da Juventude e Desporto

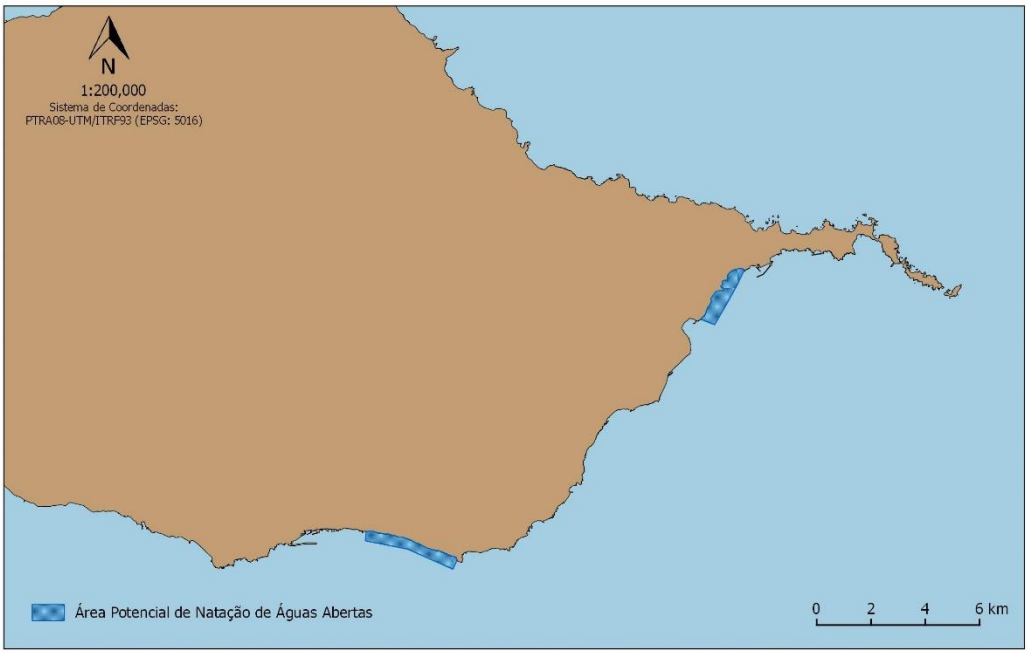


Figure 190 - Open water swimming area – potentical area (Madeira island)
Source: Secretaria Regional da Educação - Direção Regional da Juventude e Desporto

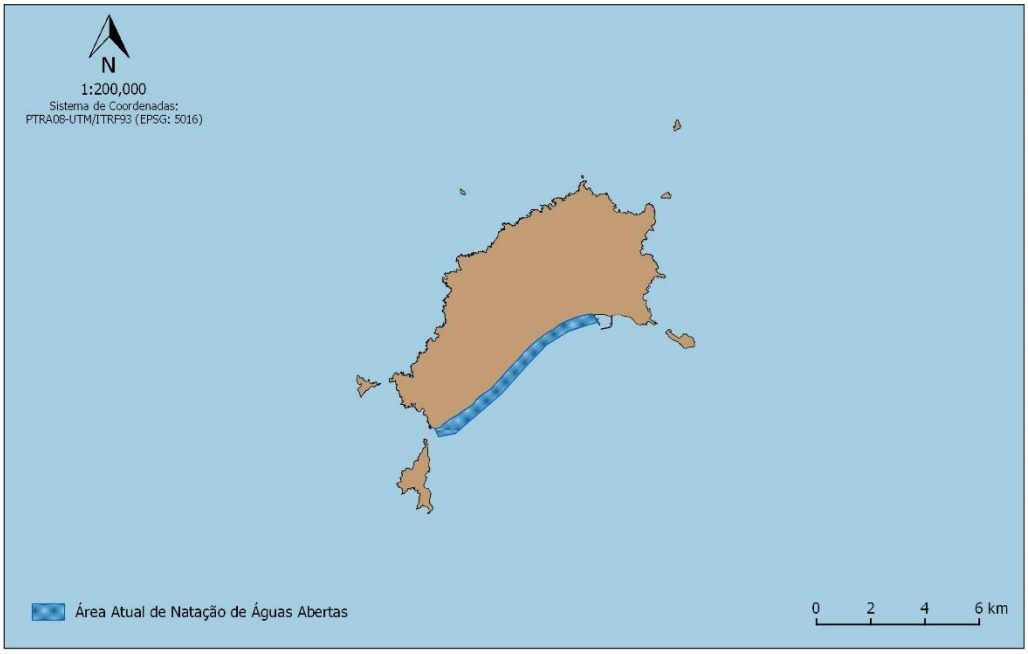


Figure 191 - Open water swimming area – current area (Porto Santo Island)
Source: Secretaria Regional da Educação - Direção Regional da Juventude e Desporto

Underwater Hunting - It is an activity carried out in a ludic or recreational perspective, tendentially seasonal, normally practiced in the summer months, although it can be practiced throughout the year, according to the migrations of the captured species. The underwater hunting in the region is preferably carried out in Ponta do Pargo, usually up to the bathymetric of 50 meters and has an average duration of 3 hours. Most practitioners make access to the sea from the shoreline or through a vessel. The species most captured is the wrasse (*labridae*). The catches resulting from underwater fishing have their own consumption. This activity is carried out along the island of Madeira and Porto Santo, except for protected areas.

There are several types of underwater hunting, depending on the degree of difficulty intended. In relation to the support sites, there are several wharf that allow access to the sea and hauling small boats.

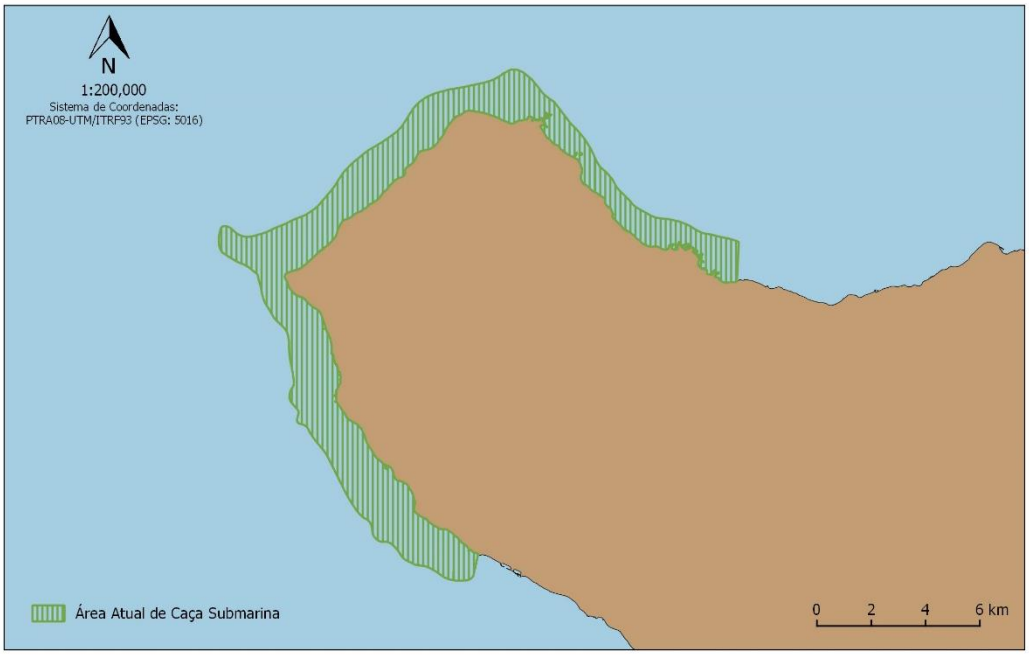


Figure 192 - Current underwater hunting area (Madeira island)
Source: Secretaria Regional da Educação - Direção Regional da Juventude e Desporto

Fishing competition can be done individually, by doubles or triples, regardless of gender. Currently the championships are made in two days (2 days), there is always a main test area and a reserve area, in case the sea conditions are not favorable.

Surfing and surfboarding:/Bodyboarding/Stand up paddle/Windsurfing - The region has several areas to practice this activity, especially on the island of Madeira. These areas are characterized by varying degrees of difficulty, from the lowest in that it allows easy access to the initiated practitioners, to the professional with waves of worldwide interest.

The Paul do Mar / Jardim do Mar area is the most used to practice this modality due to the exceptional conditions for the practice of this activity. This activity has contributed to the decline of the seasonality felt in some areas of the Region and enabled the growth of businesses associated with this modality (surf shops and surf houses e.g.). The number of championships has also contributed to the increase of this activity not only in the national context, but also internationally.

At the moment, it is stipulated the constitution of regional or world-wide reserves of surf, attracting more championships and athletes to the Region.

The modality has experienced a significant increase in the number of practitioners during the next years, especially in the training levels or younger levels. The number of championships has grown in the Region, attracting many participants.

Canoeing - Canoeing is practiced mainly on the south coast of the island of Madeira, however there is the possibility of extending to the north coast of the island and to Porto Santo.

Sport fishing - The archipelago of Madeira is located in the migratory route of some species, reason why it becomes a privileged place for the development of this activity.

Sport fishing can be practiced along the coast, next to an anchorage. This activity is carried out along the coast of the island of Madeira although the island of Porto Santo is a privileged place for the development of this activity.

Every year sports competitions are held at regional, national and sometimes international level, bringing several sportsmen and women to the Region.

This activity can also be developed in the exclusive economic zone of the Region, through the hiring of vessels destined for this purpose.

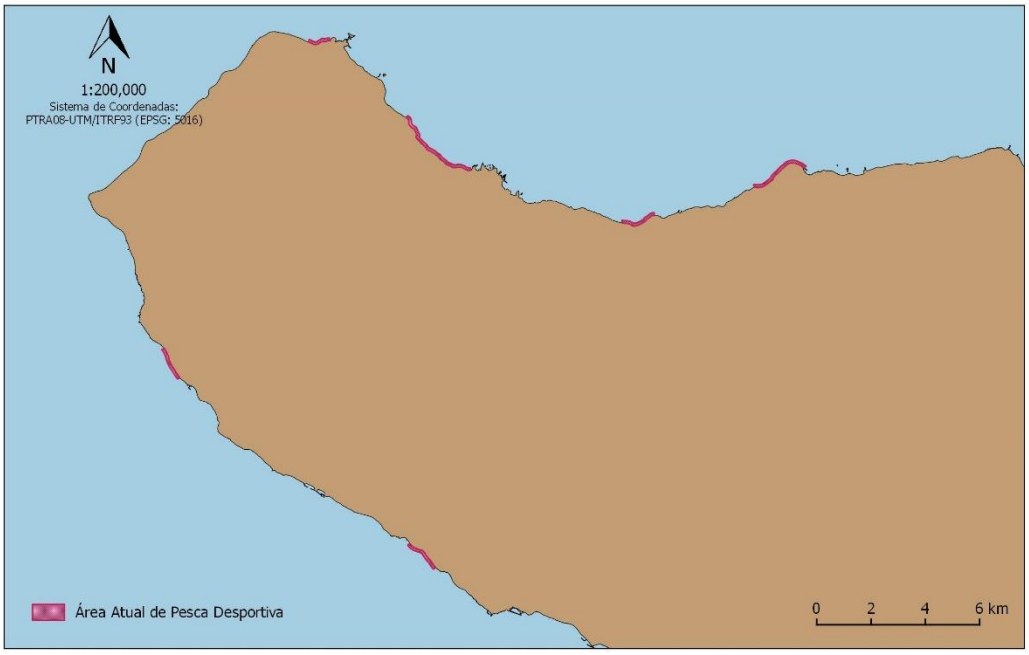


Figure 193 - Sport fishing – current area (Madeira island)
Source: Secretaria Regional da Educação - Direção Regional da Juventude e Desporto

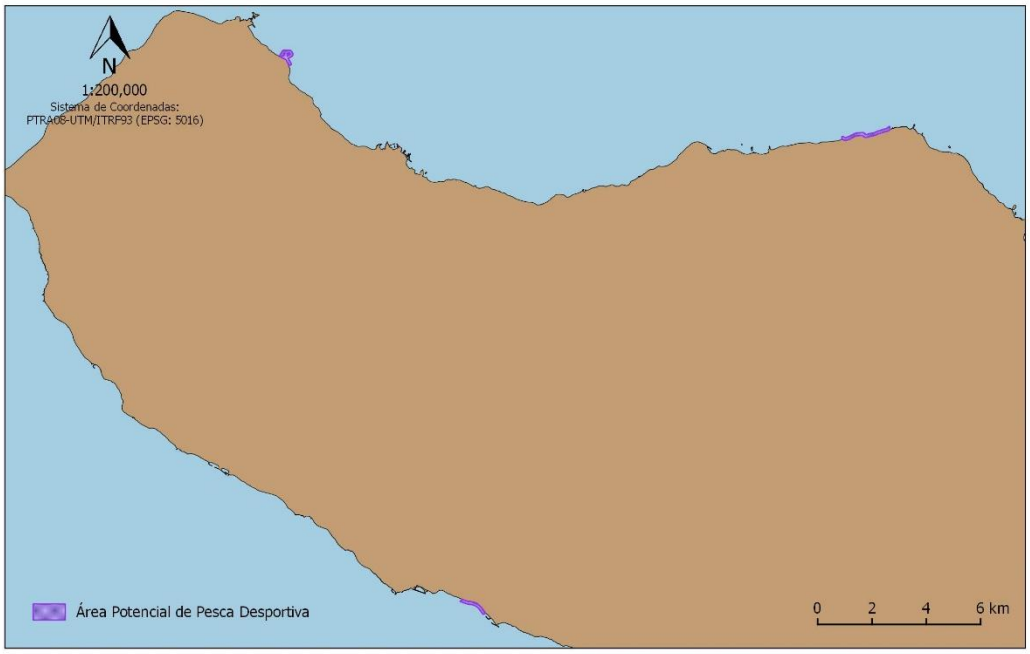


Figure 194 - Sport fishing – potential area (Madeira island)
Source: Secretaria Regional da Educação - Direção Regional da Juventude e Desporto

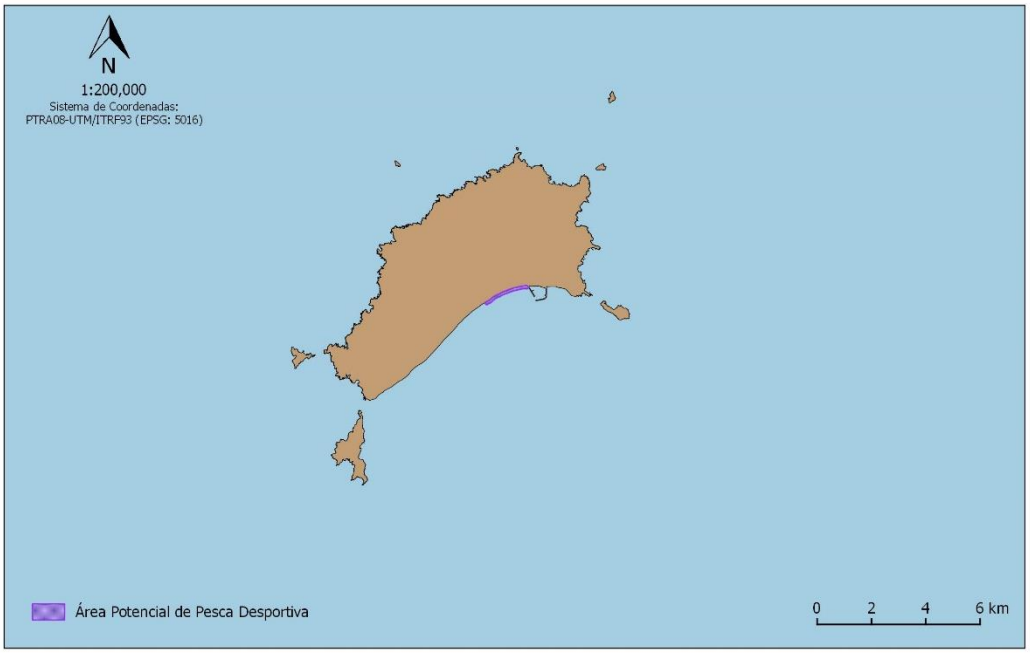


Figure 195 - Sport fishing – potential área (Porto Santo Island)
Fonte: Direção Regional da Juventude e Desporto

Sailing – This sport is performed throughout the year, depending on the natural conditions (ripple and wind). The most appropriate places for the accomplishment of this modality are the following: Funchal -São Lázaro, Quinta Calaça, Formosa beach; Santa Cruz - Reis Magos, Machico - Água de Pena, Caniçal - Ribeira do Natal, Quinta do Lorde; Porto Moniz; Paul do Mar; Calheta, Porto Santo.

Tourism

The tourism associated with the maritime activities has undergone a strong impulse in the last decades, revealing a strong dynamic that ends up attracting numerous tourists to the sea.

On the other hand, the sea offers many potentialities that must be harnessed and developed, as with the emergence of new activities, capable of attracting new stakeholders.

Constituting itself as a successful tourist product, the maritime-tourism activities offered in the Region are as follows:

Sea rides - They can last for two hours or a day at most. Depending on the program selected, sea excursions take place along the south coast of Madeira, especially on Cabo Girão and Ponta de São Lourenço, trips to the Desertas and Selvagens islands. In the last few years, the sea rides, organized by maritime tourism operators, continue to show, after almost two decades of activity, a frank growth in ARM (POTRAM, 2015). The walks are often associated with the observation of cetaceans, turtles and seabirds.

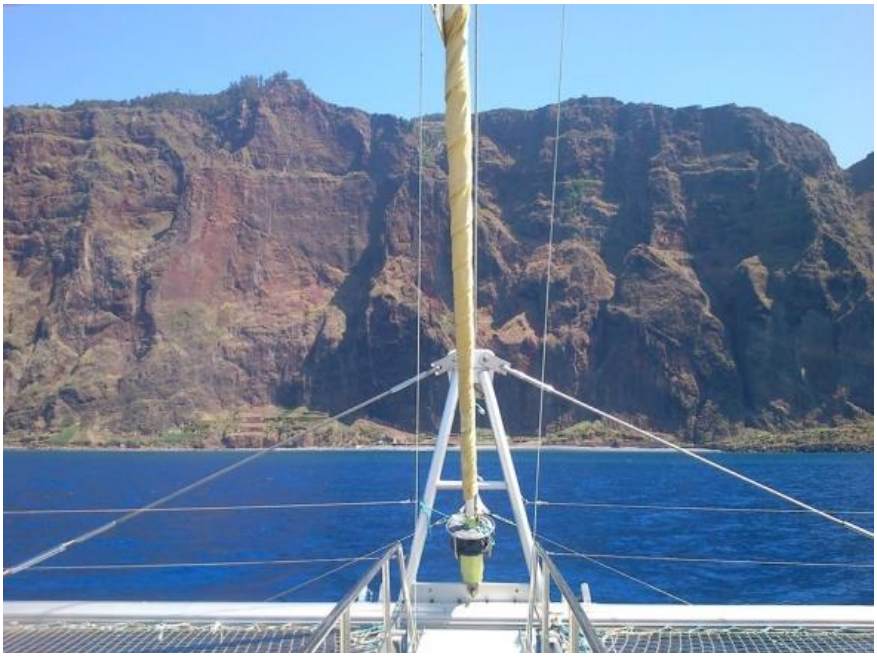


Figure 196 - Sea walk - Cabo girão.
Isabel Lopes

Whale watching – This activity began as a substitution for whaling activity, allowing whalers to continue to have a source of income and to apply their expertise in the observation and conservation of these marine mammals.

Vessels usually choose different courses depending on the program selected. The most common routes are as follows:

- They travel normally to the south and southeast of the coast of the island of Madeira, although cetaceans can be observed all along the south coast. Head west towards Cabo Girão or head east to Ponta de São Lourenço.

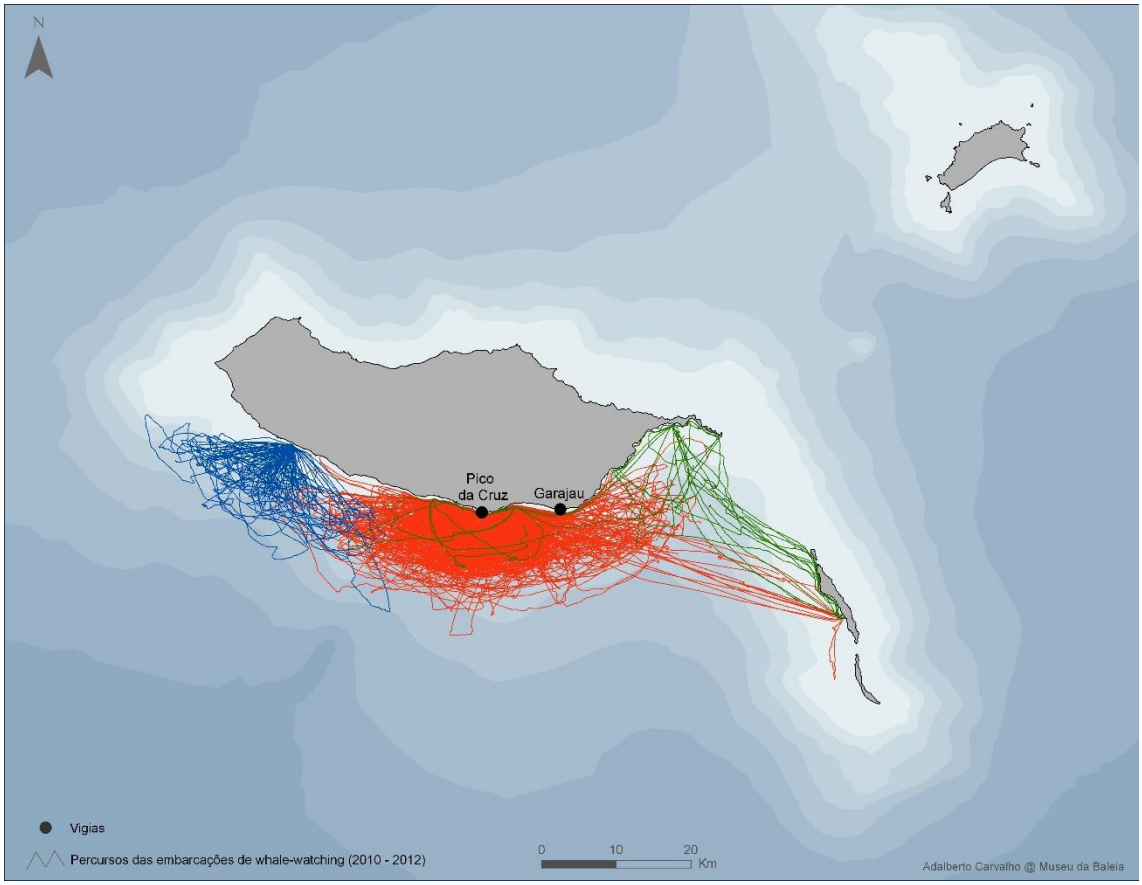


Figure 197 - Operating area of whale-watching vessels. As cores of the lines correspond to the exit points of the vessels

- **Green - trails of vessels operating from Quinta do Lorde marina;**
- Red - boat routes that operate from the port of Funchal;
- Blue - vessels operating from Calheta marina.

Source: *Adalberto Carvalho©Museu da Baleia da Madeira*.

According to the International Fund for Animal Welfare, in 2008, based on the growth of this activity, the Region was in the top 10 of the countries with the highest growth rate and had approximately 60 thousand individuals who participated in the activity. In 2007 it was estimated

this activity caught about 58 thousand tourists a year attending this activity, moving 1.5 million euros.

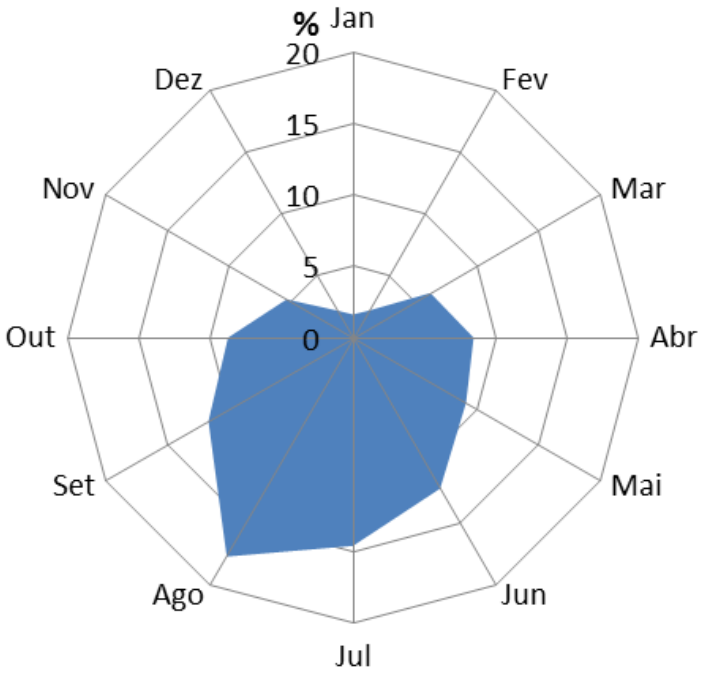
The ARM is an important area for the distribution of numerous species of marine vertebrates, many of which are of community interest and constitute one of the most diverse marine habitats of marine mammals within the European area. At present, there are more than twenty-four species of cetaceans, more than ten species of sea birds, two of them endemic, the sea lion and five species of sea turtles.

The activity of cetacean observation is in rapid growth, already exhibiting short-term effects on cetaceans. As such, it is necessary to reconcile tourist interests with the environmental safeguard and the welfare of the animals observed. These activities should follow a set of good practices, in particular when approaching and observing animals.

The constitution of these areas resulted from the scientific projects developed by the Madeira Whale Museum, especially the CETACEOS MADEIRA II project (2009-2013), in which the areas with the greatest interest for the conservation of cetaceans, especially Its crossing with the current areas of operation of whale - watching vessels. One of the objectives of this study was to try to establish maximum limits for the whale-watching activity, to determine the carrying capacity, in order to minimize the impact of the activity on cetaceans.

In 2007 the Museu da Baleia da Madeira carried out a study (Ferreira, 2007) on the impact of WW activity on cetaceans, in the scope of the EMECETUS project (FEDER / INTERREG IIIB 05 / MAC / 4.2 / M10), in which cetacean behavior was evaluated and Before, during and after the anthropogenic disturbance (assuming that any behavioral change observed during this period was due exclusively to the human factor). Regarding the behavior that the animals presented before and after a meeting with boats, and taking into account only observations from land, this study showed that in 89% of the cases the animals maintained the same behavior. This trend was consistent for all species observed. The family *Delphinidae* (group of dolphins) was the group of cetaceans that most reacted / interacted with the vessels. However, one of the final results of this study indicates that there were short-term impacts on the speed of Delphinidae due to the presence of whale-watching vessels, i.e. after boarding the animals increased their average movement speeds.

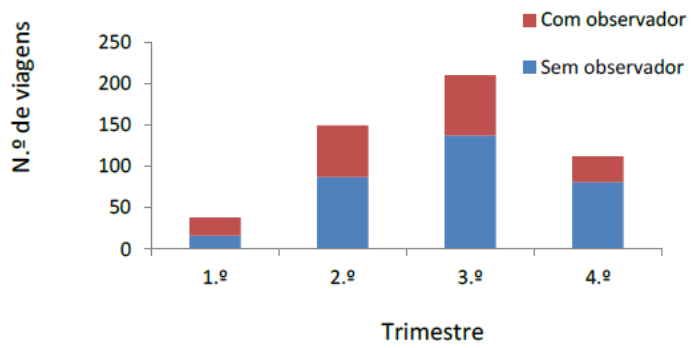
The practice of cetacean observation activity occurs almost throughout the year, however, there are monthly variations in the number of trips, with an increase, particularly in the high season (summer months). The analysis of the number of trips of three companies operating in the south coast of Madeira allows to corroborate this fact. At least 5 vessels announce 3 daily trips between July and September, and 2 daily trips throughout the remaining months of the year. The analysis of the temporal effort carried out by the maritime-tourism vessels with which MBM has established collaboration protocols, whether with or without observer, also helps to show that there are departures throughout the year, with a higher peak in the third quarter of the year.



Graphic 6 - Percentage of the number of trips made by three maritime-tourist companies during the year, based on a total of 1601 trips to the south coast of Madeira (24-month analysis - July 2010 to June 2012).
Source: Museu da Baleia da Madeira

By 2013, there were 15 vessels with bi-daily departures (annual average, but with 5 vessels making tri-daily departures in the summer) operating on the island of Madeira for tours dedicated to cetacean observation throughout the year, but with a slight Reduction in the coldest half of the year. Four of these vessels conduct underwater observation of dolphins. These numbers are based on licensed vessels that operated at least one season in the last 2 years (2012 and 2013). Of these 15 vessels, it was found that 10 operate from Funchal. Although the MBM does not have substantial data, nor the in situ knowledge of the activity of WW in Porto Santo, it seems that this activity is carried out by two vessels only in the summer months and occasionally.

The sample of the maritime-tourist vessels in this study covered more than ⅔ of the fleet and corresponded to 20 000 km of routes in 509 trips, of which 7 463 km (188 trips) had an observer on board. This level of sampling and fleet coverage allow a representative analysis of this activity.



Graphic 7 - Effort (in number of trips) made on board vessels of cetacean observations by quarter (2010-2012), with and without observer of the Museum of the Whale of Madeira.
Source: Museu da Madeira da Madeira

Birdwatching - It is an activity that attracts the interest of birdwatchers at an international level due to the endemic species that the Region holds. The first company dedicated to this activity in ARM came in 2004 and also promotes scientific tourism in this area. The Protected Areas of the Region, namely Ponta de São Lourenço, Desertas and Selvagens Islands, islets of Porto Santo, are prime locations for nesting species of seabirds, many of which are considered a priority by the Birds Directive. To the west of the island of Madeira, near Ponta do Pargo, there is an area of great interest for nesting seabirds.

Diving - There are many companies that promote diving activities (snorkelling, scuba diving, scuba diving, diving baptisms). This activity presents a high growth in the Region and that can be compatible with the guidelines for nature conservation. Most of these activities are carried out in areas where it is possible to observe the rich flora and fauna of the Island of Madeira. Thus marine protected areas are excellent sites for the development of these modalities due to the high landscape and ecological value and benefit from specific regulations necessary for the development of these activities, such as Garajau or Ponta de São Lourenço.

The growing growth of this activity should be subject to regulation so that a monitoring of the diving areas is established so that they are not subject to anthropic pressure, establishing the carrying capacity of each site and the definition of a code of conduct. On the other hand, taking into account the interviews carried out, in these areas, facilities to support this activity must be built, guaranteeing the necessary conditions for the safety of the activity.
Recreational diving has gained fans in the Region. For diving, places like: marine reserves, caves and shipwrecks, offering excellent photographic opportunities.

Big Game Fishing - Big Game Fishing The high depths near the coastline, reached 1,000 m, associated with the migratory routes of large pelagic species, attracts many fans, especially in recent years, as a result of the promotion that companies have made. Practitioners of this activity may choose to rent the vessel with or without crew and spend several hours at sea. In addition to the existing tour operators in the Region, there are a number of foreign vessels that are dedicated to this activity, most of them in the RINM - Mar, however there are others that only move to the ARM in the summer, without Tourist structures.

This type of activity registers two peaks throughout the year, according to the migratory routes of the species: the blue marlin season starts in May and runs until October and that of bigeye tuna runs from March to June.

In this activity there is no control over the capture of these species. In order to promote the sustainable development of this activity, it is necessary to frame, regulate and monitor it.

Tourist fishing (experience of commercial sea fishing) - It is an emerging concept in the European Union and intends that tourists have direct contact with this activity. As mentioned in the fisheries chapter, the Region still retains many characteristics of artisanal fishing. On the other hand, the fishery is very associated with Madeiran gastronomy, an element highly appreciated by tourists. Fishing tourism is intended to offer the experience of sea fishing experience in vessels registered in the commercial fishing exercise. It provides tourists with genuine cultural experiences and complements the income of professionals and communities in the inshore and artisanal fishing sectors, who sometimes face serious economic and social problems. According to the Tourism Planning Plan of the Autonomous Region of Madeira, there is the desire to implement an experimental unit in the Funchal port.

Coasteering - It is a relatively recent activity in Portugal. It combines sports practice and the involvement of protected areas. The activity focuses on rappel, rock climbing and jumps to the sea in a single activity. This is accompanied by specialized professionals. There are many nautical activities that exist in ARM. Most activities are seasonal, depending on weather conditions and sea waves. It should be highlighted the level of creativity that is made by many of these companies, namely in the offer of activities increasingly creative and aimed at knowledge of the Portuguese ocean. Also within the scope of tourism, there are some sports activities that can be practiced by tourists, such as surfing, bodyboarding, windsurfing, SUP, there are several tourist animation companies that are dedicated to these sports.

Maritime tourism - cruise tourism

The cruise tourism takes an important position in ARM. The geostrategic location, close to the Mediterranean, North Africa and the Canary Islands archipelago, as well as the crossing of the connecting routes between the European and American continents (Figueira de Sousa, 2001), allowed the region to become an important cruise port (Lopes, 2016).

Currently, the ARM is inserted in the following cruise circuits:

- Between the ARM and the Canary Islands and North Africa
- Circuits operating from the Atlantic facade of Europe and the Western Mediterranean
- Circuits operating from Northern Europe, namely from the United Kingdom.

Figure 198 - The ARM in the circuits of the Atlantic Cruise Region and in the cruise circuits between America and the Europe. Adapted from Figueira da Sousa, 2004.

The APRAM, S.A. has strongly focused on the development of cruise tourism, through the improvement of port infrastructures, namely the port of Funchal, in order to receive the passengers with the greatest convenience. Among the improvements are those carried out on the quay north of the port and the construction of the new cruise pier and the construction of the International Maritime Gare.

9.2. Legal framework and constraints

9.2.1. Competent institutions for sector management

This sector has a various of entities responsible. For the tourism activity, the responsible entity is the *Secretaria Regional da Economia, Turismo e Cultura*. In conjunction with this entity, the *Administração dos Portos da Região Autónoma da Madeira, S.A.* is responsible for the cruise activity in the Region.

Regarding the sports activity, the entity responsible is the *Secretaria Regional da Educação – Direção Regional da Juventude e Desporto*.

9.2.2. Normative basis or instruments

Tourism Planning Program of the Autonomous Region of Madeira

The Tourism Planning Program of the Autonomous Region of Madeira was approved by Regional Legislative Decree no. 15/2017 / M of June 6. The mission of the this program is to define a tourism development strategy within a ten-year time frame. This strategy will make it possible to consolidate the region as a differentiated tourism destination, for the authenticity of the offer, based on quality of service, aiming at economic, social and environmental sustainability.

This program defines for Madeira the following vision: *A year-round destination of unparalleled natural beauty, safe, easily accessible, cosmopolitan, recognized as a must visit of Europe, with sun*

and mild climate, a strong tradition of well receive and vast offer of experiences, capable of exceeding the most demanding expectations.

The *Tourism Planning Program of the Autonomous Region of Madeira* identifies the sea as one of the main strategic resources for the development of tourism in the region. In this sense, it is mentioned that the articulation and compatibility of the this program with the maritime spatial planning instruments in which the Situation Plan should fit must be deepened.

Within the main objectives resulting from the analysis of the diagnosis made by the POT, some of the development strategies were presented, in which the sea theme is framed:

- To requalify, in the logic of modernization and maintenance, the dominant tourism product in the consumption of nature / landscape
- Reinforcing the formatting of niche products, with a view to increasing the attractiveness of tourism audiences, in the world demand, found in their activities the main motivation of their travel
- To develop and consolidate emerging products due to the present socio-territorial context, coupled with some emerging dynamics, to affirm and develop new tourism products that broaden the region's specific attraction motives
- To optimize the secondary offer in a logic of networking, taking advantage of the fact that Madeira has today a richer and more diversified secondary offer, be it in cultural, sports or entertainment terms, supported in equipment and infrastructures.

In the Thematic Program and Strategic Projects by Areas and Sectors, POT has the More Mar program related to tourism and sports activities that use the sea as a resource. In this chapter, it is mentioned that the tourism, sports, recreational and cultural activities connected to the sea have been gaining importance in the region during the last decades, contributing to the growth of the regional economy. In this thematic program are given some guidelines or projects that must be developed, highlighting the following:

- Creation or improvement of port infrastructures or support to the development of the maritime-tourist or sport activity
- Preparation of a report assessing the evolution of the maritime-tourist activity with a view to identifying constraints, needs and opportunities, and submitting proposals for adjustment and/or corrective actions in order to ensure the development of the activity in line with the standards of high quality and safety
- The need to develop supplementary regulations regarding sea trips if there is a very significant expansion of this activity
- Need to analyze the organization and infrastructure of ports or marinas in order to allow the extension of the number of starting points
- Equating the possibility of creating specific legislation regarding tourist fishing in order to regulate this activity in order to be effectively guaranteed the control and inspection of the same

9.3. Current spatial distribution

There are no spaces defined for the tourism or sport activity although it is considered that there are certain places more susceptible to the development of these activities.

Regarding the activity of cetacean observation, there is an area that is prohibited to this activity. The Regional Ordinance no. 46/2014 of April 22 delimits an exclusion zone for cetacean observation. This area is characterized by being a preferential habitat of common bottlenose dolphin to feed, socialize, rest and reproduce (Freitas *et al.*, 2013).

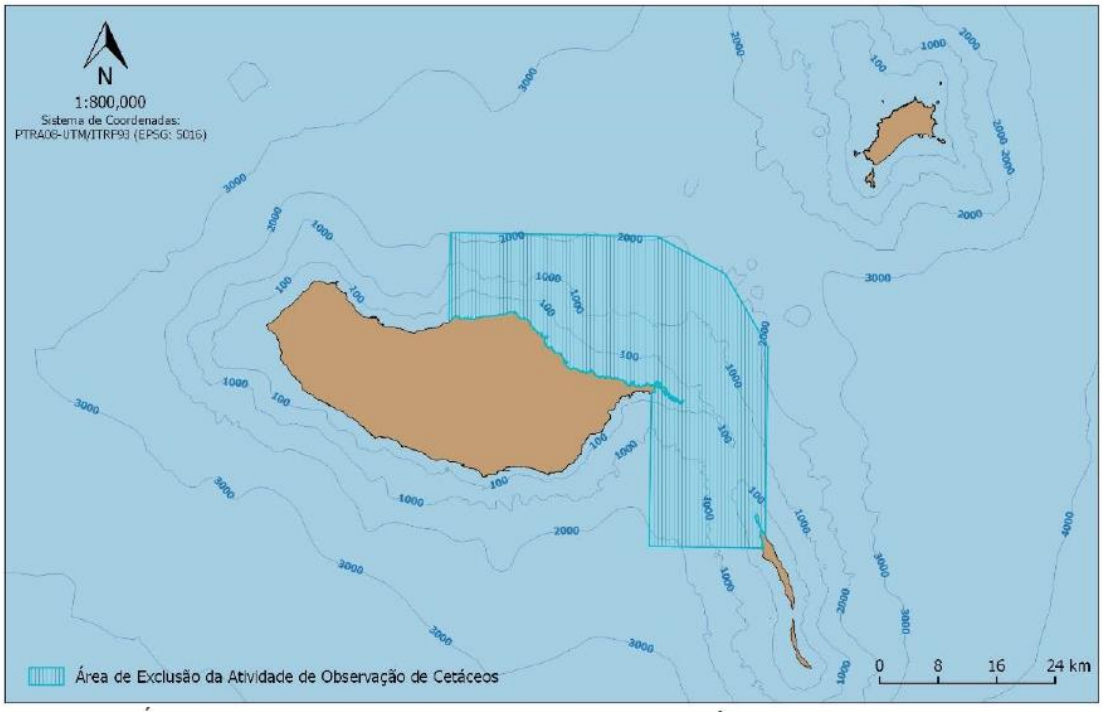


Figure 199 - Area of exclusion of cetacean observation activity.

9.4.Analysis of interactions

9.4.1. Interactions with other sectors

This sector, especially the sports and tourism activities can cause some conflicts with other uses.

In this way, these situations of conflict should be minimized, ensuring their coexistence whenever possible. This compatibility must be made at the spatial and temporal level. In spatial terms, it is observed that the greatest pressure occurs on the surface of the sea (play parks, berths, sports competitions, among others), although some activities occur preferentially in the water column and seabed, the visiting underwater itineraries. When seasonality is considered, the greatest conflicts occur mainly in the months of April to September and, especially, during the daytime period.

9.4.2. Land-sea interaction

This sector is strictly dependent of the ports or marinas areas.

9.4.3. Interactions with the environment

Management of maritime space should aim at optimum utilization, exploiting synergies and avoiding or minimizing negative effects in other uses, as well as in the good environmental state of the marine environment and the good state of coastal waters.

In the development of activities/private use of tourism and sport, the following practices, among others, should be considered:

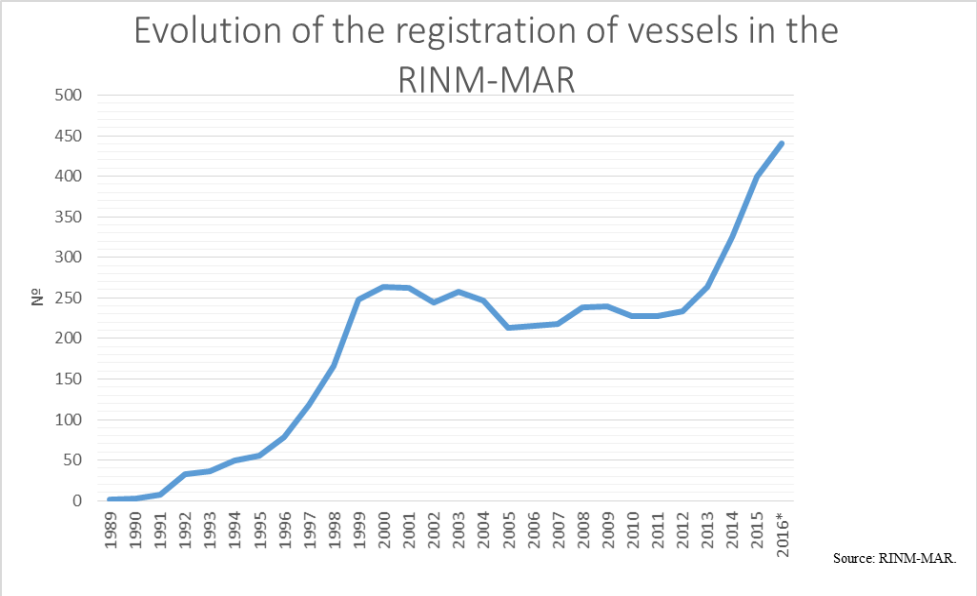
- The space to be occupied should be limited to the minimum necessary for the development of the activity
- Removal of structures deployed in the maritime space should be carried out as soon as they are no longer used
- In certain projects, such as underwater itineraries, a characterization study of the marine area that includes biodiversity, physical and chemical characteristics, as well as an evaluation of the main impacts resulting from the activity
- Regattas must comply with the navigation regulations in force, namely the Regulations to Prevent Collisions at Sea, as well as the distances to the ports according to the navigation classes of the vessels
- The maritime-tourist activities should create mooring points suitable for the vessels in order to prevent the disordered mooring of vessels and the affectation of the seabed

9.5. Statistical Information

International ship registry of Madeira (RINM-Mar in Portuguese)

Until 30 April 2016, the average age of commercial vessels was 11,4 years, one of the EU's most positive averages, which puts RINM-Mar at the highest level of international maritime records.

The main registers of RINM-Mar trade vessels in 2016 came mainly from Germany (66%), Italy (11%), Spain (8%), Portugal (4%) and Norway (4%).



Graphic 8 - Evolution of the registration of vessels in the RINM-MAR
*** Until April 30, 2016**
Source: RINM-Mar

Graphic 9 - Types of vessels registered in RINM-Mar
Source: RINM-MAR

Water sports activities (sports activities)

Sports activities play a key role in the Region. According to the *Estudo da procura e consumo desportivo da população da Região Autónoma da Madeira*, the natural spaces/mountains/sea, appear as the third option (11.6%) in the places for the accomplishment of the sport that affirmed to practice some type of activity with regularity.

Table 65 - Location of sports practice. Source: Colaço, 2009

Places of practice	Frequency
Natural Spaces / Mountains / Sea	65 (11,6)
Fitness Center / Gym	100 (17,9%)
Public facilities	180 (32,2%)
Clubs	74 (13,2%)
Public road / open spaces "promenades	118 (21,1%)
Others	22 (3,9%)
Total	559 (100%)

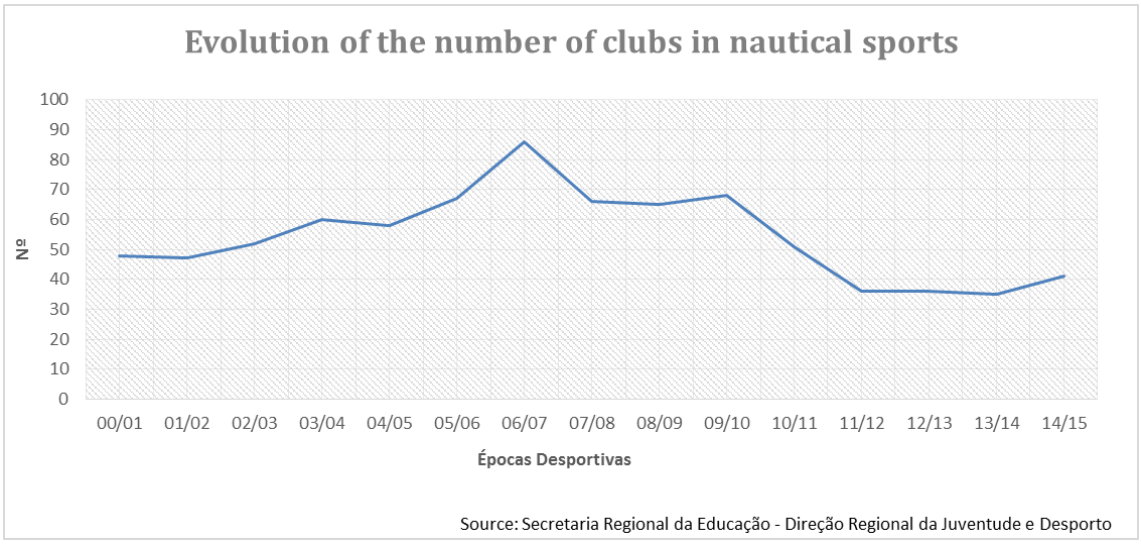
Sports activities, for their strong role in the Region, have been taken into account in the regional government programs, and their support in the new model of sport support approved by the Sports Support Regulation (RAD) has been substantiated. These funds are included in the Regional Support Program for Sports (PRAD). From the definition of the new model of support to the sport until the sporting season 2015/2016, nautical modalities were granted around 1,6 million euros. This document suport the difficulties and constraints resulting from insularity and dual insularity, development an decisive role of competitive high-level sport as a tool for promotion of the Region.

Since que sport season 2012/2013, the Secretaria Regional da Educação - Direção Regional da Juventude e Desporto, gave the following financial support:

Table 66 – Support for nautical modalities. Source: DRJD

sport season	Total
2012/2013	342.620,25 €
2013/2014	397.597,53 €
2014/2015	421.977,70 €
2015/2016	413.280,04 €
Total	1.575.475,52 €

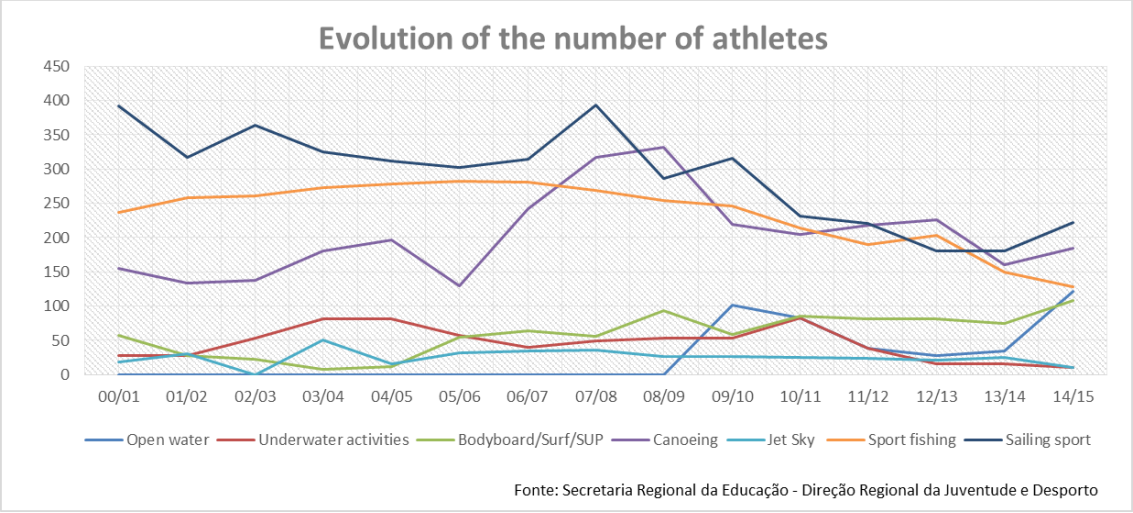
In the years under analysis, it is possible to observe the existence of some fluctuations in the number of clubs in nautical sports, and in the 2006/2007 season there were the largest number of clubs related to this activity.



Graphic 10 - Evolution of the number of clubs in nautical sports
Source: Secretaria Regional da Educação – Direção Regional da Juventude e Desporto

In the sports season 2014/2015, there were 41 sports entities related to the sea, representing about 27% of the total number of sports clubs in the region (LOPES, 2016).

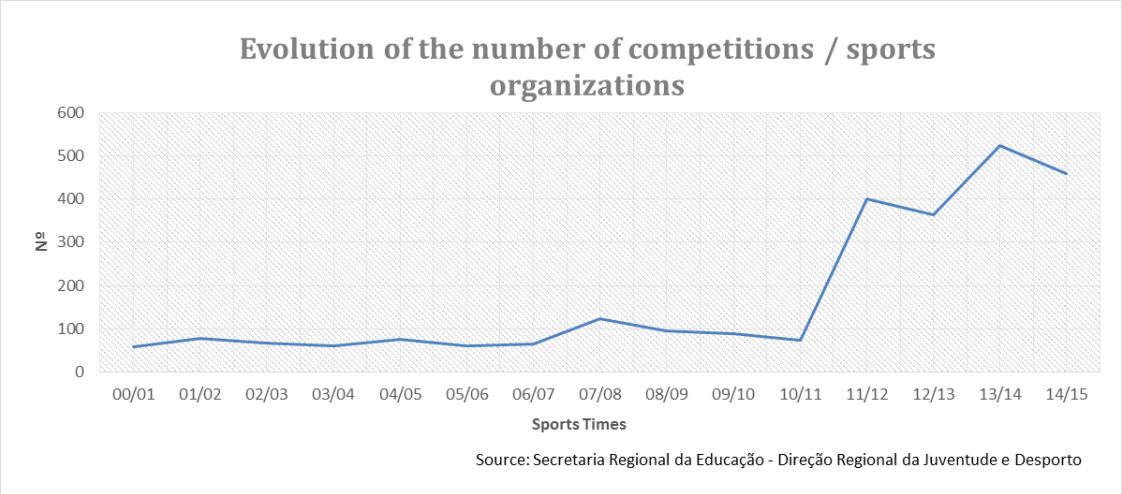
The following graphic, shows the evolution of the number of athletes. Sailing (28%), canoeing (23%) and sport fishing (16%) correspond to modalities with more federated athletes. In the 2014/2015 sports season, in the total number of federated athletes registered, the number of athletes in nautical modalities represented 5%.



Graphic 11 - Evolution of the number of athletes
Source: Secretaria Regional da Educação – Direção Regional da Juventude e Desporto

The evolution of the number of competitions / sports organizations, there has been no stability in their performance. From the sports season 11/12 there was a strong growth in the number of competitions / sports organizations, registering in the sporting season 14/15, about 460

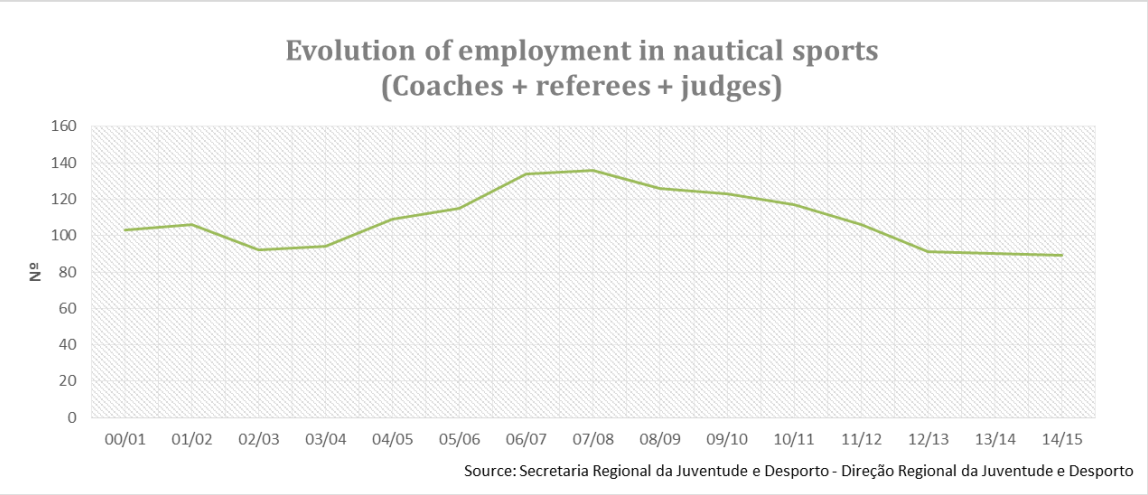
competitions / sports organizations. This positive value is due to the modification of the system of support granted to sport (Lopes,2016).



Graphic 12 - Evolution of the number of competitions/sports organizations
Source: Secretaria Regional da Educação – Direção Regional da Juventude e Desporto

The evolution of the number of employments, only the number of coaches, judges and referees of the different sports activities were counted, since it was impossible to account for all those involved in this process.

It is possible to observe that between the sports seasons 04/05 and 07/08, the number of technicians, referees and judges has grown. From this sporting season we have witnessed a decrease and stabilization. In the 14/15 sports season, there were 89 referees/judges (Lopes,2016).



Graphic 13 - Evolution of employment in nautical sports (coaches + referees + judges)
Source: Secretaria Regional da Juventude e Educação – Direção Regional da Juventude e Desporto

Cruise tourism

In the national context, the port of Funchal and the port of Lisbon constitute the main cruise ports. According to the annual statistics of APRAM, S.A., the port of Funchal in 2017 ended up achieving the national leadership by registering about 539 192 cruise lines and 208 stopovers, which would have belonged previously to the port of Lisbon in the same period.

The fall recorded in the number of passengers and stopovers in 2013 and 2014 is associated with the strong temporal that occurred in 2013 and the works that resulted from this.

Regarding the number of stopovers, in 2012, the Funchal port had the highest number of stopovers. As of that year, there was a 14% drop in the number of stopovers until 2017.This reduction could be linked to the decision of cruise ship operators to opt for another competitive destination.

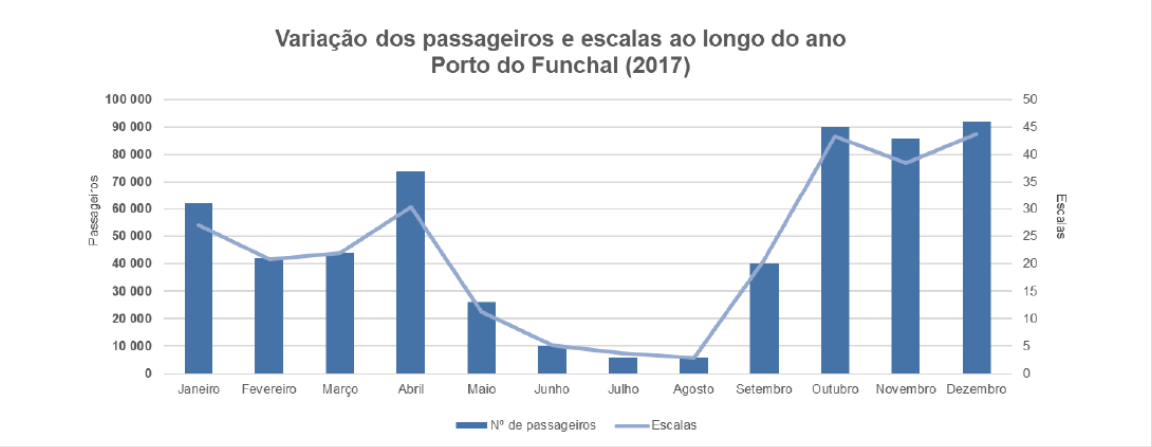
Table 67 - Stopovers of cruise ships in the Region. Source: APRAM, S.A.

Indicator	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Stopovers	248	262	270	277	294	303	336	286	283	308	294	289

According to the PIETRAM report 2014-2020, the average stay of vessels in the port of Funchal is 14 hours and is considered a reasonable period of time for a stay when compared to the same type of operations in other regions, such as Mediterranean. It is estimated that the average cost per passenger contributes to the regional economy by around 40.6M € (APRAM, 2015 apud Madeira-Canary Islands Competitive Intelligence Study 2004/2005).

The activity of the cruises in the ARM is marked by the seasonality with two peaks of activity:

- During the spring - from March to May - when shipowners are set to operate in Europe (Northern Europe, the Mediterranean and the Mediterranean Coast of Africa)
- At the end of the year - November and December - when ships return to the Caribbean again, with stopovers in the Region



Graphic 14 - Variation of passengers and stopovers throughout the year in the Port of Funchal in 2017. Source: APRAM, S. A.

9.6. Additional documents and links

Autoridade Marítima Nacional, Capitania do Porto do Funchal. Disponível em: http://www.amn.pt/DGAM/Capitanias/Funchal/Paginas/Capitania-do-porto-do-Funchal.aspx

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Decreto-Lei n.º 100/2005, de 23 de junho. Portugal: Ministério do Ambiente, do Ordenamento do Território e do Desenvolvimento Regional, Diário da República, 1.ª série- , n.º 119, pp.3936 – 3937

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FREITAS, L.; DINIS, A.; NICOLAU, C.; ALVES, F.; RIBEIRO, C. (2013) - Mar da Madeira um oásis a conservar - baleias e golfinhos da Madeira, Museu da Baleia da Madeira, Meio/Eco do Funchal.

Freitas, Mafalda (2016), Roteiro de Mergulho em Naufrágios da Madeira, Revista Anual do Clube Naval do Funchal.

Instituto nacional de Estatística (2016), Conta Satélite do Mar 2010-2013, acedido a 8 de fevereiro de2017, em:https://www.ine.pt/xportal/xmain?xpid=INE&xpgid=ine_destaques&DESTAQUESdest_boui=261965629&DESTAQUESmodo=2.

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Portaria n.º 172/2017 de 26 de maio. Portugal: Defesa Nacional e Ambiente, Diário da República, 1ª série, n.º 102, pp.2549 – 2564. (Portaria conjunta dos Ministérios da Defesa e do Ambiente com publicação anual (final de maio) em que define a tipologia (praia de banhos ou águas balneares)

Turismo de Portugal (2017), Estratégia Turismo 2027 Liderar o Turismo do Futuro, acedido a 5 de janeiro de 2017, em: http://estrategia.turismodeportugal.pt/content/estrat%C3%A9gia-turismo-2027.

10.Underwater Cultural Heritage

Sector characterization

The UNESCO Convention on the Protection of Underwater Heritage, ratified by Portugal in 2006, considers that all traces of the existence of a man of a cultural, historical or archaeological nature, whether partially or totally, periodically or continuously submerged, for at least 100 years. Underwater cultural heritage encompasses:

- Sites, structures, buildings, artifacts and human remains, as well as their natural archaeological context
- Ships, aircraft and other vehicles, or parts thereof, their cargo or other content, as well as their archaeological and natural context
- Prehistoric artifacts

Since the coast is vast under national jurisdiction, there are innumerable archaeological remains lying there and whose recovery under the right conditions requires it to be secured.

Thus, the creation of policies for the safeguarding, valorization and sustainable development of the country within the national maritime space (territorial sea, exclusive economic zone and continental shelf beyond 200 miles) is the legal actions that the Portuguese State holds.

Within this space, the sovereignty of the spoils is, however, conditioned to the shipwrecks of State Pavilion ships. In such cases, States Parties are encouraged to establish international cooperation, information exchange and exchange of researcher's agreements for the protection and management of underwater cultural heritage and in accordance with the rules of the UNESCO Convention, regardless of declarations of interest certain underwater cultural goods.

According to Decree-Law no. 577/76, of July 21, objects with no known owner found on the seabed or by the latter, which are of scientific interest (namely archeological), artistic or other, are of interest for the state, constitute its property. Those objects which are not recovered by the owner within a period of five years from the date on which he has lost them, abandoned them or separated them in any way shall be equipped with the objects without known owner.

10.1. Present Situation

In ARM, the underwater cultural heritage is mainly used for recreational diving activities, which resulted in a dive route called Scuba Diving Routing in Madeira. Scientific research is also one of the main activities developed.

The majority of the cultural heritage in the region corresponds, for the most part, to vessels that have been shipwrecked off the coast of the island of Madeira at a depth of not more than 100 meters deep. The majority of vessels are more than 100 years old and are therefore covered by the UNESCO Convention.

In the territorial sea, the following vessels and artefacts are considered as underwater cultural heritage:

- *Slot Ter Hooge*
- *Varuna*
- *Mardoll*
- *Ponta do Patacho cannons*
- *Newton*
- *Fourerunner*

In the exclusive economic zone, the following vessels are considered as underwater cultural heritage:

- *Ruelle*
- *Iran*
- *Etna*
- *Viajante*
- *Margaret L. Roberts*
- *Ioannina*
- *Açoriano*
- *Sebastian*
- *Chariton*
- *Artesia*
- *Atlantide*
- *Jorgina*
- *Rio Ave*

There are vessels less than 100 years old, which although not considered as underwater cultural heritage, should be mentioned in the Situation Plan given its importance to the diving activity or its historical importance:

- *Bom Rei*
- *Prompt or Pronto*
- *Bom Príncipe*

10.2. Legal framework and constraints

10.2.1. Competent institution for sector management

The *Secretaria Regional da Economia, Turismo e Cultura – Direção Regional da Cultura* is the responsible entity for management of this activity.

10.2.2. Normative basis or instruments

- Decree-Law No. 416/70 of 1 September amended by Decree-Law No.777 / 76 of July 21, which establishes a specific legal framework for underwater cultural heritage by distinguishing the archaeological findings "with scientific or artistic interest from others" legal protection plus, in particular, the status of cultural heritage and state property
- Decree-Law no. 289/93, of 21 August, which establishes the legal regime of the underwater cultural heritage

- Ordinance No. 568/95 of June 16, approving the Regulation of Underwater Archaeological Works
- Decree-Law No. 164/97, of July 27, which harmonizes the legislation governing the archaeological activity in an underwater environment with that applicable to archaeological activity in the terrestrial environment
- Law 24/2013 of 20 March, which approves the legal regime applicable to recreational diving
- Decree - Law No. 164/2014 of November 4, which adopts a new regulation for archaeological works

10.3. Current spatial distribution

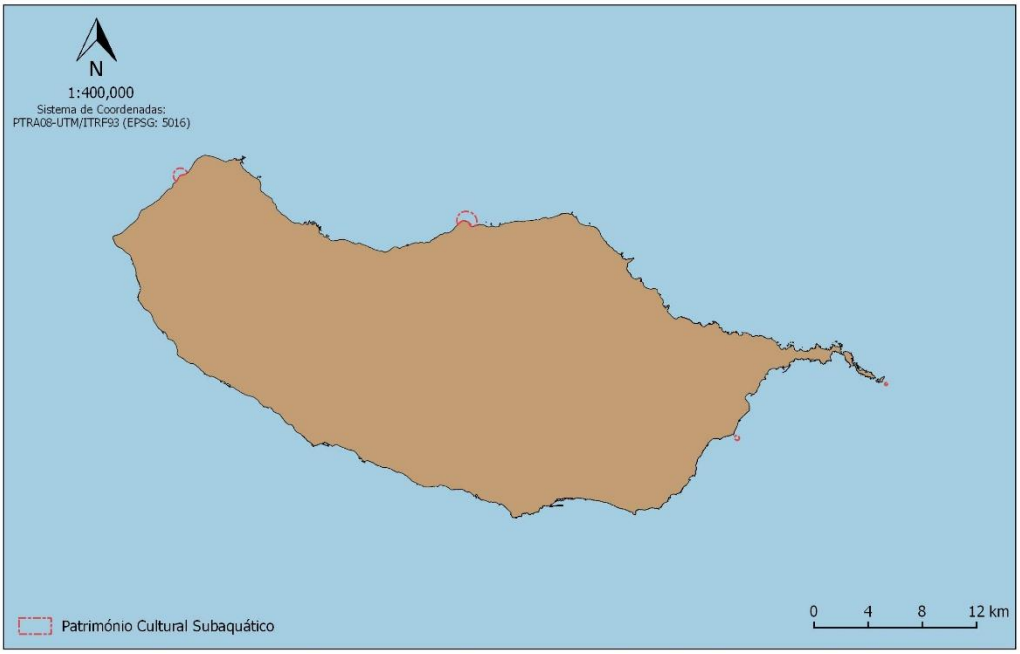

Figure 200 - Location of the existing underwater cultural heritage on the island of Madeira. Source: Secretaria Regional da Economia, Turismo e cultura – Direção Regional da Cultura

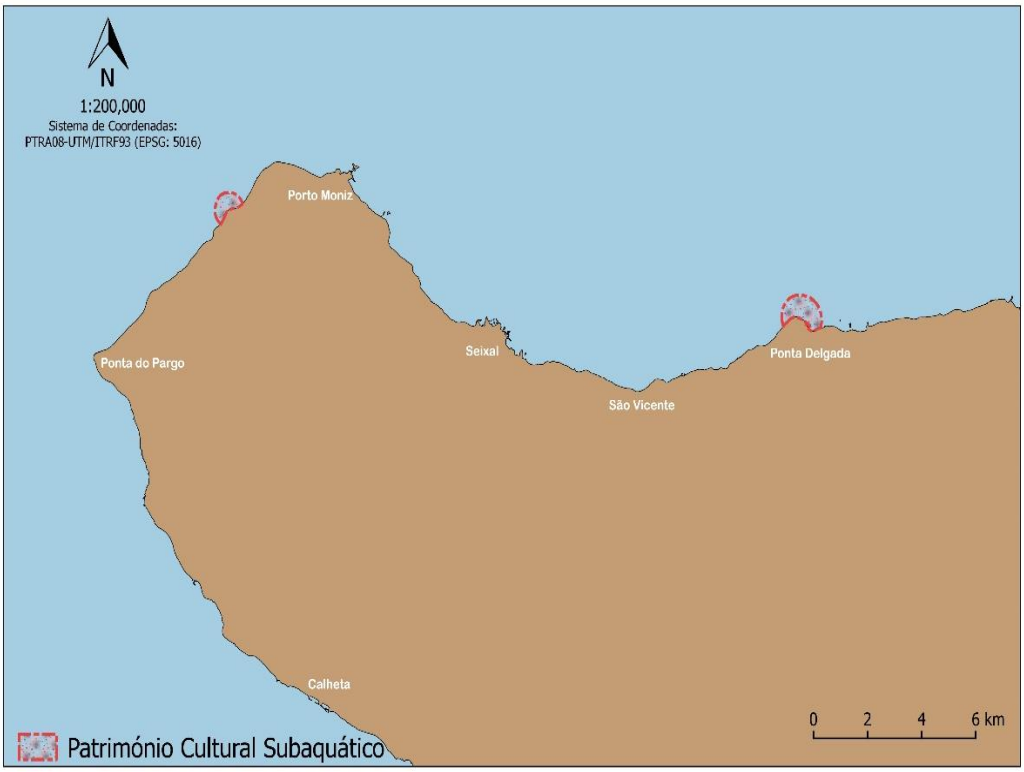

Figure 201 - Location of the existing underwater cultural heritage on the island of Madeira (West). Source: Secretaria Regional da Economia, Turismo e Cultura – Direção Regional da Cultura.

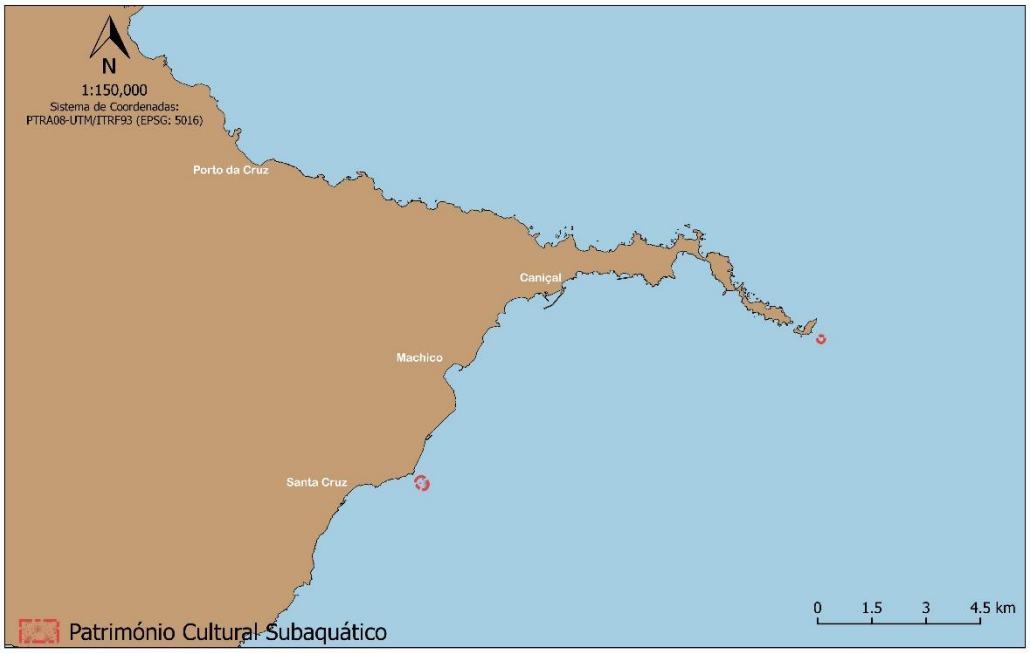

Figure 202 - Location of the existing underwater cultural heritage on the island of Madeira (East). Source Secretaria Regional da Economia, Turismo e Cultura – Direção Regional da Cultura.

Figure 203 - Location of underwater cultural heritage in the exclusive economic zone of the RAM. Source: Secretaria Regional da Economia, Turismo e Cultura – Direção Regional da Cultura

10.4. Analysis of interactions

10.4.1. Interaction with other sectors

Underwater cultural heritage has become increasingly accessible and fragile, notably due to the action of entities or bodies that often do not resort to scientific methods of archaeological exploration. On the other hand, the construction of infrastructures on the coast can damage or destroy existing assets.

The potential negative consequences on heritage are evident since they have been recorded since the second half of the 20th century. A clear example is the case of the *Prompt or Pronto*

vessel that was partially destroyed by an anchor of a vessel that was anchoring in that area.

It should also be noted that maritime archaeological sites are being plundered, which in many cases have resulted in the loss and destruction of valuable scientific and cultural materials.

The underwater cultural heritage is incompatible with activities or uses that interfere with the seabed, namely:

- Aquaculture
- Aggregates extraction
- Extraction of mineral resources
- Areas of anchorage
- Cables and pipelines and submarine emitters

The underwater cultural heritage is compatible with the following activities or uses:

- Activities in the field of sport sailing
- Tourist maritime activities
- Protected areas

- Scientific investigation

10.4.2. Land-sea interaction

As discuss above, the wrecks are used for diving activities. In this way, the interaction land-sea that this activity can arouse is with the marine areas (anchoring).

10.4.3. Interaction with the environment

The impact it has not yet been properly studied in the Region. However, it is known that vessels may have impacts on the seabed. On the other hand, it is also known that it can generate more biodiversity (e.g. fish).

10.5. Additional documents and links

Decreto – Lei nº 577/76, de 21 de julho. Portugal, Diário da República, 1º série, número 169

Decreto-lei 289/93, de 21 de agosto. Portugal: residência do Conselho de Ministros, Diário da República, Série I, n.º 196.

Decreto-Lei n.º 164/97 de 27 de junho. Portugal: Ministério da Cultura, 1.ª série-A, n.º 146, pp. 3140 – 3144.

Decreto-Lei nº 416/70 de 1 de setembro. Portugal: Diário da República,1ª série, número 202, p. 1150 - 1151

Decreto-Lei nº289/93 de 21 de agosto. Portugal: Presidência do Conselho de Ministros, Diário da República,1ª série – A, nº196, pp. 4462 - 4473

Diário da República nº137/1995, Série I-B de 1995

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Freitas, Mafalda (2016), Roteiro de Mergulho em Naufrágios da Madeira, Revista Anual do Clube Naval do Funchal.

Lei n.º 24/2013, Aprova o regime jurídico aplicável ao mergulho recreativo em todo o território nacional, em conformidade com o Decreto -Lei n.º 92/2010, de 26 de julho, que transpôs a Diretiva n.º 2006/123/CE, do Parlamento Europeu e do Conselho, de 12 de dezembro, relativa aos serviços no mercado interno, com a Lei n.º 9/2009, de 4 de março, que transpôs a Diretiva n.º 2005/36/CE, do Parlamento Europeu e do Conselho, de 7 de setembro, relativa ao reconhecimento das qualificações profissionais, e com o Decreto -Lei n.º 92/2011, de 27 de julho, que cria o Sistema de Regulação de Acesso a Profissões (SRAP) de 20 de março. Portugal: Assembleia da República, Diário da República, 1.ª série, n.º 56, pp. 1767 -1775.

Portaria 568/95, de 16 de junho. Portugal: Presidência do Conselho de Ministros, Diário da República, 1ª série – B, nº13, pp. 3870 – 3879.

SALGADO, A.; CLAUDIA, F. *et al*, O que é o Património Cultural Subaquático, Comissão Nacional da UNESCO – Ministério dos Negócios Estrangeiros, Grafilinha,2016.

UNESCO, Convenção sobre a proteção do património cultural subaquático.

11. Dredging Immersion

Sector characterization

The operability of maritime accesses to port infrastructures is one of the priority areas for intervention, ensuring that ports can operate safely and efficiently.

In the port areas, especially in the ports of Funchal, Caniçal and Porto Santo, there is the accumulation of sediments in the sea bottom, derived from the transport of sediments caused by the streams or the result of rippling conditions.

In order to ensure the safety and operability of port areas, regular dredging operations are required.

Dredged materials that are not reusable or used for other purposes are immersed in the sea, as is the case in the port of Funchal. In the case of Porto Santo, they are reused for feeding the beach.

11.1. Present Situation

Dredging immersion in the ARM is associated with the underwater discharge of sediments from dredging operations commonly performed in port areas.

The port of Funchal, due to its location and derived from the dominant sea currents of the East, is affected by the deposition of the materials loaded by the streams that flow into the Funchal bay (São João, Santa Luzia and João Gomes). São João riverside is responsible for frequent burials in the entrance area of the Funchal marina, on quays 6 and 7 and in the sheltered area located inside the port to the west. The riversides of Santa Luzia and João Gomes are responsible for the silting of the city wharf, which, with the changes in the port infrastructures, have reduced the bathymetry of the maneuvering basin of the larger vessels, as well as the area of small vessels fishing anchorage.

On the island of Madeira, there is a specific dump site for the dredging deposit, in front of the port of Funchal (16 53 '30 "W (longitude) and 32 36' 35" N (latitude)).

Given the history of the silting of the port, interventions are planned every two years, corresponding to a maximum dredging volume of approximately 50,000 cubic meters, to be carried out during the months of May/June.

In Porto Santo this operation allows the feeding of the existing beach on the south coast of the island. Given the orientation of the main jetty in relation to the dominant currents of the East, it is a port that does not have a great tendency to sediment, however periodic interventions are necessary in order to guarantee the initial design quotas. Areas subject to intervention are constituted by the interior of the whole basin but should mainly concern the mooring areas of the main jetty, the operating area of the cement vessels and the inner maneuvering area (rotating basin).

Due to the characterization of the materials to be dredged, the dredging will be used in the direct deposition as feeding of the beach, in zones to be defined by the *Secretaria Regional do Ambiente e Recursos Naturais – Direção Regional do Ordenamento do Território e Ambiente*.

11.2. Statistical information

The following table shows the volumes dredged in the port areas. The last scheduled dredging intervention with some significance was made in 2004, for which purpose, samples were collected in the different areas of the port, which were submitted to analyzes for their characterization (Order of the Ministry of the Environment and of the Sea, Republic Diary, no. 141 - 2nd series, of June 21, 1995).

The values of the dredged volumes have varied over the years, as needed. It should be highlighted the period from 2010 to 2014 in which the volume of dredging was increased due to the storm that occurred during the year 2010 as well as the works that took place in the port of Funchal.

In the year 2014 and 2015 there was an increase in the volume of dredging. This situation was due to the need to dredge the port areas due to the significant changes in the configuration of the port of Funchal that resulted from the works carried out.

The displacement to the west of the São João river mouth and the geometric alteration of the entrance to the Funchal marina also revealed the need for future dredging planning, accompanied by a programmed monitoring in order to continue to ensure the operation of the port.

Table 68 - Volumes dredged in the ports of RAM. Source: APRAM, S.A

Year	Volume (m^3)
2004	40 000
2005	30 000
2006	20 000
2007	7 000
2008	3 000
2009	12 000
2010	110 000
2011	64 500
2012	0
2013	0
2014	124 504
2015	32 006
2016	There was no dredging immersion.
2017	There was no dredging immersion

11.3. Legal framework and constraints

11.3.1. Competent institutions for sector management

The competent entity responsible for the dredging immersion is the Administração dos Portos da Região Autónoma da Madeira (APRAM, S.A.).

11.3.2. Normative basis and instruments

In ARM, the legal framework for the characterization and management of dredging is governed by Ordinance no. 1450/2007 of November 12. This ordinance provides for the sampling and prior characterization of sedimentary materials in terms of density, percentage of solids, particle size and total organic carbon, sediment contamination classes, number of sampling stations as a function of volumetric to be dredged and their final destination.

11.4. Current spatial distribution

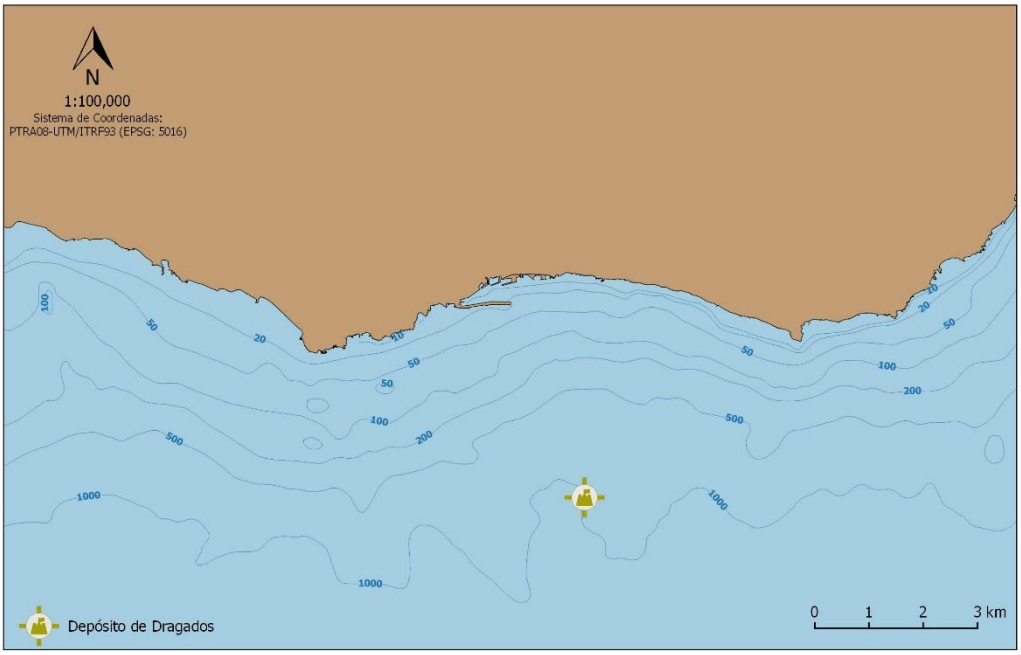


Figure 204 - Location of the area for the dredging deposit. Source: APRAM, S.A.

11.5. Analysis of interactions

11.5.1. Interaction with other sectors

The dredging immersion is compatible with the following activities or uses:

- Touristic and sport activities
- Navigation
- Areas of anchorage

The dredging immersion is incompatible with the following activities or uses:

- Underwater cultural heritage
- Artificial reefs
- Aquaculture
- Protected Marine Areas
- Areas of passage of cables, outfalls and submarine pipelines and their protection areas, pipelines and pipelines

11.5.2. Land sea interaction

This area is not dependent of any terrestrial infrastructures.

11.5.3. Interaction with the environment

The dredging immersion should, wherever possible, take place at low tide and regarding the sea conditions and currents favorable to the dredging operation, which must be accompanied by APRAM, SA and the maritime police so that dredging does not disperse outside of the place of disposal.

Before dredging and dredging operations are carried out at sea, any lighter debris that may float and which are included in dredged materials, especially plastics and other products harmful to the environment, must be removed.

Dredging refers to muds, clays, silts and sands that must be transported by barge and deposited in the sea in order to safeguard the ecological conditions of the coastal region.

The company that is to carry out the dredging / transport and dredging dredging works, must, in due time, request the monitoring of the Port of Funchal Harbor.

Since it is a project in a port area adjacent to areas of high tourist interest, dredging and dredging operations should be carried out as far as possible outside the bathing season, which runs from June to September. Work to be carried out should also avoid as far as possible the periods of greatest vulnerability for migratory species (of high natural and commercial value).

In all situations, the best techniques and appropriate measures should be adopted in the operations of dredging, transport and immersion of materials, in order to minimize the negative environmental effects that these activities may originate.

11.6. Additional documents and links

AUTORIDADE MARÍTIMA NACIONAL, Capitania do Porto do Funchal. Disponível em: http://www.amn.pt/DGAM/Capitanias/Funchal/Paginas/Capitania-do-porto-do-Funchal.aspx

Portos da madeira - APRAM, S.A., disponível em: http://www.apram.pt/site/index.php/pt/

12. Ship Sinking and other structures

Sector characterization

The region has extensive experience in the development of artificial reefs, proven by the various structures sunk since the early 1980s by the Regional Directorate for Fisheries - Research Services.

The main objective of the use of sunken structures is to contribute to the restocking of coastal areas degraded by fishing or other activities that have an impact on marine ecosystems. On the other hand, it allows diving activities in these areas.

12.1. Present Situation

In Baía d'Abra, the first shedding of tire collars occurred, followed by shedding of carcasses previously decontaminated. These are scattered over a large area, between 14 and 17 m deep. Faunal evolution of the site was monitored over several years in the 1980s, 1990s and following.

Between 2000 and 2004, a new model of integrated marine production and coastal protection, on the sea front of Calheta, was experimented with the Mariculture Center (Ponta da Marinha) in the context of a community project, INTERREG III B - MARINOVA MAC / 4.2 / 11. Galley). This project aimed to study the interaction between an aquaculture system and an artificial reef, aiming at its use as a biofiltration agent in relation to the excess organic matter generated by aquaculture practice in the floating cages, entered into the system.

Madeirense was a Portuguese boat constructed in 1962 and sunk in the bay of the island of Porto Santo in 2000, becoming an authentic sanctuary for several marine species.

The former Portuguese Navy vessel, the General Pereira d'Eça corvette, was sunk in the bay of the island of Porto Santo on July 13, 2016 to create an artificial reef and had as objectives to promote the ecological, scientific and socioeconomic development of the region. The first monitoring campaign for the Pereira d'Eça corvette took place between October 31 and November 4, 2016, and it was possible to inventory more than 20 species of fish, invertebrates and algae.

The Corvette Afonso Cerqueira was sunk in Cabo Girão on September 4th of 2018 to create an artificial reef. This sinking aims to promote ecological, scientific and socio-economic development.

12.2. Legal framework and constraints

12.2.1. Competent institutions for sector management

The responsible entity is the *Instituto de Florestas e Conservação da Natureza, IFCN, IP RAM* and *Secretaria Regional de Agricultura e Pescas – Direção Regional de Pescas*.

12.2.2. Normative basis and instruments

It will be necessary for the Captaincy of the Port of Funchal or Porto Santo to issue a notice with the location of the sinking area.

12.3. Current spatial distribution

Figure 205 - Location of artificial reefs on the island of Madeira (West).

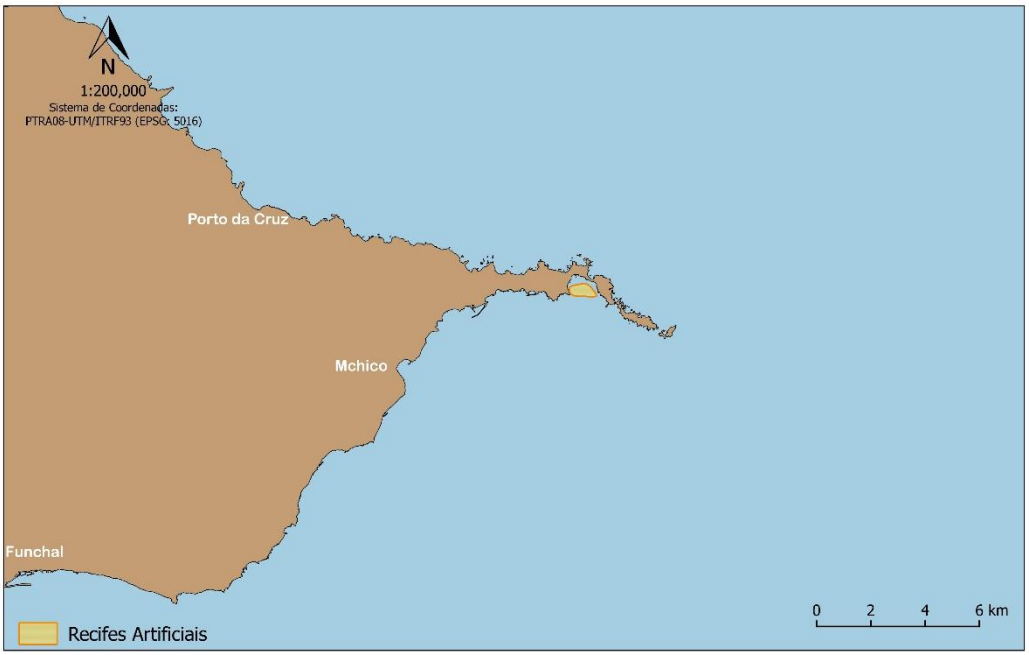


Figure 206 - Location of artificial reefs on the island of Madeira (East).

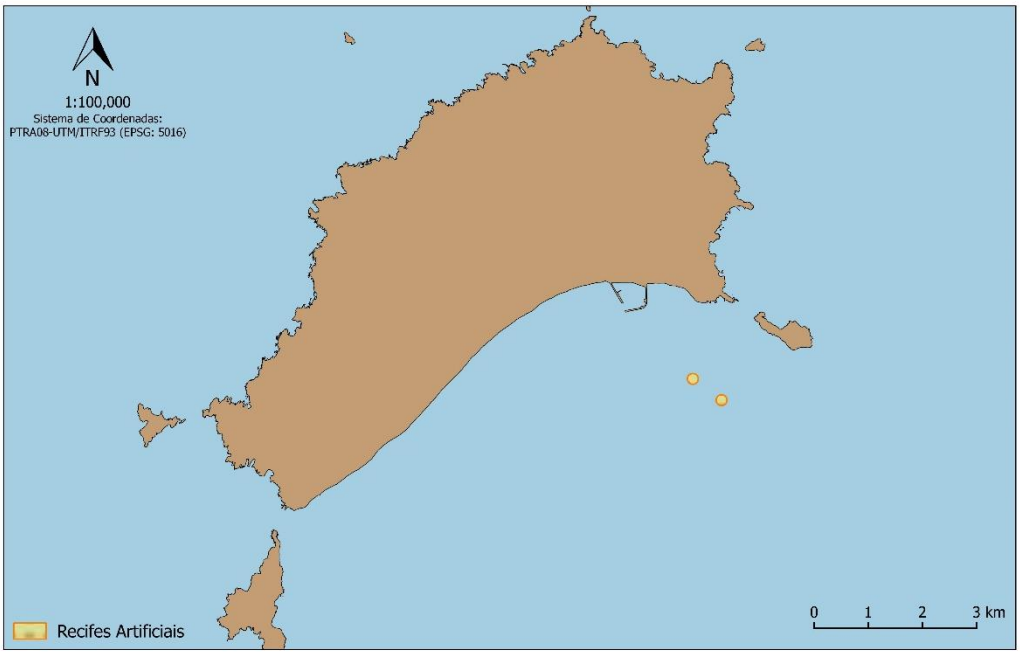


Figure 207 - Location of artificial reefs on the island of Porto Santo.

12.4. Analysis of interactions

12.4.1. Interaction with other sectors

Based on the objectives defined for artificial reefs, the activities considered to be incompatible are as follows:

- Dredging for inert extraction
- Fishing - Prohibition of trawls and gill nets
- Underwater cables and pipelines

The compatible activities are the following:

- Diving for observation and photography - provided it is properly planned and regulated
- Tourist and sports activities
- Protected Marine Areas

12.4.2. Land sea interaction

This area is not dependent of any terrestrial infrastructures.

12.4.3. Interaction with the environment

It will be necessary to monitor the artificial reefs already in place to characterize the biodiversity existing there, following the colonization of sessile organisms as well as the ichthyofauna for an extended period (5 to 10 years). A comparative study should be carried out between man-made concrete reefs and artificial reefs made up of sunken vessels in order to characterize the biodiversity of each type of reef and to respond to the best option when creating new artificial reefs in the near future.

Annual reports of the waters characteristics where the artificial reefs are should be carried out in order to assess the quality and toxicity levels of the reefs.

It will be important to create a multidisciplinary team to collect and analyze data to better respond to future applications for artificial reef installations.

Since there are artificial reefs that are intended for diving, it will be important to create a manual of good practice for the users (diving in apnea and scuba diving or other activities to consider).

12.5. Additional documents and links

Castanhari, G.; Tomás, A.R.G.; Elliff, C. I. (2012) - Benefícios, prejuízos e considerações relevantes na utilização de sistemas de recifes artificiais e estruturas correlatas Benefits, damages and relevant considerations in the use of artificial reef and correlated structure systems. G. Castanhari, Revista da Gestão Costeira Integrada 12(3):313-322 (2012). Journal of Integrated Coastal Zone Management 12(3):313-322.

Da Cunha, A. G.; Santos, D. A. (2010) Implantação de recifes artificiais: uma forma alternativa para incrementar a produtividade pesqueira, Rev. Bras. Eng. Pesca 5(2): I-XII, 2010.

Lukens, R.R.; Selberg, C. (2004) Guidelines for marine artificial reef materials Second Edition Compiled by the Artificial Reef Subcommittees of the Atlantic and Gulf States Marine Fisheries Commissions, Project Coordinators January 2004. Pp 198.

Menezes, G.M., H.M. da Silva H. Krug, E. Balguerias,J. Delgado, J.G. Pérez, I.L.Soldevilla, J.L. Nespereira, D. Carvalho & J.S. Morales. 1997: Design Optimization and Implementation of Demersal Survey Cruises in the Macaronesian Archipelagos (Final Report). Arquivos do DOP, Série: Relatórios Internos, Biblioteca da DSIP, 162 pp .

Menezes,G.M.,J. Delgado, H .Krug, M.R. Pinho,H.M. da Silva e D. Carvalho .1998. Design Optimisation and Implementation of Demersal Cruise Surveys in the Macaronesian Archipelagos II (Final Report). Biblioteca da DSIP. 160 pp.

Timóteo, V. - Relatório dos Censos Visuais do Conjunto Recifal Jardim do Mar e Paul do Mar, 2007, Relatório n03 /2008, Publicação Interna da DSIP-DTAP.

13. Navigation and maritime transport

Sector characterization

Safety navigation and piloting areas

The Madeira archipelago, consisting of a set of volcanic islands, set on a deep continental shelf with a steep slope near the coast, is devoid of submerged geological obstructions that may pose a risk for navigation and passage, especially on the south coast of the island. from Madeira. Accordingly, an adequate ground clearance must be observed which must be at least three miles.

On the north coast of the islands of Madeira and Porto Santo, certain geological obstructions are present, and it is recommended to navigate in transit to be protected at least eight nautical miles from the coast. Thus, the use of pilotage service is mandatory in the following areas:

- Funchal port: the interior of the port and up to the outer limit of 3 miles, centered on the eastern tip of Pontinha area
- Caniçal port: the interior of the port and up to the outer limit of 3 miles, centered on the South of the lighthouse
- Porto Santo port: the interior of the port and to the outer limit of 3 miles, centered on the South lighthouse

Figure 208 - Pilot areas required. Source: APRAM, S.A.

Landing at ports and marinas takes place in safe waters and without significant risks for the experienced navigator, provided that the minimum nautical care is followed during the operation.

The maneuver is conditioned within the port basins due to the following factors:

- Size of vessels
- Occasional adverse weather conditions

In Selvagens Islands, special caution should be given to the tidal regime, which causes part of the island to appear.

Maritime transport – passagers

Passenger, car and inter-shipment traffic is provided by the Ro/Ro *Lobo Marinho* ferry, belonging to the shipping company Porto Santo Line.

The ferry travels between the port of Funchal and the port of Porto Santo with the frequency of 6 stopovers per week in winter time and 7 weekly stopovers in summer time (Lopes,2016). The ferry has capacity to receive 1 150 passengers, 145 vehicles although this value is not totally accurate, depending on the size of the cargo it transports.

This ferry allows Porto Santo island to receive daily cargo, most of which are transported in vans and trucks, which reduces logistical costs and increases distribution capacity.

Maritime transport – goods

According to PIETRAM 2014-2020, the following sets of commercial vessels are currently registered:

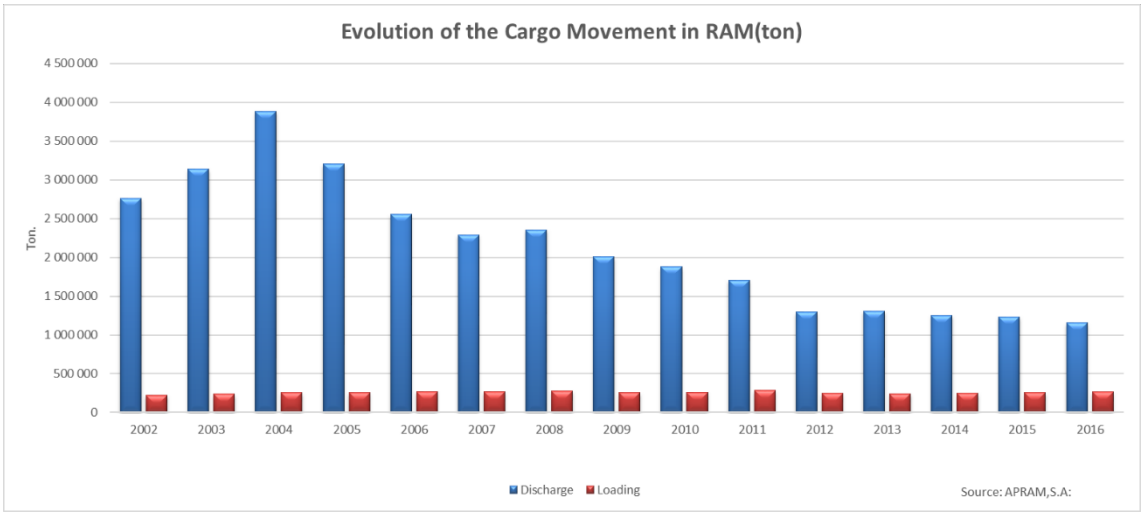
- Weekly service consisting of three regular lines between the port of Caniçal and the ports of Lisbon - climb the port of Caniçal on Mondays (two lines) and Thursday (one line). Fortnightly one of these lines climbs the port of Porto Santo;
- A biweekly regular line linking Ponta Delgada (RAA) and mainland Portugal;
- A regular line from Northern Europe scales the Port of Caniçal every 3 weeks.
- If the vessel movement is analysed by its type, it is possible to observe that the movement of ships in 2016 represented 54% of the movements in the RAM.

13.1. Statistical information

Port activity

The first indicator to be analysed is the movement of cargo. The overall movement of cargo in the ports of the RAM, for the years under review, reached its highest value in 2004, with more than 3.5 thousand tons. Between 2008 and 2012 the variables related to container shipping, freight shipping and number of ships have fallen due to economic instability that has impacted the country and the region. This trend continued in 2016 with 1.5 thousand tons of goods moved.

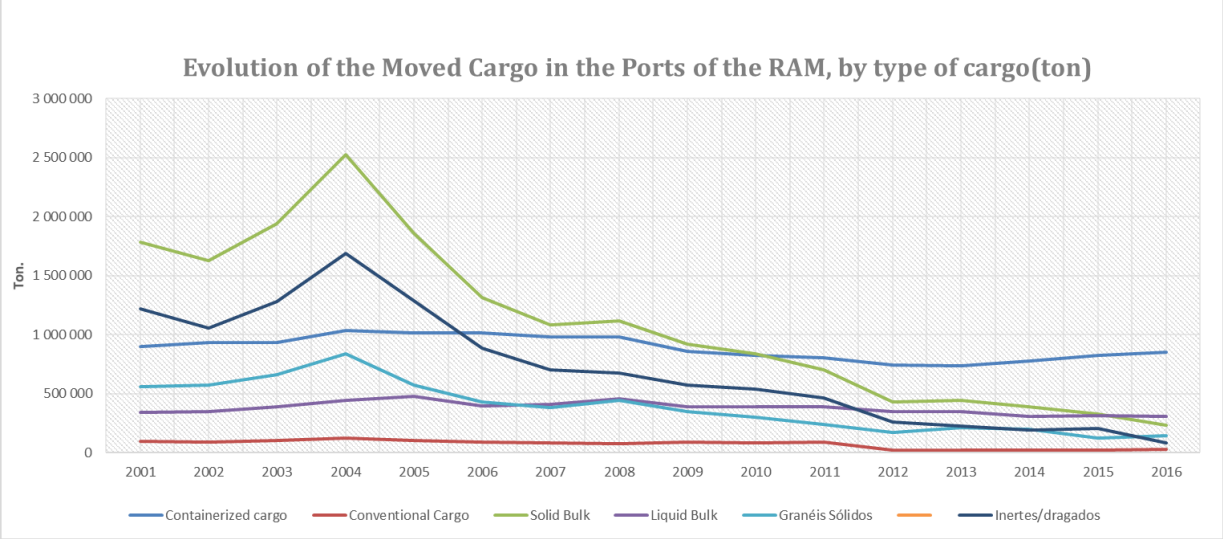
Approximately 82% of the goods handled are imported. It comes mostly from the rest of the national territory (89%). Exports account for 17% of the total regional merchandise movement. These have remained constant in recent years. Export support from the EU may be one of the factors that have contributed to this stability (Lopes, 2016). About 99% of the exports are destined to the national territory.



Graphic 15 - Evolution of the cargo movement in RAM (ton)
Source: APRAM ,S.A.

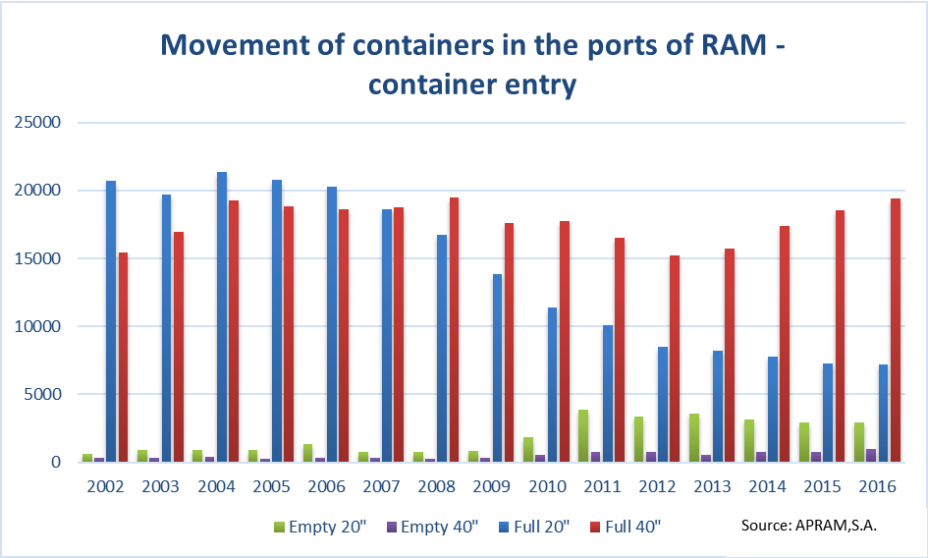
Currently, the port of Caniçal accounts for 87% of the region's merchandise traffic (fuels included), followed by the Socorridos terminal (cement and fuels until January 2015) with 10.5%, the port of Porto Santo with 2, 2% and the port of Funchal has a share of 0.2% (CONSULMAR and Figueira De Sousa, 2016).

In 2016 containerized cargo accounted for 60% of the total cargo handled. The solid bulk was the load that registered a major decrease. Since the aggregates are the only cargo that has origin and destination to Madeira, it was decided to separate from solid bulk. The fall in consumption and especially in construction, explain these values.



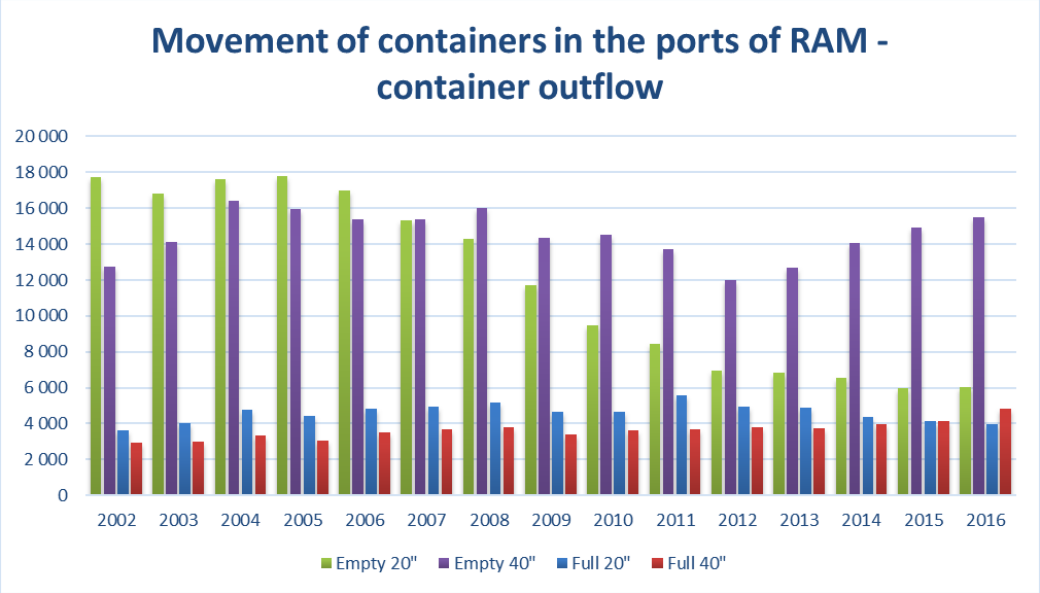
Graphic 16 - Evolution of the moved cargo in the ports of the RAM by type of cargo (RAM)
Source: APRAM, S.A.

With regard to the movement of containers in the Region, based on what has been mentioned previously in this analysis, about 87% of containers entering the Region are full and correspond mostly to 40-foot containers.



Graphic 17 - Movement of containers in the ports of RAM – container entry
Source: APRAM, S.A.

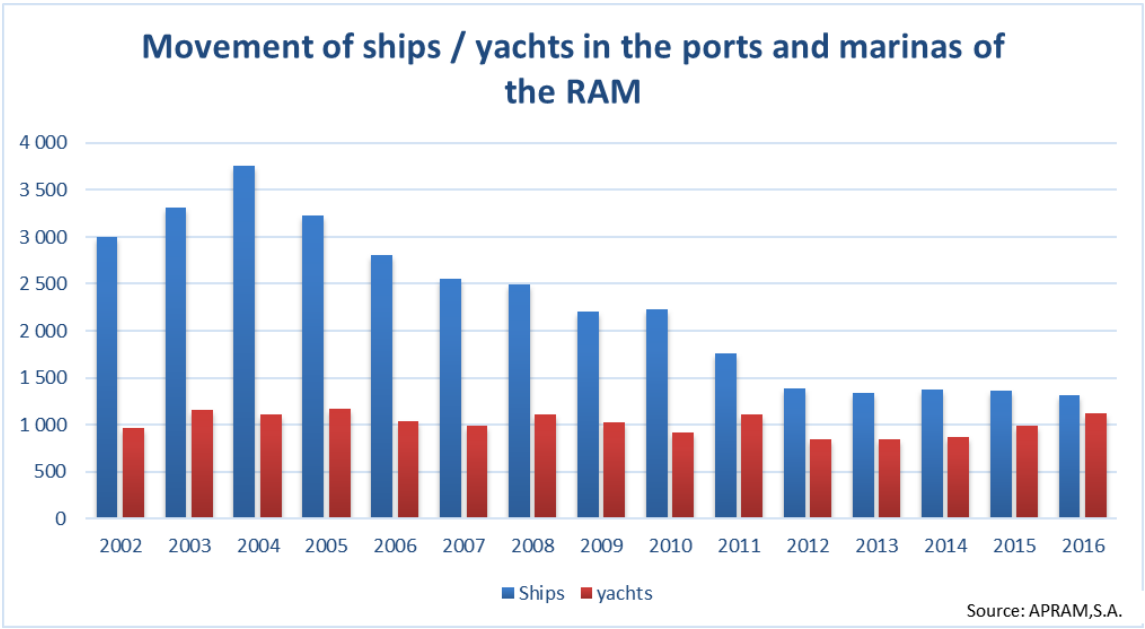
About 71% of the containers leaving the Region correspond to empty containers, in line with the previous analysis that reveals that the Region is mainly an importing territory.



Graphic 18 - Movement of containers in the ports of RAM – container outflow
Source: APRAM, S.A.

The gross registered tonnage in the ports of the Region, in the period of 2002 and 2016, shows a growing trajectory until 2012, with more than 31 thousand tons. In 2013 there was a decrease of 17% compared to the previous year. In 2015 there was a growth of 16% over the previous year.

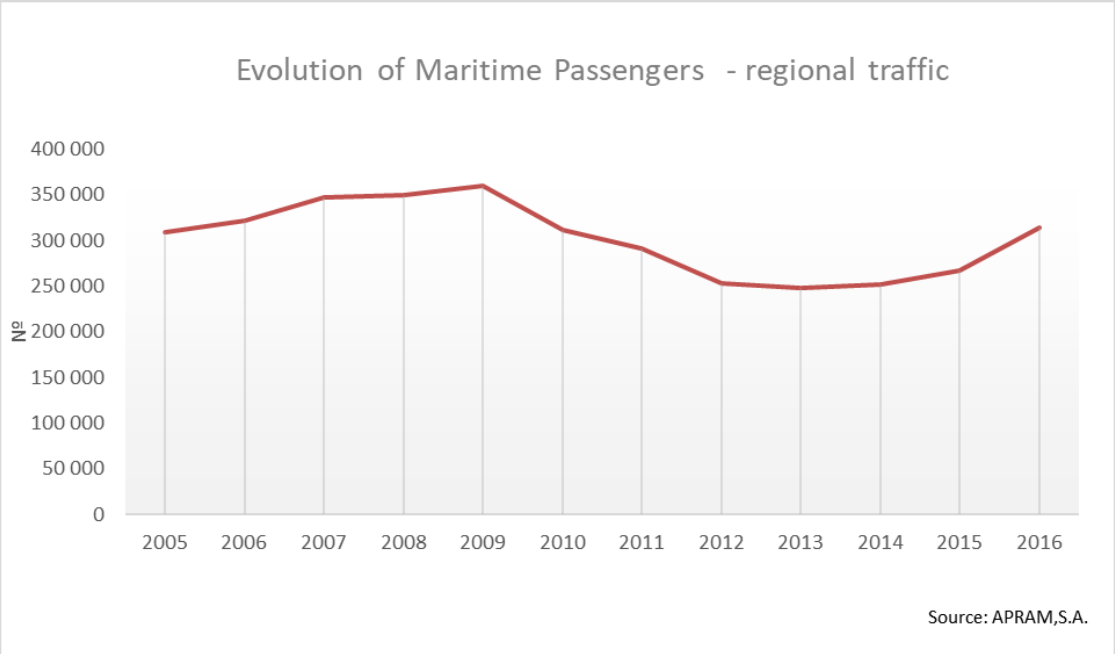
Regarding the movement of yachts, the marina of Porto Santo is the one with the highest value, about 754 vessels, or 67%.



Graphic 19 - Movement of ships/yachts in the ports and marinas of the RAM
Source: APRAM, S.A.

Transportation of passengers

The analysis of the evolution of maritime traffic of inter-island passengers allows us to verify that there was a fall between 2009 and 2012, due to the economic crisis. As of 2012, the number of passengers transported remained stable, and in 2015, it was 267,541 passengers.



Graphic 20 - Evolution of maritime passengers – regional traffic
Source: APRAM, S.A.

According to PIETRAM 2014-2020, the Madeira-Porto Santo line is only sustainable with a minimum traffic of 300 thousand passengers per year.

This objective was reached in 2016, due to the efforts made by the Regional Government, in the design of subsidies in support of Madeira Islanders who wish to move between islands during the low season.

The company *Naviera Armas* operated a ferry boat for the transport of passengers and goods (trailers and vehicles) between 2006 and 2012 (Lopes,2016). Initially the transport was assured between the Madeira Archipelago and the Canary Islands Archipelago. This activity eventually extended to the national continent (Portimão), from 2008 to 2012. The activity ceased on the island of Madeira for economic reasons.

13.2. Analysis of interactions

13.2.1. Interaction with other sectors

Activities producing goods, such as aquaculture, are dependent on this sector.

Port areas are compatible with activities such as tourism or sport.

Regarding navigation, corridors may be incompatible with activities that require some fixed infra-structure.

13.2.2. Land-sea interaction

In the case of the transport of goods, the ports will be of support to the industries for the disposal of goods.

13.2.3. Interaction with the environment

The impacts that this activity may have on marine ecosystems are still poorly studied. However, it is known that navigation is responsible for the emergence of non-indigenous species that are embedded in the hulls of ships.

13.3. Additional documents and links

CONSULMAR e Figueira de Sousa (2016) - Plano Integrado Estratégico de Transportes da Região Autónoma da Madeira 2014-2020, Funchal: Secretaria Regional da Economia, Turismo e Cultura.

WW e PRIMA (2002). Estudo do Plano Diretor do Porto Santo, Administração dos Portos da Região Autónoma da Madeira, S.A.

WW e PRIMA (2012). Estudo do Plano Diretor do Porto do Funchal, Administração dos Portos da Região Autónoma da Madeira, S.A.

WW, PRIMA, CISEN (2008). Estudo do Plano Diretor do Porto do Caniçal, Administração dos Portos da Região Autónoma da Madeira, S.A.

14. Ports and marinas

Sector characterization

The ports assume a relevant position, especially in an outermost island region, in order to "*constitute a door for the rest of the world and fully assume the gateway function attributed to these infrastructures*" (Figueira de Sousa, 2004: 1).

In recent years the main ports of the Region have been the target of several modernizations, allowing their constant adaptation to the needs of the archipelago (Lopes, 2016).

The APRAM, S.A. - Administration of the Ports of the Autonomous Region of Madeira S.A., better known as Portos da Madeira, is responsible for the administration and jurisdiction of most of the port areas in the Madeira archipelago.

The delimitation of these port areas is based on Regional Legislative Decree no. 25/2003 / M, of August 23, and the work to change the areas of jurisdiction that take place.

According to these works, the port infrastructure in the RAM that is under the purview of APRAM, S.A., is divided in three categories of importance for the management:

- Main ports, spanning 3 nautical miles
- Secondary or secondary ports, with a range of 1.5 nautical miles
- Tertiary or third-level ports, with a length of 500 linear meters

In the port areas are included:

- Areas reserved and consolidated by specific plans for anchorages in the main ports of the AMR established in Articles 21 to 24 of the Security Regulation annexed to the Operating Regulations of APRAM S.A., approved in point 4 of Minutes no. °38 / 2010 of September 28 of the Board of Directors
- Pipeline terminals
- Areas of exclusive access to port areas

Main ports

The Funchal, Caniçal and Porto Santo ports are the main port infrastructures of the archipelago. It is through these ports that the region establishes maritime connections with the outside.

The configuration, infrastructures, equipment and services, which today characterize these port areas, result from the implementation of the port director plans.

In the region, several improvements have been made over the last years in the port areas, through valorization and development works. The following are the main characteristics of the low-lying infrastructure serving the main port infrastructures.

Funchal Port

The port is located in the bay of the city of Funchal. In recent years, the port of Funchal has undergone deep restructuring. The inability to cope with the multiplicity of commercial and tourist activities led to the restructuring of the port of Funchal, making it a port dedicated to cruise tourism and nautical activities, freeing the city of Funchal from handling and cargo transportation, passing the activity to the port of Caniçal.

Caniçal Port

In the extreme east of the south coast of the island of Madeira, is located the port of Caniçal. It is a commercial port responsible for the handling of commercial cargoes: containerized cargo, general cargo, solid bulk cargoes and liquids.

The surrounding area of the Caniçal port is now an important logistics platform for the region, housing several services and industries.

Port of Porto Santo

The port of Porto Santo is located on the eastern end of the south coast of the island of Porto Santo. It is an artificial harbor, built in the mid-eighties of last century. Access to the port is affected by the marginal regional road to the coast, constituting itself as the connecting axis to the main urban nucleus of the island. The purpose of the port is the transport of people and goods and the development of recreational and sports activities.

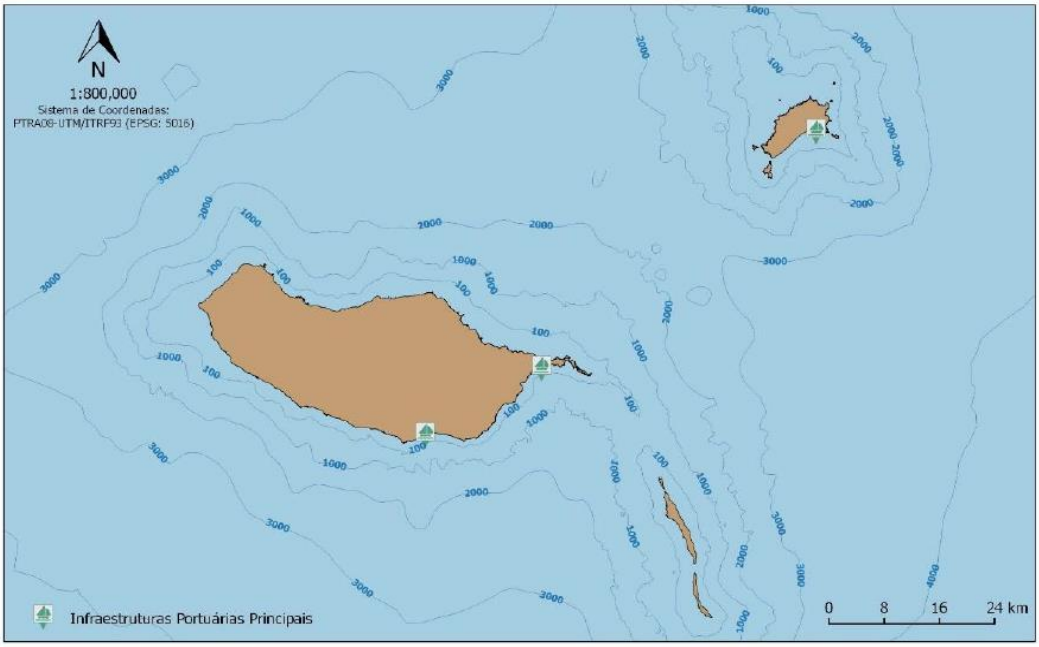


Figure 209 - Main ports. Source: APRAM, S.A.

Secondary ports

The secondary ports defined in the region are as follows:

- Porto Novo port
- Câmara de Lobos port
- Porto Moniz port
- Calheta port

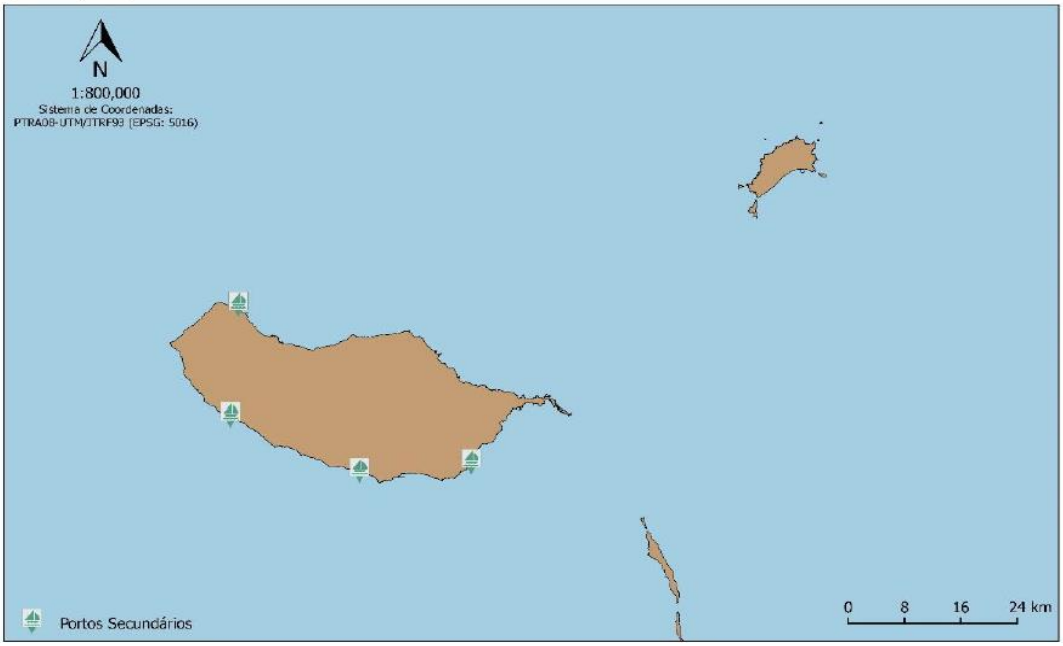


Figure 210 - Location of secondary ports. Source: APRAM, S.A.

Tertiary ports

The tertiary ports defined for the region are as follows:

- Machico port
- Ribeira Brava port
- Paul do Mar port
- Santa Cruz port

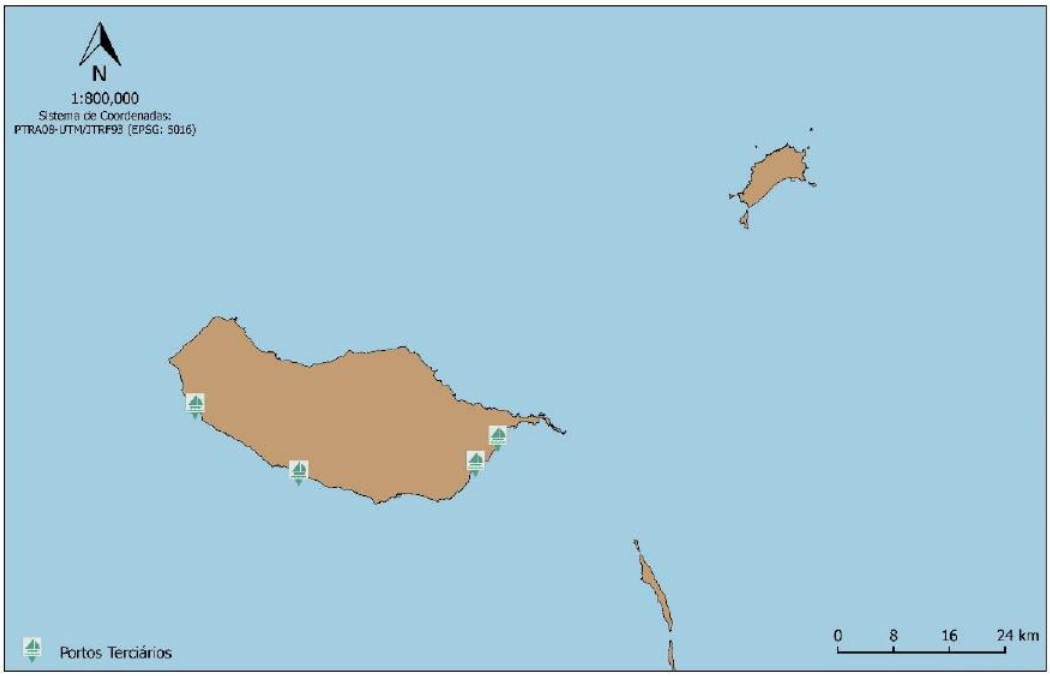


Figure 211 - Location of tertiary ports. Source: APRAM, S.A.

In the region there are also several secondary infrastructures that provide access to the sea in adequate safety conditions. These are essentially ramps, piers, pontoons that have supported the development of maritime tourism activity or at least have the potential to serve this activity.

Although not referenced as secondary or tertiary ports, it should also be mentioned the Madalena do Mar pier and the Santa Cruz pier (under the head of the airport), the Seixal pier, as well as some pontoons, pier bridges or other fixed structures. mooring of vessels that exist along the coast. In some cases these infrastructures are in poor condition and require significant maintenance interventions. These infrastructures are under the protection of public or private entities.

Figure 212 - Sea access infrastructures such as small towns and ramps. Source: Hydrographic Institute

Marinas

The Region has five main infrastructures with shelter against sea turmoil. Five of these infrastructures are located on the south coast of Madeira and one on Porto Santo.

Table 69 - Characteristics of the region's recreational marinas.

Designation	Floating mooring	Dry Park	Maximum length of the vessel	Operator/Manager	Construction Date
Funchal marina	240 (+20 visitors)	n.i.	20	Private	1984
Quinta do Lorde marina	260	0	50	Private	2002
Machico marina	70	0	20/25	Public	2005
Santa Cruz marina	40/60 (if equipped with walkways and fingers)	15/30 (facilities of Santa Cruz Yacht Club)	15/20	Public	2006
Porto Santo marina	140	40/50	50	Private	n.i.

In total, these infrastructures provide approximately 770 floating parking spaces. Currently, the Funchal marina is experiencing problems of reception, with sold out. Each of these marinas has a specific port.

It is also important to mention the dock for maritime-tourist activities, near the port of Funchal. This dock has a mooring dock about 200 m in length and a minimum working depth of - 3.5 m (ZH).

Port Approach Areas

For the main, secondary, tertiary and marinas / recreational ports, the port approach areas were delimited. The delimitation of these areas was based on the diploma in force - Regional Legislative Decree No. 25/2003 / M of August 23, and the alteration work on the areas of jurisdiction that took place during the preparation of the Situation Plan.

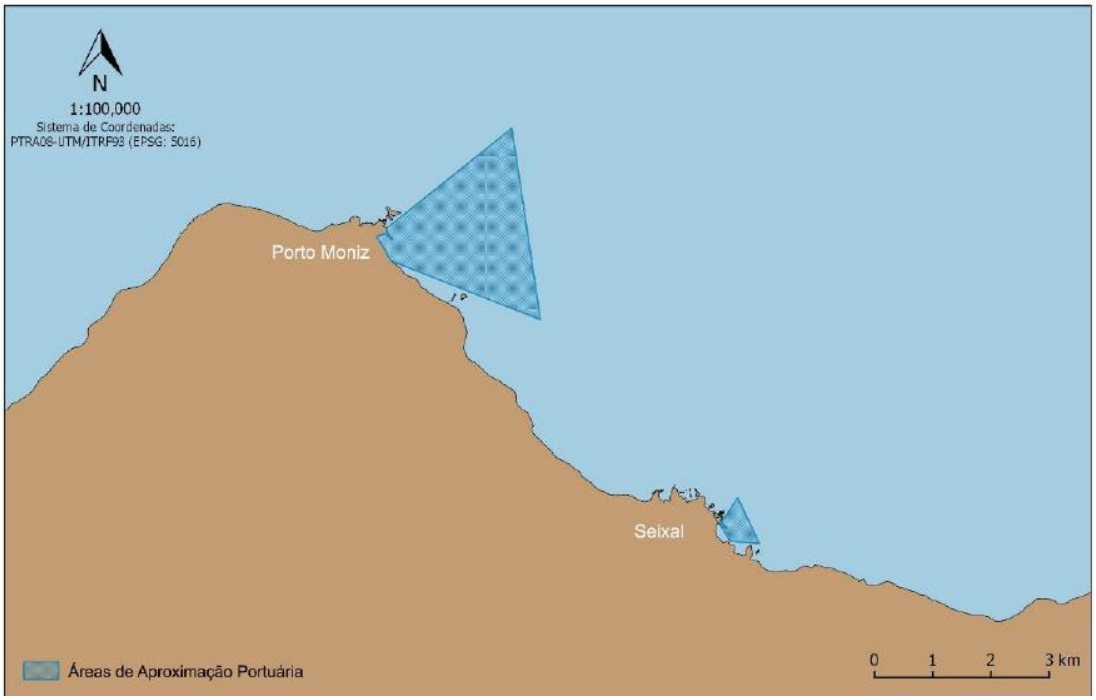


Figure 213 - Port Approach Areas Northwest of the island of Madeira. Source: APRAM, S.A.

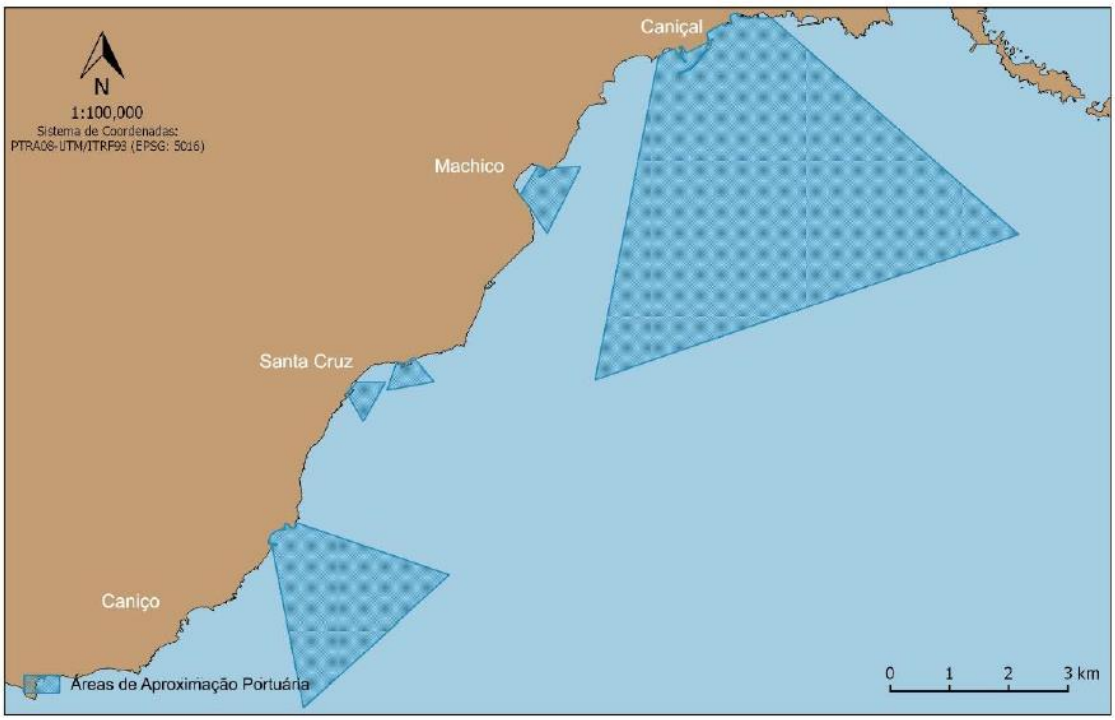


Figure 214 - Port approach areas- Southeast of the island of Madeira. Source: APRAM, S.A.

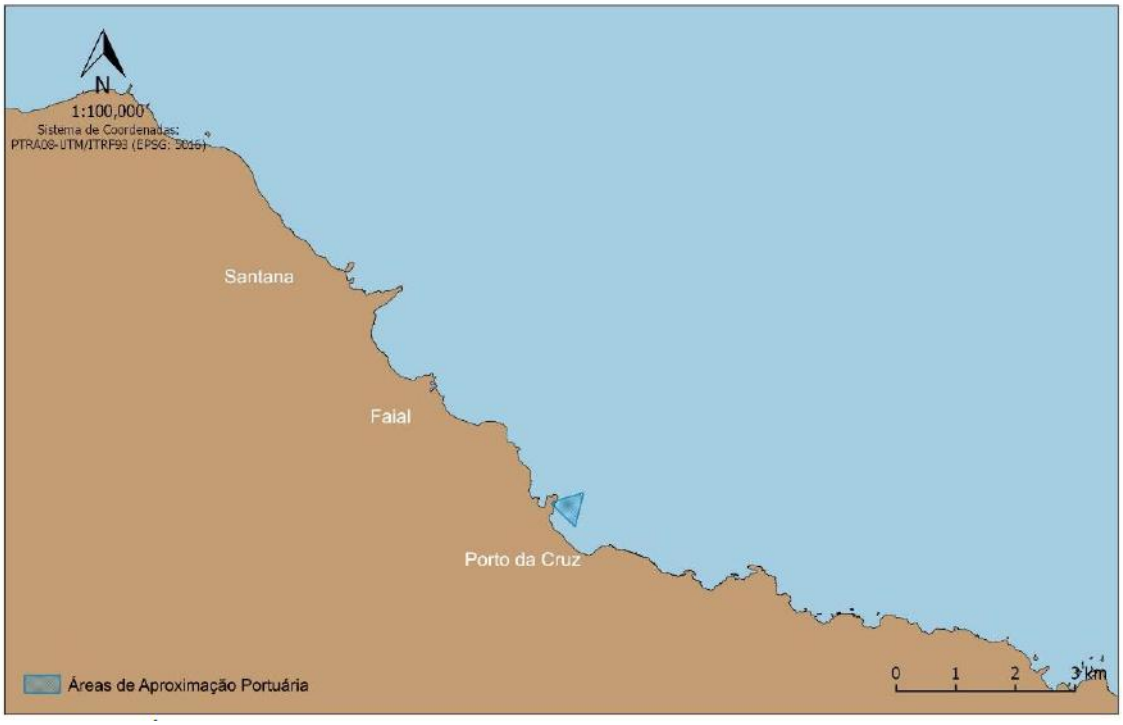


Figure 215 - Port approach areas North northwest of the island of Madeira. Source: APRAM, S.A.

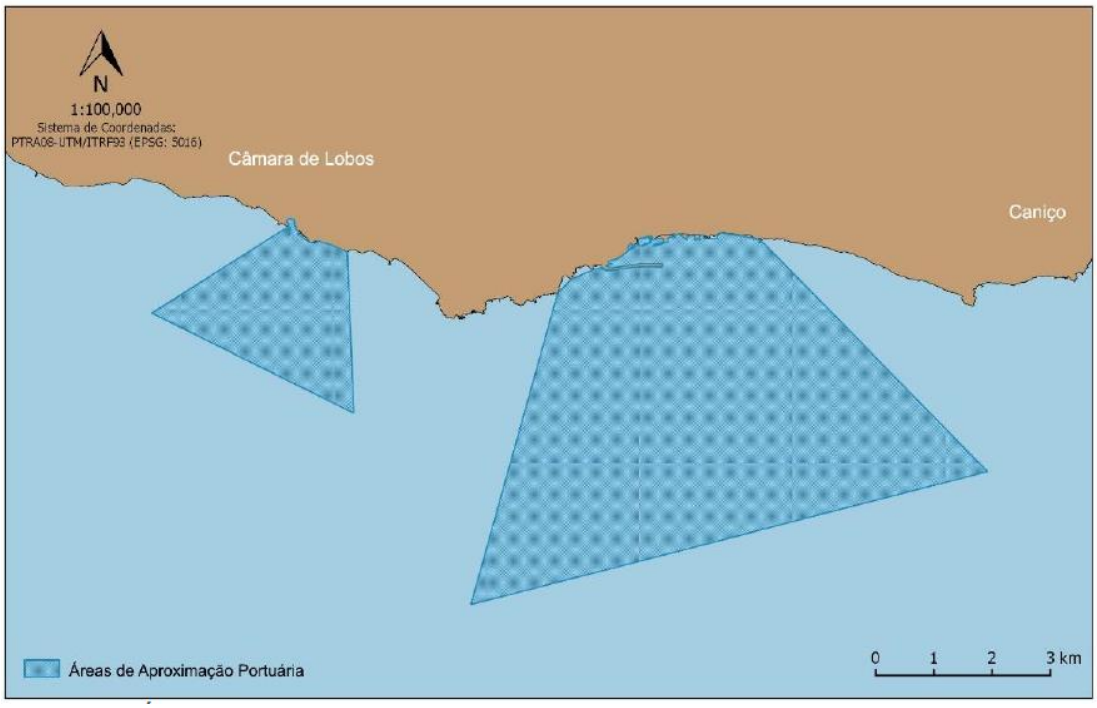


Figure 216 - Port Approach Areas South Southeast of Madeira Island. Source: APRAM, S.A.

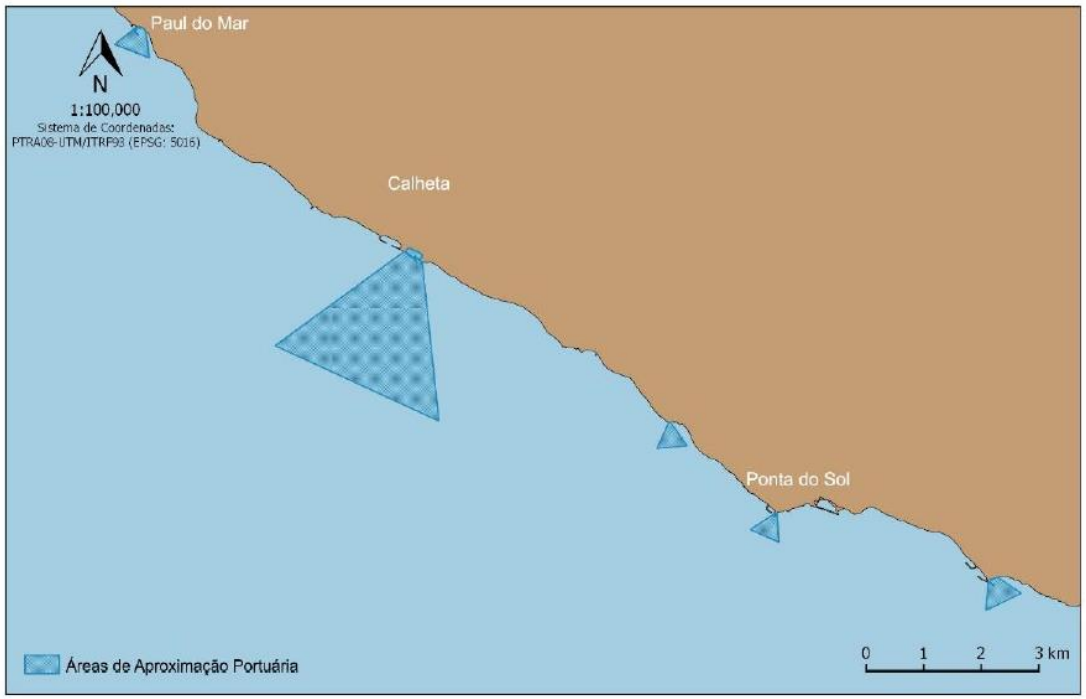


Figure 217 - Port Southeast approach areas of the island of Madeira. Source: APRAM, S.A.

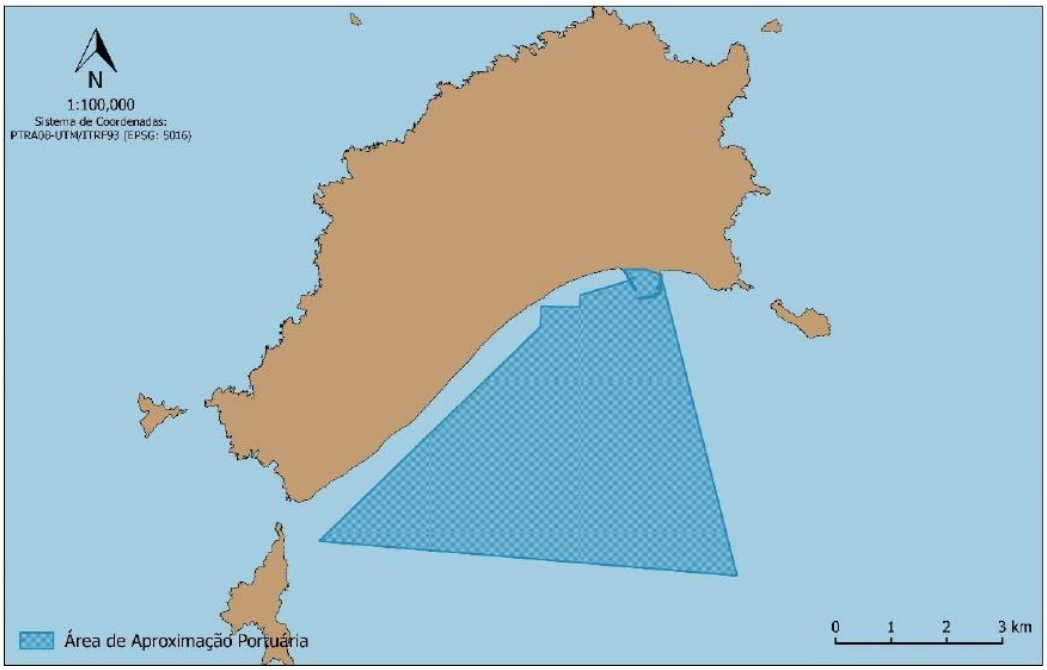


Figure 218 - Port approach area Porto Santo Island. Source: APRAM, S.A.

14.1. Analysis of interactions

14.1.1. Interaction with other sectors

Port and marinas areas are compatible with activities such as tourism or sport.

14.1.2. Land-sea interaction

Most of the sea activities or sectors are strictly dependent of the port or marina areas.

14.1.3. Interaction with the environment

The impacts that this activity may have on marine ecosystems are still poorly studied. However, it is known that navigation is responsible for the emergence of non-indigenous species that are embedded in the hulls of ships.

14.2. Additional documents and links

CONSULMAR e Figueira de Sousa (2016) - Plano Integrado Estratégico de Transportes da Região Autónoma da Madeira 2014-2020, Funchal: Secretaria Regional da Economia, Turismo e Cultura.

WW e PRIMA (2002). Estudo do Plano Diretor do Porto Santo, Administração dos Portos da Região Autónoma da Madeira, S.A.

WW e PRIMA (2012). Estudo do Plano Diretor do Porto do Funchal, Administração dos Portos da Região Autónoma da Madeira, S.A.

WW, PRIMA, CISEN (2008). Estudo do Plano Diretor do Porto do Caniçal, Administração dos Portos da Região Autónoma da Madeira, S.A.

Macaronesian Maritime Spatial Planning

ANNEX III. CURRENT MARITIME USES AND CONSTRAINTS – The Canary Islands

List of acronyms

BDBC: Banco de Datos de Biodiversidad de Canarias (Biodiversity Data Bank of the Canary Islands)
BDN: Banco de Datos de la Naturaleza (Nature Data Bank)
BEA: Banco Español de Algas (Spanish Bank of Algae)
BIOCON: Grupo en Biodiversidad y Conservación (Group in Biodiversity and Conservation)
BOE: Boletín Oficial del Estado (Official Spanish Gazette)
CBM: Centro de Biotecnología Marina (Marine Biotechnology Center)
CONCUMAR I: Convención Nacional de Cultivos Marinos (First National Convention on Marine Crops)
DPMT: Dominio Público Marítimo Terrestre (Maritime Terrestrial Public Domain)
EOMAR: Grupo de Ecofisiología de Organismos Marinos (Marine Organisms Ecophysiology Group)
EU: European Union
EEMM: Estragias Marinas (Marine Strategies)
EEZ: Exclusive Economic Zones
EMODnet: The European Marine Observation and Data Network
FIFG-IFOP: Instrumento Financiero de Orientación de la Pesca (Financial Instrument for Fisheries Guidance)
GEBCO: General Bathymetric Chart of the Oceans
GIA: Grupo de Investigación en Acuicultura (Aquaculture Research Group)
HPL: Herramienta de Pilotaje del Litoral Canario
IAC: Instituto Astrofísico de Canarias (Institute of Astrophysics of the Canary Islands)
ICONA: Instituto para la Conservación de la Naturaleza (Institute for the Conservation of Nature)
IDECanarias: Infraestructura de Datos Espaciales de Canarias (Spatial Data Infrastructure of the Canary Islands)
IDEGran Canaria: Infraestructura de Datos Espaciales de Gran Canaria (Spatial Data Infrastructure of Gran Canaria)
IEO: Instituto Español de Oceanografía (Spanish Institute of Oceanography)
IGN: Instituto Geográfico Nacional (National Geographic Institute)
IHM: Instituto Hidrográfico de la Marina (Marine Hydrographic Institute)
INE: Instituto Nacional de Estadística (National Institute of Statistics)
ITC: Instituto Tecnológico de Canarias (Technological Institute of the Canary Islands)
IMO: International Maritime Organization
IUCN: International Union for Conservation of Nature
MarSP: Macaronesian Maritime Spatial Planning
MaB: Man and the Biosphere Programme
MPA: Marine Protected Areas
MSFD: Marine Strategy Framework Directive
IMDG Code: Maritime Dangerous Goods Code
MSP: Maritime Spatial Planning
MARM: Mininisterio de Medio Ambiente y Medio Rural y Marino (Ministry of the Environment, and Rural and Marine Affairs)
MAPA: Ministerio de Agricultura, Pesca y Alimentación (Ministry of Agriculture, Fisheries and Food)
MAPAMA: Ministerio de Agricultura,Pesca y Alimentación y Medio Ambiente (Ministry of Agriculture, Fisheries, Food and the Environment)
MITECO: Ministerio para la Transición Ecológica (Ministry for the Ecological Transition)
MPA: Marine Protected Area
LOT: Regulation of Tourism of the Canary Islands
ORM: Observatorio del Roque de los Muchachos (Roque de los Muchachos Observatory)

OT: Observatorio del Teide (Teide Observatory)
PSSA: Particularly Sensitive Sea Areas
PIO: Plan Insular de Ordenación (Insular Territorial Plan)
PIOH: Plan Insular de Ordenación de El Hierro (El Hierro Insular Territorial Plan)
PIOT: Plan Insular de Ordenación de Tenerife (Tenerife Insular Territorial Plan)
PROAC Plan Regional Ordenación Acuicultura de Canarias (Regional Plan for the Management of Canarian Aquaculture)
PLOCAN: Plataforma Oceánica de Canarias (Oceanic Platform of the Canary Islands)
pSCI: Proposed Sites for Community Importance
RAMPE: Red de Áreas Marinas Protegidas de España (Marine Protected Areas Network of Spain)
REE: Red Eléctrica de España (Electricity Network of Spain)
SiMAC: Sistema de Información Medioambiental de Canarias (Canary Islands Environmental Information System)
SITCAN: Sistema de Información Territorial de Canarias (Territorial Information System of the Canary Islands)
SCI: Sites of Community Importance
SAC: Special Areas of Conservation
SPA: Special Protection Areas
TOTMA: Grupo de Turismo, Ordenación del Territorio y Medio Ambiente (Group of Tourism, Territorial Planning and the Environment)
UNESCO: United Nations Educational, Scientific and Cultural Organization
ULPGC: University of Las Palmas de Gran Canaria
WMS: Web Map Service

Existing maritime uses, activities and constraints in the Canary Islands

Methodological approach

The development of maritime uses and activities is hampered by several factors. These limiting factors or **constraints** are important to know in order to understand the current situation and future development of the uses at sea. Most importantly, acknowledging constraints allows addressing their causes and promote and develop the activity further. The existing knowledge gaps around constraints for the maritime sectors have been filled with local knowledge from stakeholders. The 2nd MarSP stakeholder workshop of the Canary Islands held in Las Palmas de Gran Canaria on 10th April 2019 was the occasion for it. A working table was prepared with a large sheet where maritime sectors together with categories of constraints by their nature (legal, administrative, economic, social, technological and environmental constraints) were placed face to face (see Appendix 1). After a short presentation explaining the exercise, participants were asked to provide inputs about constraints based on their knowledge and experience. Post-it were available to write each constraint identified and be placed in the corresponding box of the sheet. Results of the working table are presented and analysed sector by sector in the present report.

The methodology to obtain the **current spatial distribution** of maritime activities was based on the search of cartographic data in diverse sources. Most data have been obtained from SDI (Spatial Data Infrastructure), cartographic viewers and geoportals of public organizations or international networks assembling marine data, products and metadata to make more resources available. In addition, information on plans, reports and publications has been collected. Depending on the source, the information can be divided into four levels (Insular, Regional-provincial, National and International), so there may be differences between the data of the different islands according to their origin, mainly if they come from the island administrations. All data were recorded and classified by use sectors. Much of the existing information is not free access, so it is necessary to request such information from the corresponding organisations. This work of compiling the information is in process, so it is presented in this report through its original sources. For the presentation of current spatial distribution maps, the IDECanarias OrtoExpress 2018 (GRAFCAN) and GEBCO's gridded bathymetric data set were used as the base layer.

MSP aims to promote coexistence and reduce conflicts between uses and activities at sea. Understanding interactions between maritime sectors is an important step for MSP plans. **Interactions with other sectors** were the focus of two of the working tables in the 2nd MarSP stakeholder workshop of the Canary Islands. One table addressed positive interactions (synergies) while the other table focused on negative interactions (conflicts) (see Appendix 1). Stakeholders were provided with a short explanation and indications to participate in the activity. They were asked to assess the degree of interaction between activities in general terms based on their knowledge and experience. Sticks with different colours representing neutral (0), low (+1), medium (2) and high interaction (3) were available to fill a matrix with maritime sectors placed face to face (positive values for synergies and negative for conflicts). The average value for all sticks was calculated (see Appendix 2) to obtain the synergy/conflict value for each interaction. Besides, participants could also identify concrete synergies or conflicts, write in post-it and place them in the corresponding box of the matrix. Results from both the degree of interaction and the identification of specific interactions are presented and analysed in this report.

The EU MSP Directive places great emphasis on taking into account **land-sea interactions**. Maritime sectors rely on land for multiple purposes, without which their activities cannot occur. Land uses have a large number of impacts on the sea and the activities taking place on it and vice versa. This is the reason why two working tables were prepared to address this issue at the 2nd MarSP stakeholder workshop of the Canary Islands. Each working table addressed positive (synergies) and negative (conflicts) interactions respectively (see Appendix 1). After a brief explanation about the activity, participants were asked to provide inputs based on their knowledge and experience. Large sheets facing land uses with maritime sectors were available to be filled with sticks with different colours representing neutral (0), low (1), medium (2) and high (3) interactions (positive values for synergies and negative for conflicts). The average value of all sticks was calculated (see Appendix 2) to obtain the final degree of synergy/conflict of each interaction. Besides, participants could also identify specific synergies or conflicts, write them in post-it to be placed in the corresponding box of the sheet. The results of the two working tables (synergies and conflicts) are presented and analysed sector by sector in this report.

AQUACULTURE

PART I

Sector characterization

The first attempts to implant aquaculture in the Canary Islands date from the beginning of the 20th century and consisted in the establishment of oyster farms in the Playa de Las Canteras (Las Palmas de Gran Canaria) and in Puerto Naos (Arrecife). However, their results are almost unknown and have been of little duration. At the same time, other experiences were related to nursery techniques. This system consisted in extracting the fish, keeping it alive in a tank on the boat and depositing it in cages anchored in the bays of the capital's ports. It was then taken out into the market in accordance with the business strategy of the owner. This system remained until the thirties, when crude petroleum oils began to contaminate the bays of Santa Cruz de Tenerife and Puerto de la Luz. The Institute for the Conservation of Nature (ICONA) launched in the seventies a pilot experiment in freshwater for trout cultivation in the highlands of the Orotava Valley that remains to this day.

However, the most important beginnings of modern aquaculture were the organization of the First National Convention on Marine Crops (CONCUMAR) in 1980 in Lanzarote, which laid the basis for the development of the sector in the region. After this, the first experiences in cages and on land for the production of commercial species emerged, also combined with basic and applied research in the university departments and research institutes established in the Archipelago. In the second half of the 1980s, up to a dozen projects were presented with a planned production of 1,400 tonnes (metric ton) and an investment of more than 12 million Euros, although finally only four projects ended up being installed. Most of the promoters were small investors encouraged by subsidies to the sector, with little knowledge of the business, although later large investment groups appeared that started buying shares or injecting capital to companies with less financial capacity.

It was with the creation of the Financial Instrument for Fisheries Guidance (FIFG-IFOP in Spanish) that the sector experienced significant growth in the Canary Islands, with twelve grant dossiers being approved in the first programming period (1994-1999), while in the second period (2000-2006) 105 applications were approved. The subsidies led to an increase in investment in productive infrastructure, especially between 2001 and 2005. This fact, added to the agreements with companies producing juveniles such as Cupimar or Tinamenor as well as with feed manufacturers such as DIBAQ, which financed the juveniles in exchange for taking over the marketing of the final product, enabled the companies to cover a large part of the operating costs without resorting to own funds. The result of all this support was a spectacular growth between 2001 and 2006, reaching to 34 companies in the Canary Islands, with an authorized production capacity of gilthead seabream (*Sparus aurata*) and European sea bass (*Dicentrarchus labrax*) that exceeded 12,000 T. In the year 2008 the authorized production reached almost 14,000 T, reaching more than 15,000 T in the year 2012.

The year 2008 saw the start of the second major crisis in the sector, as a result of restrictions on access to finance, leading to the release of a significant quantity of fish, many of which are under 300 grams (especially in 2009), which was used by distributors to reduce prices, further exacerbating the lack of finance in companies. The effects of the 2008 crisis include the cessation

of the activity of several companies and a real decrease in productive capacity in the Canary Islands, as well as a business concentration.

Currently, aquaculture activity is concentrated on four of the seven islands of the archipelago. The distribution of the concessions at sea is as follows: one in La Palma, five in Tenerife, four in Gran Canaria and one in Lanzarote, plus three authorizations for ground installations in Gran Canaria. These concessions and authorizations are carried out by seven small enterprises (between 10 and 50 workers) and four micro enterprises (less than 10 workers).

According to data from the Ministry of Agriculture, Livestock, Fisheries and Water of the Government of the Canary Islands, the production of aquaculture activity in the Canary Islands from 2007 to 2017, is approximately 5,700 t in 2010 and 9,000 t in 2016, with an average production of around 7,000 t during this period. The species of greatest production are the European sea bass (*Dicentrarchus labrax*) with 60% of the production and the gilthead seabream (*Sparus aurata*) with 39.8%.

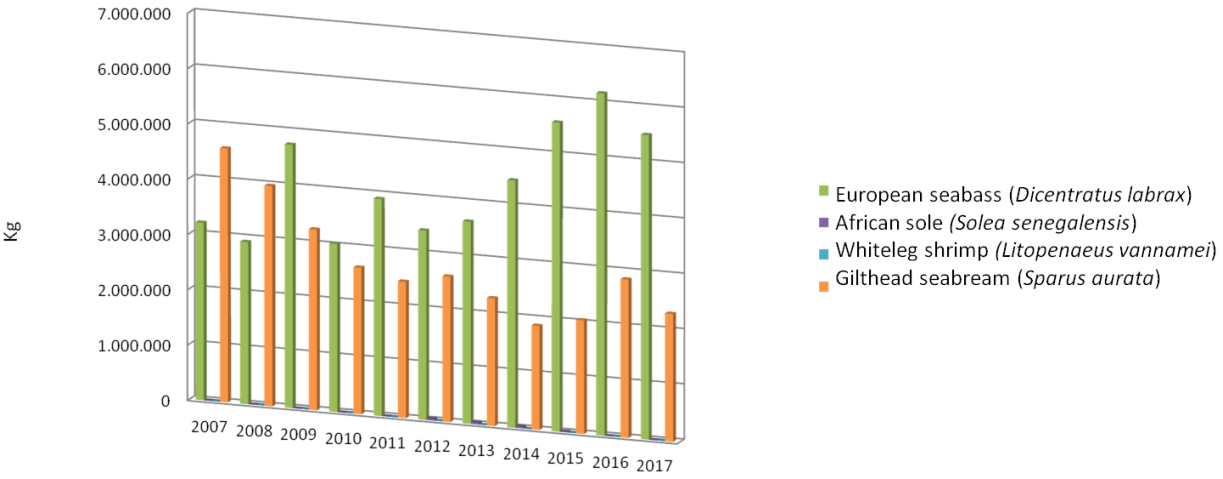


Figure 219. Evolution of aquaculture species production. Taken from the website of the Ministry of Agriculture, Livestock, Fisheries and Water of the Government of the Canary Islands (http://www.gobiernodecanarias.org/agricultura/pesca/temas/cultivos_marinos/breve_historia.html)

Legal framework and constraints

Legislation applicable to the Canary Islands context: summarize the applicable legislation and the developed matters (Internal waters)

Aquaculture is an economic activity that is sustainable and respectful of the marine environment, since, in its exploitation, it favours regeneration, the development of fishery resources, the protection of marine protected species and human health (against plastic pollution that affects fish in the open sea). In fact, thanks to aquaculture it is no longer necessary to catch or kill fish in the open sea, even accidentally because they are trapped in nets, species that are protected. On the other hand, thanks to the cultivation of fish, aquaculture can satisfy the human needs of food (the average consumption of current marine products is 23.1 kg per person, of which 24% comes from aquaculture).

Despite the previous statement, an orderly planning is necessary because both the inadequate and lack of planning can generate a degeneration or imbalance of the marine ecosystems motivated by the organic waste that is released from the cages and other facilities that are located in the sea, as well as, by the interference of human activity in the natural development of the marine environment. Because of that, it is essential to make an adequate aquaculture planning in the Canary Archipelago. The Autonomous Community of the Canary Islands has such **competence** in accordance with **article 131, paragraph 3, of the Organic Law 1/2018, of November 5, of the reform of the Statute of Autonomy of the Canary Islands** (hereinafter EAC), according to which corresponds to the Autonomous Community of the Canary Islands competence in matters of *activities in the maritime areas defined in Article 4 of the same Statute, which includes, in any case, the planning, management, management of shellfish and aquaculture, as well as the facilities destined to these activities.* It is the responsibility of the Island Councils to perform executive functions in aquaculture and marine farming (Article 70.2 ñ of the EAC).

According to **article 131.4 of the EAC**, the Autonomous Community of the Canary Islands, without prejudice to those that may correspond to the State, has the *exclusive competence* in internal waters to delimit and declare protected areas of fishing interest, as well as to establish zones of special interest for shell-fishing, aquaculture and recreational, sports and ecotourism activities.

In the development of such competences, which are not new because they were already recognized in the repealed Statute of Autonomy of the Canary Islands of 1982, the Parliament of the Canary Islands approved the law 17/2003, of April 10, of Fisheries in Canary Islands, which has object the regulation of fishing, shell-fishing and aquaculture, as well as maritime-fishing training and the management of the fishing sector, within the scope of the competences of the Autonomous Community of the Canary Islands.

In particular, with regard to aquaculture, the aforementioned Law 17/2003 establishes that the Regional Plan for the Management of Canarian Aquaculture (PROAC; Plan Regional de Ordenación de la Acuicultura de Canarias; original name) will be configured as an instrument for the management of aquaculture activity in the Autonomous Community of the Canary Islands, and will to be prepared by the Ministry of the Canary Islands Government responsible for fisheries.

This norm was developed by Decree 102/2018, of July 9, which definitively approves the Regional Plan for the Management of Aquaculture of the Canary Islands (hereinafter, PROAC), norm that currently establishes the general management of aquaculture in the Autonomous Community of the Canary Islands and, specifically, the zones and species of interest for marine crops, the areas and prohibited species, as well as, the technical characteristics and the conditions of the exploitations. Regarding the authorization procedures or concessions for the development of the aquaculture activity, it is necessary to take into account the Decree 182/2004, of December 21, which approves the Regulation of the Fisheries Law of the Canary Islands, as it is which continues to regulate the procedure for granting aquaculture concessions and the procedure to obtain the pertinent authorizations, the procedures can be activated by the stakeholders.

Eventual administrative derivative acts: explain the required procedure (Internal waters)

Aquaculture is understood, according to the law 17/2003, the breeding or marine species culture, vegetables or animal, using techniques to increase their production above the natural capacities of the environment.

The PROAC regulates the areas and the keys species for the marine cultures, the areas and the prohibited species, and the techniques features, and the farms conditions. According to art. 22 of the PROAC, in general, for the establishment of an establishment for aquaculture, will be mandatory:

- The delimitation of a Zone of Interest passes the Aquaculture (Z.I.A.);
- The ordering with enough degree of detail of the area by delimiting parcels. In addition, it will be necessary to specify the maximum productive capacity per parcels and the area of occupation of each of them, the species to be cultivated and the type of establishment, these two last determinations being of nature.
- However, for the cases of aquaculture authorizations for research/experimentation and/or training in the Z.I.A., they may be granted without the need for detailed management;
- Obtaining qualifying licenses and / or authorization, required by the Fisheries Law of the Canary Islands depending on the purpose intended; marketing, research / experimentation, training or repopulation.

With respect to the obtaining of the concession and/or authorization qualifying titles, the above-mentioned Decree 182/2004, of December 21, establishes, in Title IV:

- The procedure for granting aquaculture concessions (Chapter I)
- The procedure for granting authorizations (chapter II);
- The surface of occupation (chapter III);
- The constitution and composition of the Regional Aquaculture Commission (Chapter IV);
- The Register of Aquaculture Holdings (Chapter V).

Constraints

Participants in the 2nd MarSP stakeholder workshop of the Canary Islands identified many and diverse constraints for the development of the aquaculture sector (see table below). Legal constraints mostly refer to the uncertainty generated by new legislation. Administrative constraints mainly correspond to bureaucracy and complex administrative procedures while economic constraints primarily come from difficulties for funding and investment. Technology is still costly and not enough adapted to the environmental conditions of the archipelago. There are still concerns regarding environmental impacts of the sector such as dirt and sediments. From the social aspects, constraints come from the insufficient acceptance of aquaculture in the society, the need to improve the reputation of the sector and also the lack of specialised professionals (MarSP, 2019).

Table 70. Constraints to the development of the aquaculture sector (source: MarSP, 2019).

Aquaculture	
Legal	✓ Legislation on nature conservation and requirements by the new statutes ✓ Modification of the General Regulation of the Coasts. New Statute of Autonomy of Canarias ✓ There is no governance plan but management plan, which is not applied later on
Administrative	✓ Limitations for licensing ✓ Long and complex administrative procedures

	✓ Inappropriate, long and inadequate administrative procedures ✓ Lack of will from local, island and regional administrations to reach consensus and execute the plans ✓ Modification of the General Regulation of the Coasts. New Statute of Autonomy of Canarias
Economic	✓ Private investments are not sufficiently encouraged ✓ Difficult access to funding for production improvements ✓ Insurance is too costly
Technological	✓ Environmental and oceanographic conditions of the islands ✓ There is technology, sometimes costly though, but its establishments is limited by the current concessions (licenses) ✓ Technology limits the diversification of produced species in different settings
Social	✓ Social rejection to facilities due to ignorance and past malpractices ✓ The sector needs society's acceptance. The sector needs to improve its image through sustainable production systems ✓ People's prejudices regarding visual and environmental impacts ✓ Insufficient specialised personnel ✓ Lack of professionals related to the activity (ship mechanics, captains, divers) ✓ Reputation to attract sharks. Oily waste and odours are observed when calm waters ✓ The activity is considered worse than offshore fisheries by people not familiar with the activity
Environmental	✓ Need to reduce local impact on sediments, among others ✓ Need to improve the sustainability of the production system to suit environmental requirements. Diversify production systems and the species produced ✓ Inshore installations produces dirt

PART II

Current spatial distribution

The instrument for the management of aquaculture activity in the Canary Islands is called **The Regional Plan for the Management of Aquaculture (PROAC, of its initials in Spanish)**, which contains the division of the maritime-terrestrial public domain by zones, as follows: Prohibited area, Suitable area, and Aquaculture area of interest. It also contains the location of existing aquaculture farms, the species that are prohibited as well as those of aquaculture interest, and it establishes, among other issues, the types of aquaculture establishments and their technical characteristics.

Within the Multiannual Strategic Plan of Spanish Aquaculture 2014-2020, the secretary's office of Fishery has developed a cartographic viewer **(Acuivisor)** that integrates the most relevant information for the development of aquaculture and serving in turn to support the spatial planning actions in the country. It can be used to consult the geographical location and descriptive information about aquaculture establishments, about mollusc production areas and aquaculture areas of each region (Autonomous communities).

Finally, on the **EMODnet** website there is access to microalgae crops in the Canary Islands, with a single facility in Gran Canaria. This dataset stems from the BIOMASS project.

Table 71. Cartographic information available for aquaculture.

Name	Source	Organization	Date	Definition
Aquaculture active facilities	Acuivisor	MAPAMA	2016	Facilities and aquaculture areas of interest.
Link: https://servicio.pesca.mapama.es/acuivisor/				
Algae Production	EMODnet Human Activities	EMODnet	2018	Single place in Gran Canaria, ranked as Open Ponds (Algalimento SL). Source: This dataset stems from the BIOMASS Project.
Link: http://www.emodnet-humanactivities.eu/search-results.php?dataname=Microalgae#Top				
Aquaculture zoning	PLASMAR Proyect (ULPGC)	Dirección General de Pesca (GobCan)	2018	Zoning (Suitable, Of interest or Prohibited) for aquaculture in the Canary Islands. Source: Plan Regional de Ordenación de la Acuicultura (PROAC).
Aquaculture concessions	PLASMAR Proyect (ULPGC)	Dirección General de Pesca (GobCan)	2018	Aquaculture concessions in force with production data, species and facilities of the Canary Islands in 2018.
Link: http://www.gobiernodecanarias.org/agricultura/pesca/temas/cultivos_marinos/proac.html				

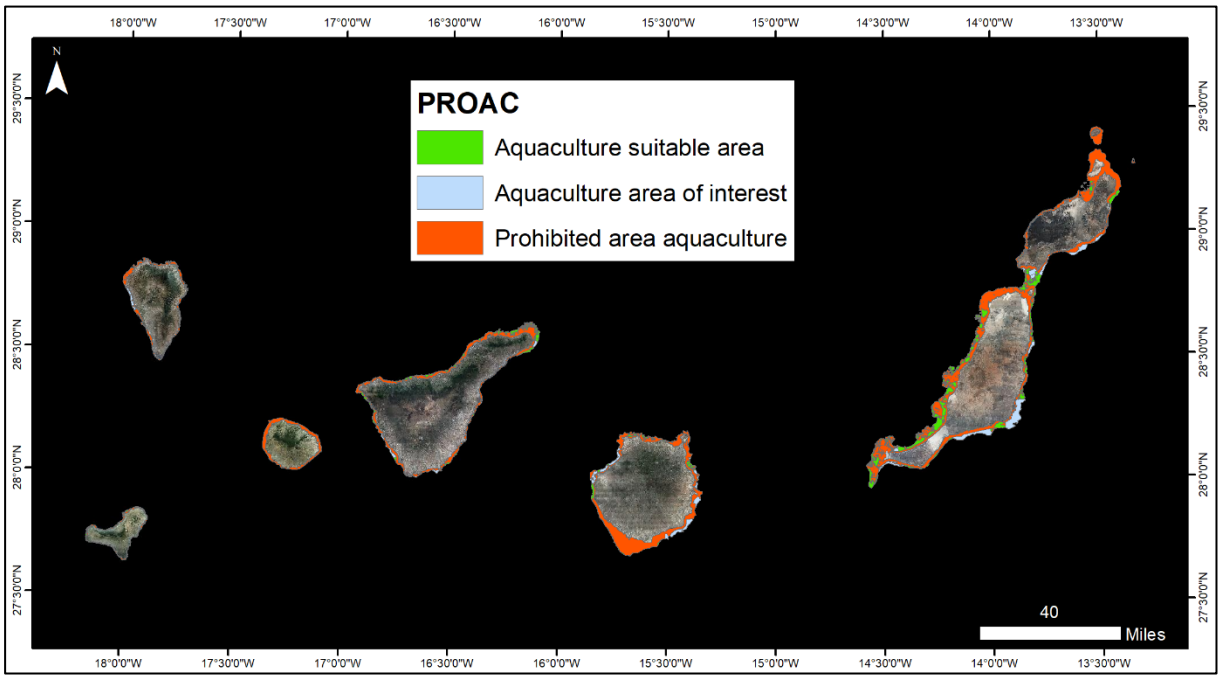


Figure 220. Aquaculture zoning in the Canary Islands (source: PROAC, 2018).

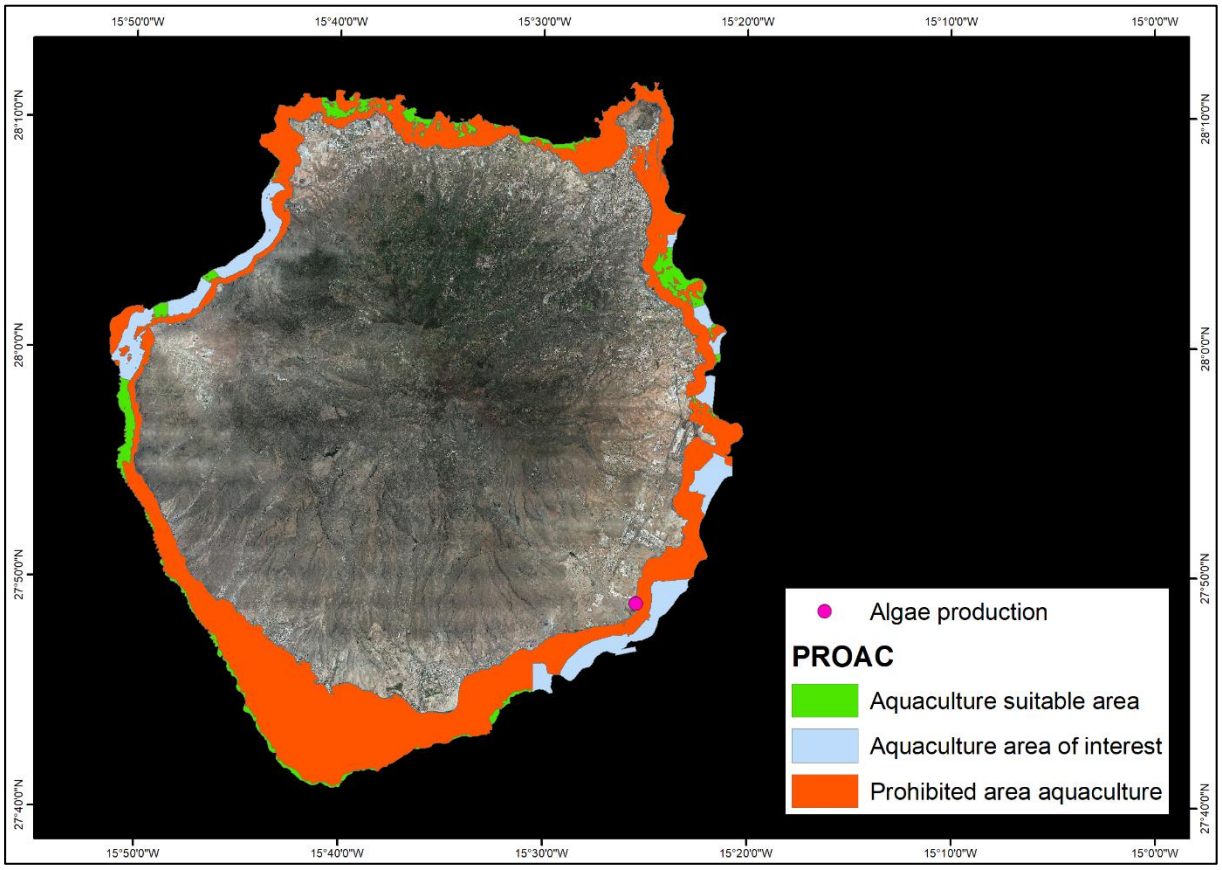


Figure 221. Aquaculture zoning for Gran Canaria (source: PROAC, 2018).

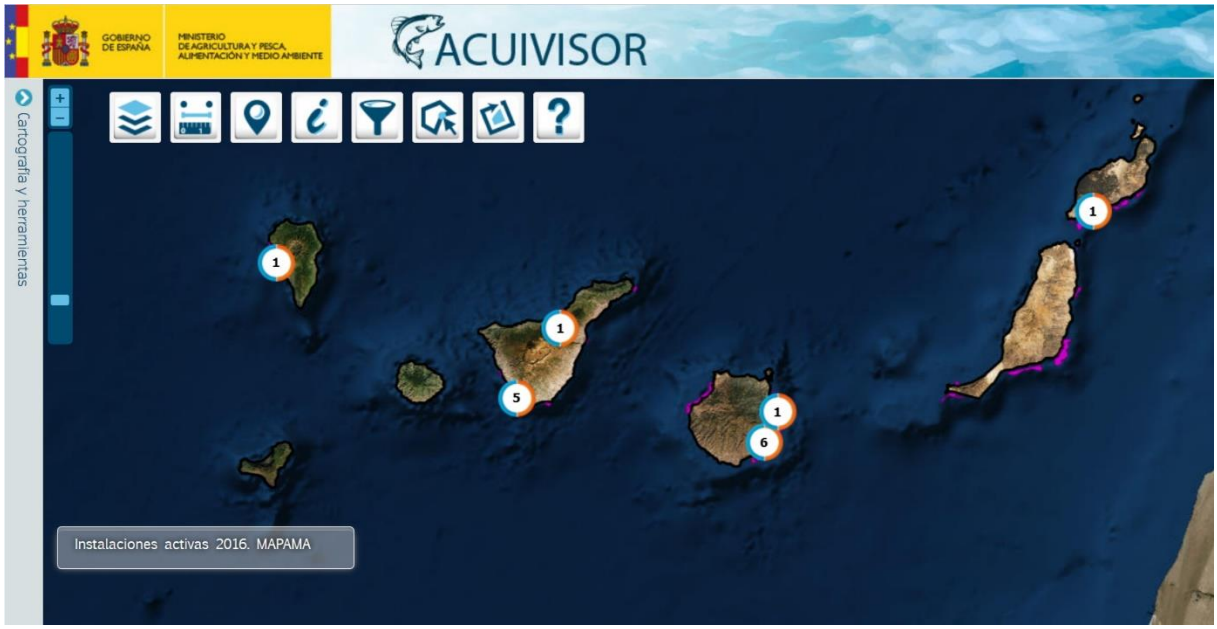


Figure 222. Aquaculture facilities in the Canary Islands (source: Acuivisor, 2019).

Figure 223. Sample of aquaculture facilities in the Canary Islands (source: Acuivisor, 2019).

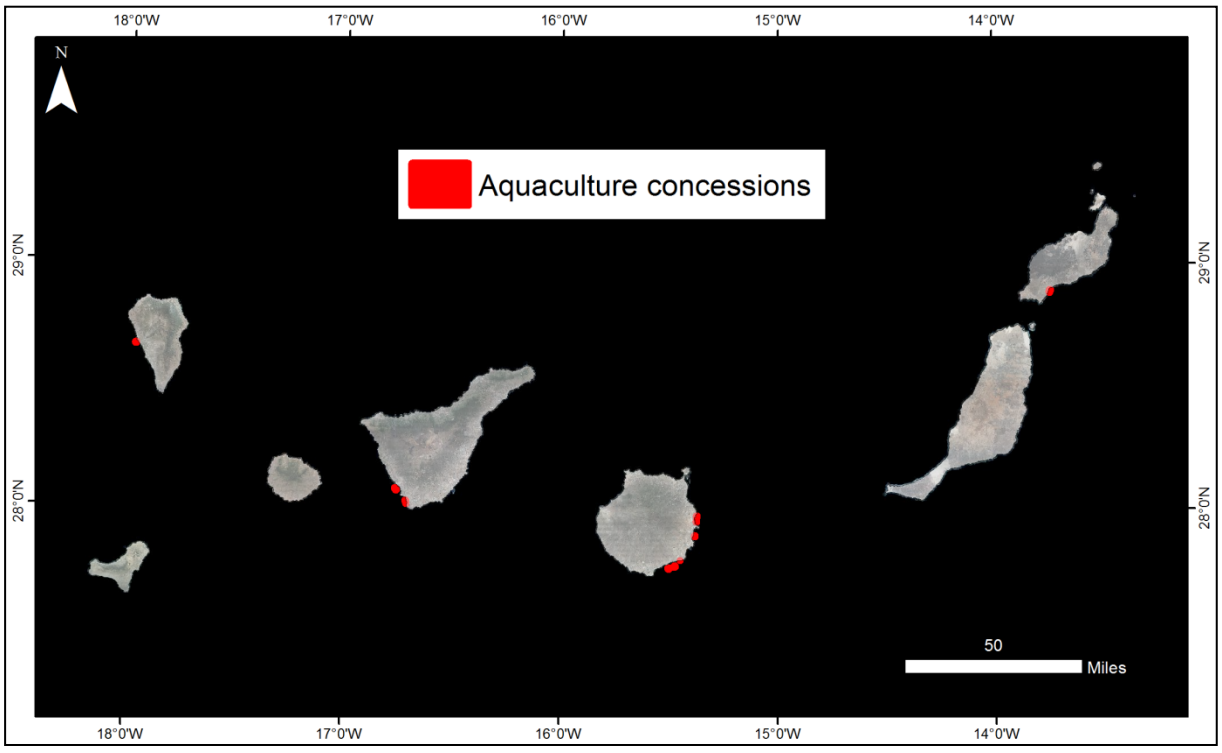


Figure 224. Aquaculture concessions in force of the Canary Islands in 2018 (source: Dirección General de Pesca, 2018).

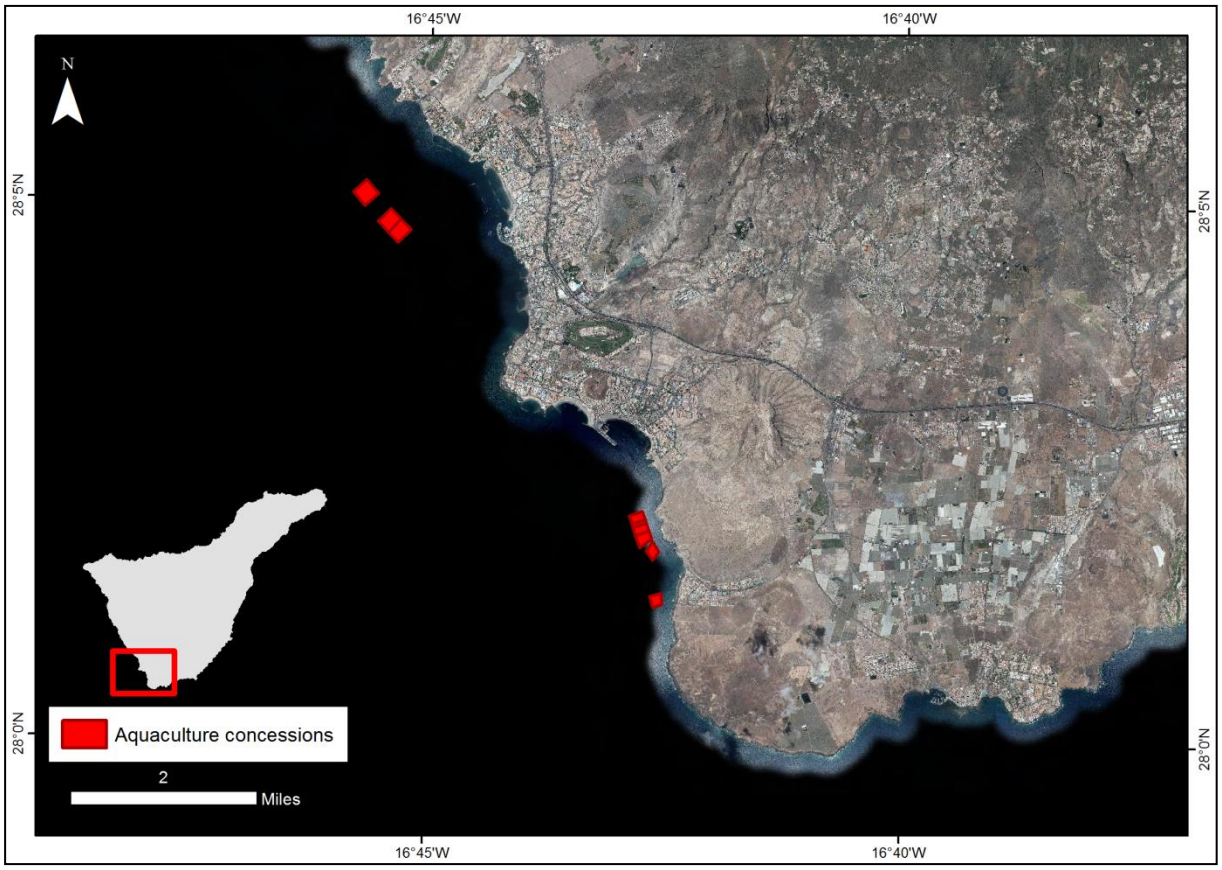


Figure 225. Sample aquaculture concessions in force. South Tenerife (source: Dirección General de Pesca, 2018).

PART III

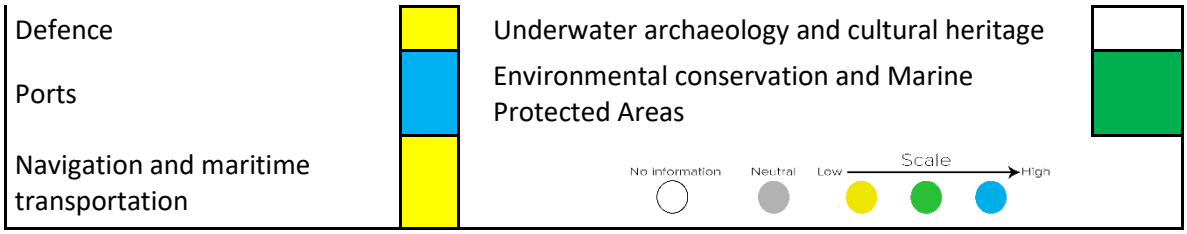
Analysis of interactions

Interaction with other sectors

According to the participants of the 2nd MarSP stakeholder workshop of the Canary Islands, the aquaculture sector has synergies with many other maritime sectors (see table below). This sector results in medium synergies with aquaculture, except for ports and scientific research and marine biotechnology, with high synergies. Scientific research is a fundamental activity for the development of sustainable aquaculture facilities and poison control in species. Aquaculture for example may be beneficiated in places where fishing overexploitation is an important issue. Navigation and maritime transportation together with defence obtained low synergy (MarSP, 2019).

Table 72. Degree of synergy of the aquaculture sector with other maritime sectors (source: MarSP, 2019)

Aquaculture			
Fisheries		Infrastructures	
Mineral resources		Tourism	
Energy		Scientific research and marine biotechnology	



On the conflict side, aquaculture also presents a variety of conflicts with the other sectors (see table below), particularly with mineral resources, defence and navigation. Energy, infrastructures, underwater archaeology, ports and scientific research registered the lower conflicts. Fishers (medium conflict) think that aquaculture impacts negatively to fish breeding areas, affecting their activity. Intensive aquaculture and continuous feeding of the cultivated species also affects environmental conservation (medium conflict) (MarSP, 2019).

Table 73. Degree of conflicts of the aquaculture sector with other maritime sectors (source: MarSP, 2019)

Aquaculture			
Fisheries		Infrastructures	
Mineral resources		Tourism	
Energy		Scientific research and marine biotechnology	
Defence		Underwater archaeology and cultural heritage	
Ports		Environmental conservation and Marine Protected Areas	
Navigation and maritime transportation			

Land-sea interactions

Regarding land-sea interactions (see table below), aquaculture has high synergies with airports and roads and medium synergies with protected areas and built-up, agriculture and tourism potential zones. Tourism areas may vary their activities by offering visit to aquaculture facilities. Neutral synergies were registered with bathing zones and built-up areas in risk zones (MarSP, 2019).

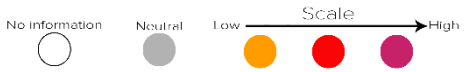
Table 74. Degree of synergy of the aquaculture sector with land-use sectors (source: MarSP, 2019)

Aquaculture		
A	Natural, cultural and landscape areas	
B	Bathing areas	
C	Built-up areas in risk zones	
D	Marine Protected Areas	
E	Terrestrial Protected Areas	
F	Built-up areas	

G	Agriculture, forestry and other uses	
H	Tourism potential areas	
I	Airports	
J	Roads	

On the conflict side, participants also identified many conflicts but none of them are high conflicts (see table below). Roads is the only land use with neutral conflict. Airports and terrestrial protected areas have low conflict. Aquaculture is forbidden is some MPAs designated as marine reserves (medium conflict). Built-up areas in risk zones may affect aquaculture production with the discharge of waste water (medium conflict) (MarSP, 2019).

Table 75. Degree of conflict of the aquaculture sector with land-use sectors (source: MarSP, 2019)

Aquaculture		
		
A	Natural, cultural and landscape areas	
B	Bathing areas	
C	Built-up areas in risk zones	
D	Marine Protected Areas	
E	Terrestrial Protected Areas	
F	Built-up areas	
G	Agriculture, forestry and other uses	
H	Tourism potential areas	
I	Airports	
J	Roads	

FISHERIES

PART I

Sector characterization

Fishing in Canary Islands waters is artisanal and multispecific, with a large number of techniques and fishing gear being used by a very large fleet, old, largely versatile and poorly equipped. In addition, there is a marked seasonality in fishing activities and in the choice of target species by a certain part of the fleet, usually due to the importance of tuna fishing and its harvests. Fishing activity is carried out on a large number of species (about one hundred and fifty). Typical is the lack of discards in catches, all of which are marketed. Different degrees are found in the complexity of biomass assessment or estimation, according to species and their economic importance. However, there is no real knowledge of fishery resources or even less of their exploitation rates.

Three major groups of fishery resources are exploited in the waters of the Canary Islands: ocean pelagic (about fifteen species of tuna and related species), coastal pelagic (about eight species: Atlantic chub mackerel, European pilchard, bogue and sand smelt) and demersal fish (about one hundred and thirty demersal species, which basically include fish, crustaceans and cephalopods). Fishing effort is exerted mostly in coastal zones up to 150-200 m deep, leading to an intensive exploitation of the species inhabiting these sectors. Catches are unloaded on beaches, fishing shelters or in numerous small ports in general, scattered along more than 1.290 km of shoreline.

The associations or institutions created in relation to fishing activities are very diverse, and the most relevant are the Cofradías. Cofradías are fishermen's cooperatives, corporations of public law, without profit, representative of the economic interests of the owners of fishing vessels and of the workers of the extractive sector, acting as consultative and collaborative bodies of the administrations responsible for maritime fisheries and fisheries management, the management of which is carried out in order to meet the needs and interests of their partners, with a commitment to contribute to local development, social cohesion and sustainability. In the Canary Islands one is distributed in El Hierro, two in La Palma, one in La Gomera, ten in Tenerife, four in Gran Canaria, three in Fuerteventura and four in Lanzarote.

Shows the percentage by weight and economic value of discharges and shows that both economically and by weight the pelagic group represents an average value of 83.2 % of the weight of discharges in that period and a 64.9 % in economic value. The demersal group provides an average value of 15.8 % of the weight of discharges and 32.2 % of the economic value. Finally, crustaceans and molluscs add up to an average value of 1% of the discharges over that period and almost 3% of the economic value.

Table 76. Percentage in weight and economic value of different species groups from 2007 to 2017. Data taken from the website of the Ministry of Agriculture, Livestock, Fisheries and Water of the Government of the Canary Islands

% WEIGHT IN DISCHARGES											
Groups	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**
Crustaceans	0.5	0.5	0.9	0.7	0.6	0.4	0.6	0.6	0.8	0.6	0.6
Demersals	22.0	19.2	24.3	23.5	16.7	8.1	11.5	10.4	14.5	11.4	12.0
Molluscs	0.7	0.4	0.7	0.3	0.3	0.5	0.4	0.3	0.3	0.2	0.2
Pelagic	76.9	79.9	74.1	75.5	82.5	91.1	87.5	88.8	84.4	87.8	87.2

% ECONOMIC VALUE IN DISCHARGES											
Groups	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**
Crustaceans	1.8	1.6	3.0	2.3	2.2	1.5	2.5	2.6	2.7	2.1	2.3
Demersals	36.8	39.9	49.8	42.4	33.2	20.0	25.1	24.1	28.4	24.8	29.6
Molluscs	0.8	0.5	1.0	0.5	0.5	0.9	0.7	0.6	0.6	0.4	0.5
Pelagic	60.6	58.0	46.2	54.8	64.1	77.6	71.7	72.7	68.2	72.7	67.6

As for the most significant species in the discharges the Skipjack tuna, bigeye tuna and albacore take values of 24.29, 23.33 and 17.33 % of the discharges. The small pelagics Atlantic chub mackerel and blue jack mackerel are followed in importance by 7.19 and 4.94%. The most important demersal species are the parrotfish and the pink dentex with 1.6 and 1.02 % of the discharges.

Table 77. Most significant species downloaded in 2017. Data taken from the website of the Ministry of Agriculture, Livestock, Fisheries and Water of the Government of the Canary Islands

Name	**Species**	**%**	**Kg**
Skipjack tuna	*Katsuwonus pelamis*	24.29	3,360,798.27
Bigeye tuna	*Thunnus obesus*	23.33	3,228,352.39
Albacore	*Thunnus alalunga*	17.33	2,397,407.88
Yellowfin tuna	*Thunnus albacares*	2.04	282,268.06
Northern bluefin tuna	*Thunnus thynnus*	1.27	176,316.10
Total Tunids		**68.26**	
Atlantic chub mackerel	*Scomber colias*	7.19	994,428.16
Blue jack mackerel	*Trachurus picturatus*	4.94	683,644.35
European pilchard	*Sardina pilchardus*	2.56	354,353.59
Round sardinella	*Sardinella aurita*	2.33	321,876.58
Madeiran sardinella	*Sardinella maderensis*	0.61	84,086.10
Total Small pelagic		**17.63**	
Parrotfish	*Sparisoma cretense*	1.60	221,164.12
Pink dentex	*Dentex gibbosus*	1.02	140,471.34
Splendid alfonsino	*Beryx splendens*	0.83	115,401.81
European hake	*Merluccius* spp	0.80	110,668.05
Red porgy	*Pagrus pagrus*	0.65	89,858.53
White trevally	*Pseudocaranx dentex*	0.40	55,068.04
Total demersal most important		**5.30**	

Rest of species	8.81	1,221,627.52

Legal framework and constraints

Legislation applicable to the Canary Islands context: summarize the applicable legislation and the developed matters (Internal waters)

Fishing and shell-fishing in the Canary archipelago are very popular activities due mainly to the great diversity of fish resources present, thanks to a unique and original oceanographic and geographical conformation of the seven Canary Islands. Fishing means not only professional and commercial maritime fishing but also recreational, making the Canary Islands a tourist attraction for fishing enthusiasts. Precisely for this reason, an optimal planning of the fishing activity in the Canary Islands waters is essential, in order to kept a balance between fishing resources and the demand of consumers, entrepreneurs and amateurs to this activity.

According to the **Organic Law 1/2018, of November 5, of reform of the Statute of Autonomy of the Canary Islands**, the Autonomous Community of the Canary Islands has exclusive competence in matters of fishing, which includes, in any case, planning, regulation, surveillance, as well as the establishment of the regime for the use of fishing resources. Both sporting and commercial fishing are included among the subjects of exclusive competences of the Autonomous Community of the Canary Islands, because **according to article 131, it is established that:**

- Corresponds to the Autonomous Community of the Canary Islands, in the Canary waters defined in accordance with Article 4 of this Statute, in accordance with state legislation, competence in matters such as: **The management of the fishing and recreational sector**.

- The **promotion of research, development and innovation activities** and the transfer of fishing technologies, which favour the rational and sustainable use, the conservation of marine resources, as well as the improvement of the quality of life of the fishing sector.

- The Autonomous Community of the Canary Islands, without prejudice to those that may correspond to the State, **has exclusive competence in the internal waters** to delimit and declare protected areas of fishing interest, as well as to establish areas of special interest for shell-fishing, aquaculture and fishing activities. recreation, sports and ecotourism.

- The Autonomous Community of the Canary Islands has **exclusive competence in matters of surveillance**, inspection and control of the activities regulated in the previous sections.

- It is the responsibility of the Autonomous Community of the Canary Islands to **develop legislation and implement the management of the fishing sector**. This competence includes, without prejudice to those that may correspond to the State, the development and adoption of enforcement measures regarding the professional conditions of fishermen and other subjects related to the sector, ship construction, security measures, official records, fishing guilds, hiring markets and other similar.

In accordance with the bases dictated by the State, the Parliament of the Canary Islands approved **Law 17/2003, of April 10, on Fisheries of the Canary Islands** (partially modified by Law 6/2007, of April 13), published in the Official Gazette of the Canary Islands (BOC) of April 23, 2003, which came to address, in the territorial scope, an integral management of fishing, aquaculture and shell-fishing activities. In particular, maritime fishing and shell-fishing are addressed in **Title I** of the

standard, devoting, for each subject, a different chapter with the same structure: fishing and shellfish classes and their concepts; authorization of said activities; and specific ordinations. The establishment of measures for the conservation of fishery resources is also a concern, and Chapter III of Title I of Law 17/2003 is devoted to this. **Title III of Law 17/2003** is concerned with establishing some clarifications in terms of nautical and maritime-fishing training, in development of the basic state regulation, also proceeding to the regulation of the agents of the fishing sector, especially of the fishing guilds. Based on that, **Title IV**, dedicated to fisheries research, is attached, fixing its scope and purposes, to conclude with **Titles V and VI** on the supervisory institutions, as well as, the sanctions that may be imposed for breach of the rules.

However, it should be noted that the Law 17/2003, still, has not sought to carry out an exhaustive regulation of all the matters that make up its object, since it does not address, as we shall see, all the activities that they could be under the heading of fishing and shellfish.

Certainly, the First Final Provision of the Law authorizes, in fact, the Government of the Canary Islands to dictate as many provisions as are necessary for its development and application, authorization that is collected by the Regulation of the Fisheries Law of the Canary Islands, approved with Decree 182/2004 of December 21, with the purpose of gathering in a single text the regulatory regulation of all the subjects object of the Law 17/2003. This Regulation regulates the procedures that can be specifically activated by the stakeholders and, above all, describes and differentiates the activities of professional fishing, recreational fishing, shell-fishing and shell-fishing on foot, regulating the different authorizations or licenses for those interested, attending to the different activity carried out.

Eventual administrative derivative acts: explain the required procedure (Internal waters)

The purpose of the **Decree 182/2004** is the **development and execution of Law 17/2003**, of April 10, on the Fisheries of the Canary Islands, as well as the development of the basic legislation of the State in relation to management of the fishing sector.

In particular, the Decree distinguishes the different fishing and shell-fishing activities allowed, the authorizations or licenses required for the respective activities and, finally, the different disciplines and methods to carry out the activity.

Specifically, Title I of the Regulation addresses the regulation of professional fishing, describing the procedure and requirements for obtaining the required authorization, as well as the authorized fishing methods and gear, as well as the conditions related to the exercise of activity. Title II regulates marine recreational fishing, establishing the different modalities, requirements and procedures to grant the different licenses. The shell-fishing, both in its professional and recreational aspects, is dealt with in Title III, distinguishing, within the first one, the one developed from a boat and the one made on foot. In the regulation of professional shell-fishing from a vessel there is an important remission to the regulation of professional fishing, depending on the consideration of that as a complementary or accessory activity of it. Title V deals with the Regulation of the fishing sector, developing the basic legislation of the State regarding fishing fleet, establishment and change of the official base of fishing vessels and certain promotion measures. Title VI is dedicated to the regulation of the legal regime of the Fishermen's Associations and their Federations, in those aspects not included in the Law, highlighting the configuration of the electoral regime. The commercialization of fishery products is addressed in Title VII, regulating the

first sale at source, the fish markets, fishing establishments and marketing at destination, among other aspects. Finally, Title VIII is dedicated to the Inspection and Sanctioning Regime in the area of maritime fishing in inland waters and shell-fishing.

To complete the regulatory framework for authorizations for fishing, it is necessary to add to this basic legislation, two other specific Decrees later in time:

- Decree 88/2008, of April 29, which establishes the conditions that enable the practice of professional diving in the Autonomous Community of the Canary Islands and the authorization to centers that wish to teach courses for obtaining professional diving certificates;
- Decree 62/2010, of June 3, which regulates the practice of professional shell-fishing of certain species in the area of the marine reserve of fishing interest around the island of La Graciosa and the islets of the North of Lanzarote.

Constraints

The participants of the 2nd MarSP stakeholder workshop of the Canary Islands identified a wide range of constraints for the fisheries sector (see table below). These are mostly from the legal and administrative aspects, mostly referring to the heterogeneity of regulations, competences and administrative procedures; and environmental problems such as pollution, overexploitation or illegal fishing. Some economic and social constraints were also identified regarding fish added value and generational renewal (MarSP, 2019).

Table 78. Constraints to the development of the fisheries sector (source: MarSP, 2019)

	Fisheries
Legal	✓ Different regulations for internal and external waters (waters beyond the baselines) ✓ Different competences for internal and external waters (waters beyond the baselines) ✓ Heterogeneous regulations for recreational fisheries depending where the activity is developed (internal and external waters) which makes control and audit difficult ✓ Too strict regional regulation in comparison with other regions ✓ There is no governance plan but management plan, which are not applied later on
Administrative	✓ Excessive bureaucracy. Need of a one-stop-shop ✓ Lack of will from local, island and regional administrations to reach consensus and execute the plans ✓ Complex and excessive administrative procedure to develop the activity ✓ Negotiate competences regarding some issues in order to apply or transfer
Economic	✓ Added value is not applied to catches ✓ Follow-up fish consumption campaigns that increases a fair price for fish, without contributing to the value of the product. Do not increase fishing effort
Social	✓ Lack of generational renewal
Environmental	✓ Spills, litter, plastics, sewage ✓ Need to control catches and guard illegal fishing

- ✓ Global warming, pollution, overfishing, illegal fishing (including artisanal fisheries), habitat destruction, ciguatera poisoning, invasive ichthyofauna
- ✓ Need to provide information related to fisheries management
- ✓ There in limit for issuing permits and licenses for recreational fisheries. Overexploitation of the resource

PART II

Current spatial distribution

In the tool named as ***Herramienta de Pilotaje del Litoral Canario*** **(HPL),** developed by the Coastal Management Service of the Vice-Ministry for Territorial Policy of the Canary Islands Government, the following information regarding the fishing sector can be found:

- Closed times for seafood season established by the Order of May 2nd, 2011 and later by the order of May 18th, 2011.

- Fishing Guilds of the Canary Islands (Fishermen's associations, territorial areas of these associations and authorized landing spots).

- Bounded areas for underwater fishing, defined by the following regulations:

  ORDER of October 30th, 1986, establishing the bounded areas for the Canary Islands where the underwater fishing is permitted.

  ORDER of October 29th, 2007, whereby the zones for the exercise of sea fishing for underwater recreation are bounded in the interior waters of the Canary Islands.

  ORDER of July 3rd, 2008, which modifies the Order of October 29th, 2007.

- Fishing infrastructures (artificial reefs). Information generated from coordinates published in the *Boletín Oficial del Estado* (B.O.E), defined by the *Ministerio de Agricultura, Pesca y Alimentación* (MAPA) based on the reports of installation companies of the reef modules.

From the **Spanish Institute of Oceanography (IEO, of its initials in Spanish) fishing effort** data are obtained from bottom longline and purse seine, by grids of 5 x 5 nautical mile squares and the location of the **fishing grounds**, set of polygons that define, approximately, the traditional fishing areas close to the national territory of the Spanish fleet. The data is a compilation of several publications and personal communications of fishery researchers.

Futhermore, within the MarSP project, the **IU-ECOAQUA** (**University of Las Palmas de Gran Canaria)** has developed a mapping with the fishing areas using the information obtained through interviews with fishermen with the collaboration of the fisheries associations and the Coastal Action Groups association (GAC, of its initials in Spanish). This information was subsequently filtered and is in the analysis and homogenization phase. The fishing gear data shown in Table 79 was collected.

Table 79. Fishing gear (IU-ECOAQUA, 2019).

Hooks and lines	Surrounding nets	Traps	Set gillnets	Others

Palangre	Cerco	Tambor	Cazonal	Vara de peto
Anzuelo	Chinchorro	Nasas de camarón	Trasmallo	Potera
Aparejo	Gueldera	Nasas de peces		
Cordel	Pandorga	Nasas (general)		
Liña	Salemera			
Liña de mano	Sardinal			
Liña de profundidad	Traiña			
Puyón				
Túnidos con cebo vivo				

Table 80. Cartographic information available for fisheries.

Name	Source	Organization	Date	Definition
Zones and closed season for gathering shellfish	IDECanarias	Dirección General de Pesca (GobCan)	2016	Shellfishing closed season for certain species.
Link WMS: https://idecan2.grafcan.es/ServicioWMS/VedasMarisqueras?				
Fishing Guild of the Canary Islands	IDECanarias	Dirección General de Pesca (GobCan)	2018	Fishermen's associations (Dirección General de Pesca, de la Consejería de Agricultura, Ganadería, Pesca y Aguas del Gobierno de Canarias). Territorial areas of fishermen's associations. Authorized landing spots for each Fishing Guild.
Link WMS: https://idecan2.grafcan.es/ServicioWMS/CofradiasPesca?				
Bounded areas for underwater fishing	HPL	Government of the Canary Islands	2008	Zoning for practicing underwater fishing.
Fishery infrastructures (artificial reefs)	HPL	IEO	2013	Artificial reefs for fishing.
Link HPL: http://www.pilotajelitoralcanario.es/				
Fishing effort	IEO	IEO	2012	Fishing effort of bottom longline and purse seine, by means of 5 x 5 nautical mile squares.
Fishing grounds	IEO	IEO	2013	Traditional fishing areas.
Link WMS: http://barreto.md.ieo.es/arcgis/services/wms/wmsBase/MapServer/WMSServer?				
Fishing area	IU-ECOAQUA	IU-ECOAQUA	2019	Fishing areas in Canary Islands. Distribution of 24 fishing gear, grouped into 5 types.

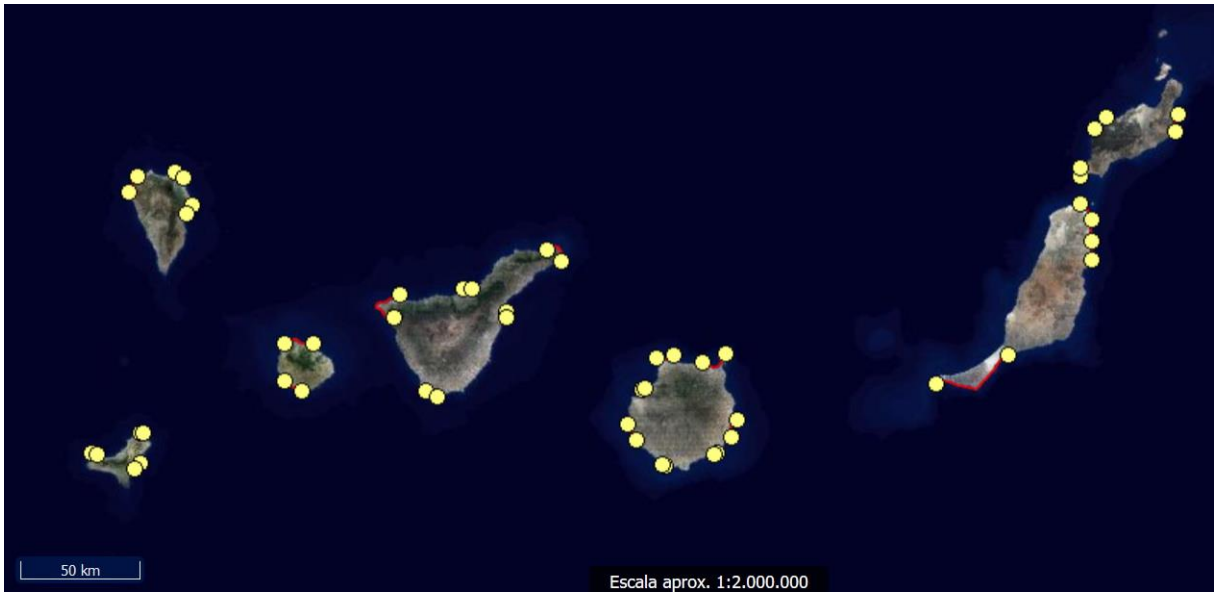


Figure 226. Closed season areas for shellfishing (source: viewer HPL, 2019).

Figure 227. Information concerning Fishermen's associations (source: IDECanarias, 2019).

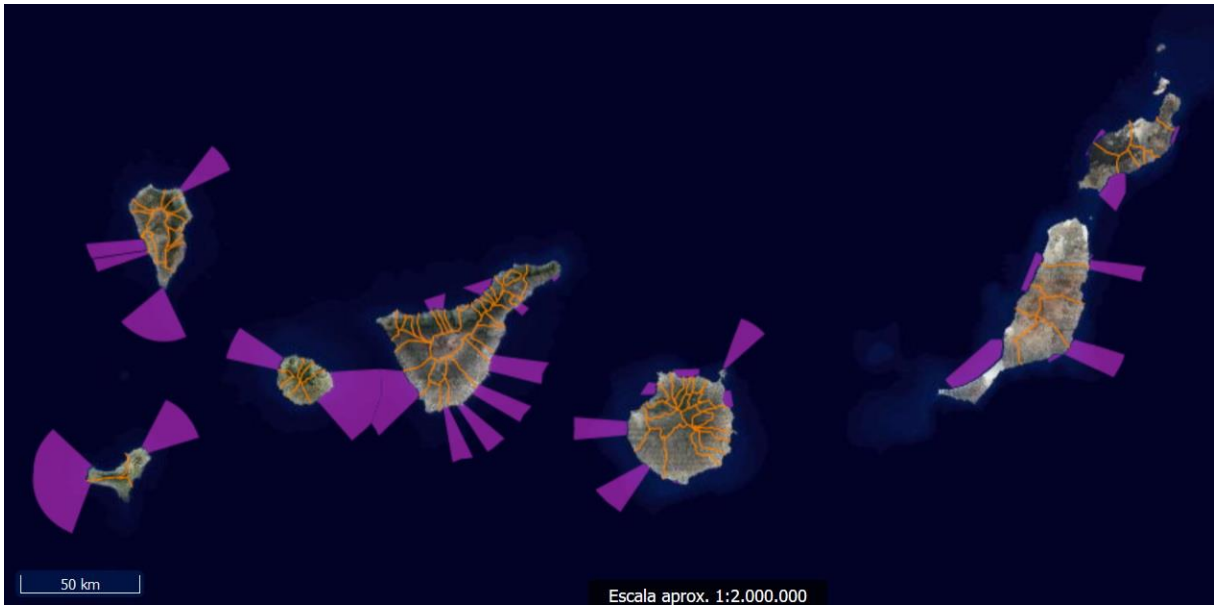


Figure 228. Underwater fishing areas (source: viewer HPL, 2019).

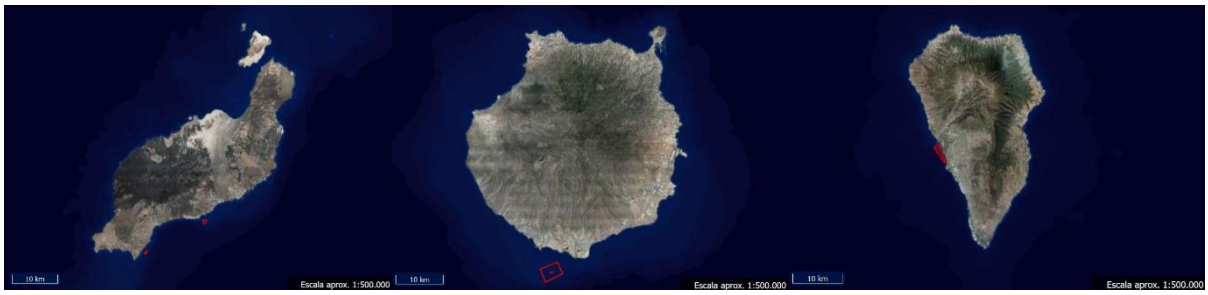


Figure 229. Artificial reefs (source: viewer HPL, 2019).

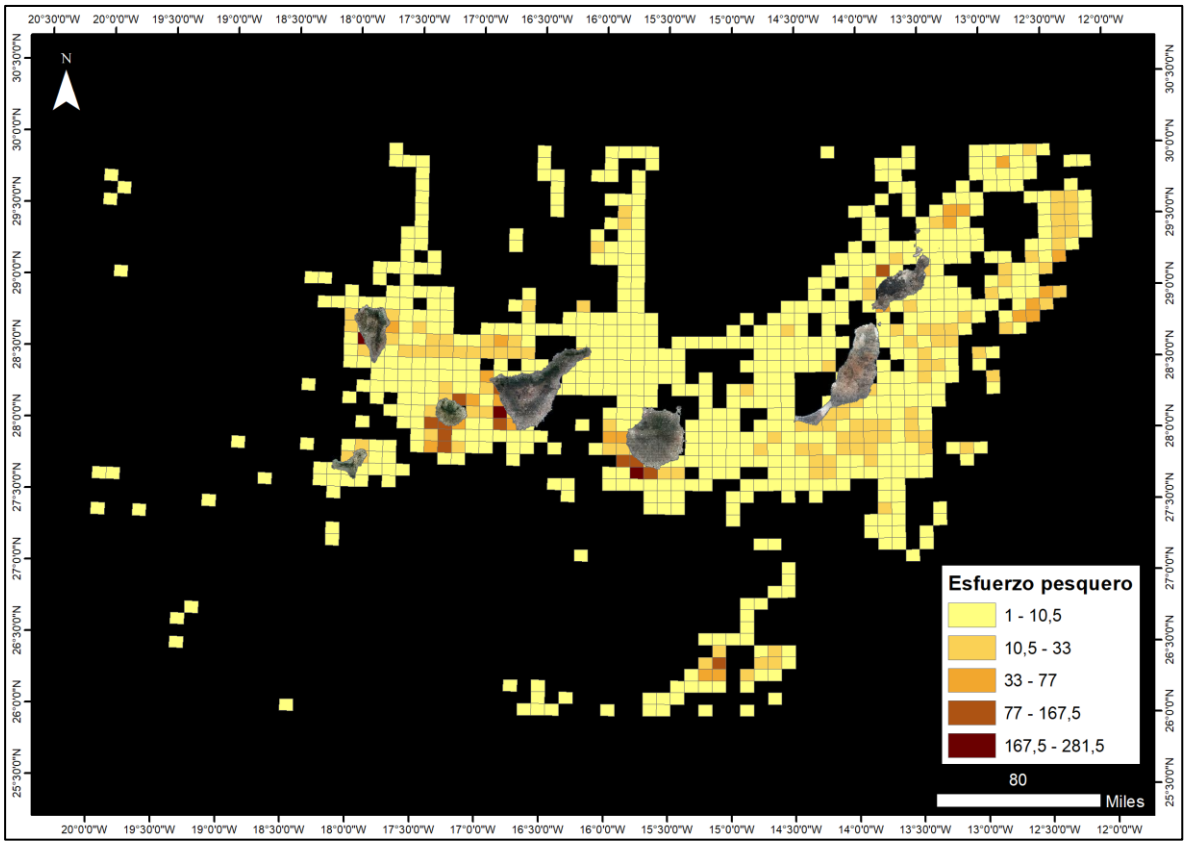


Figure 230. Grids showing the fishing effort of bottom longline and purse seine (source: IEO).

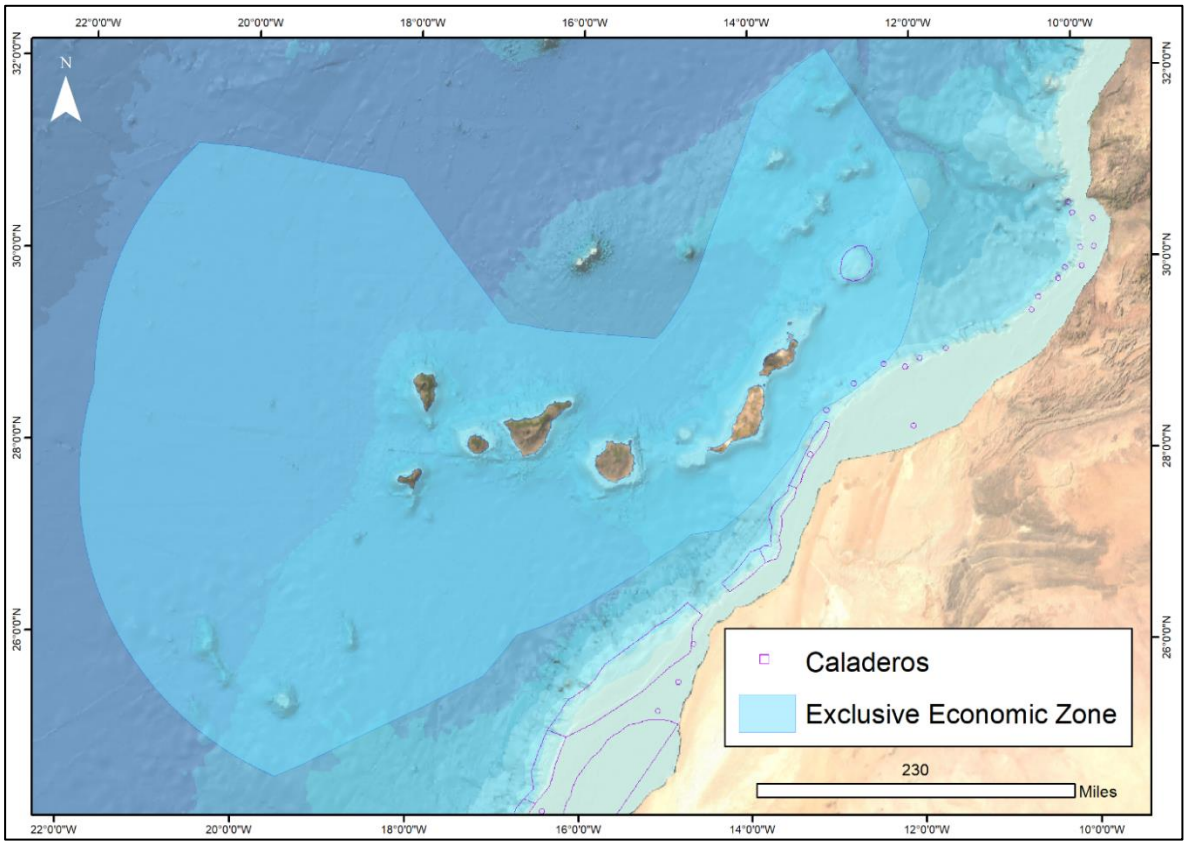


Figure 231. Traditional fishing areas (source: IEO).

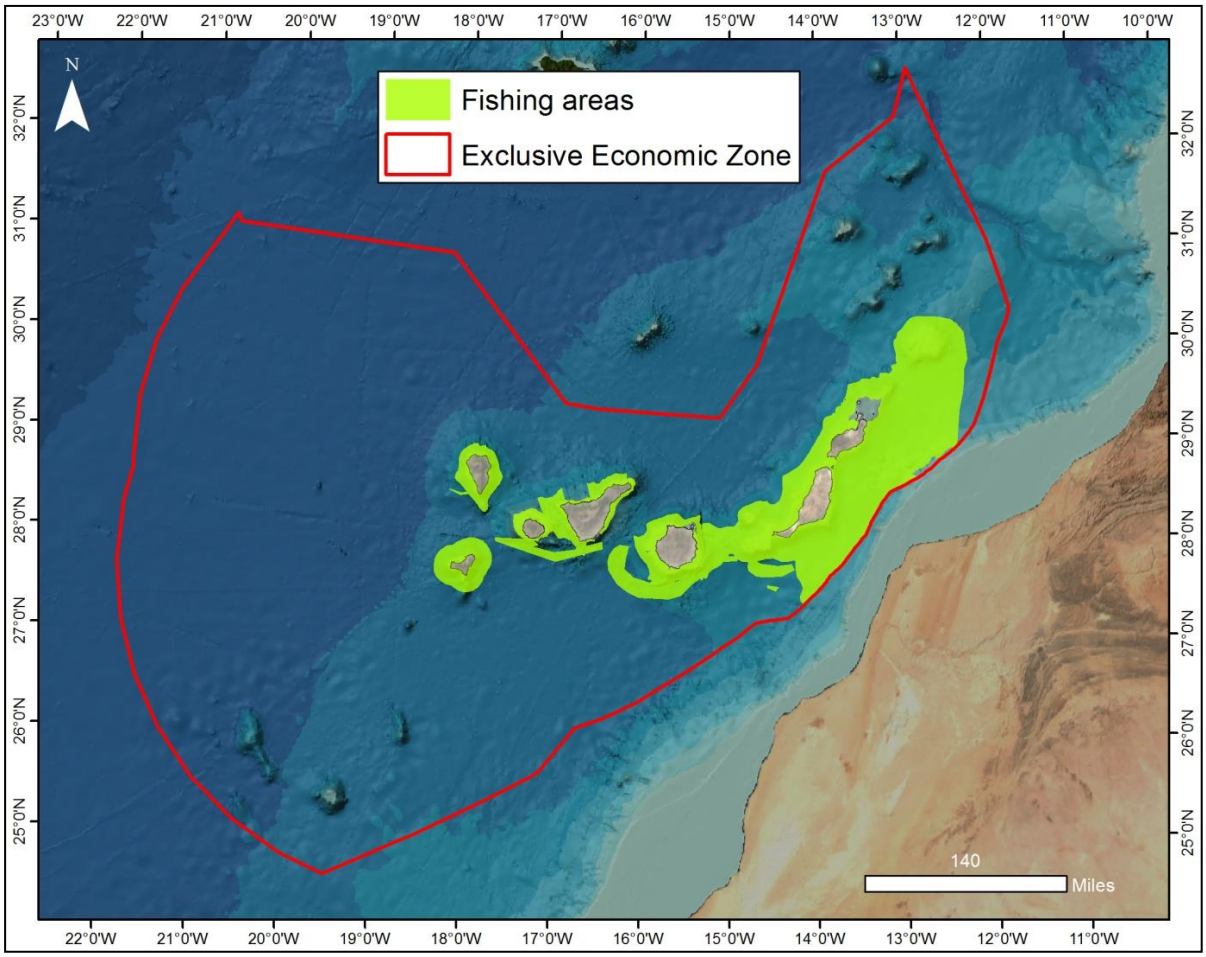


Figure 232. Fishing areas in Canary Islands (source: IU-ECOAQUA, 2019).

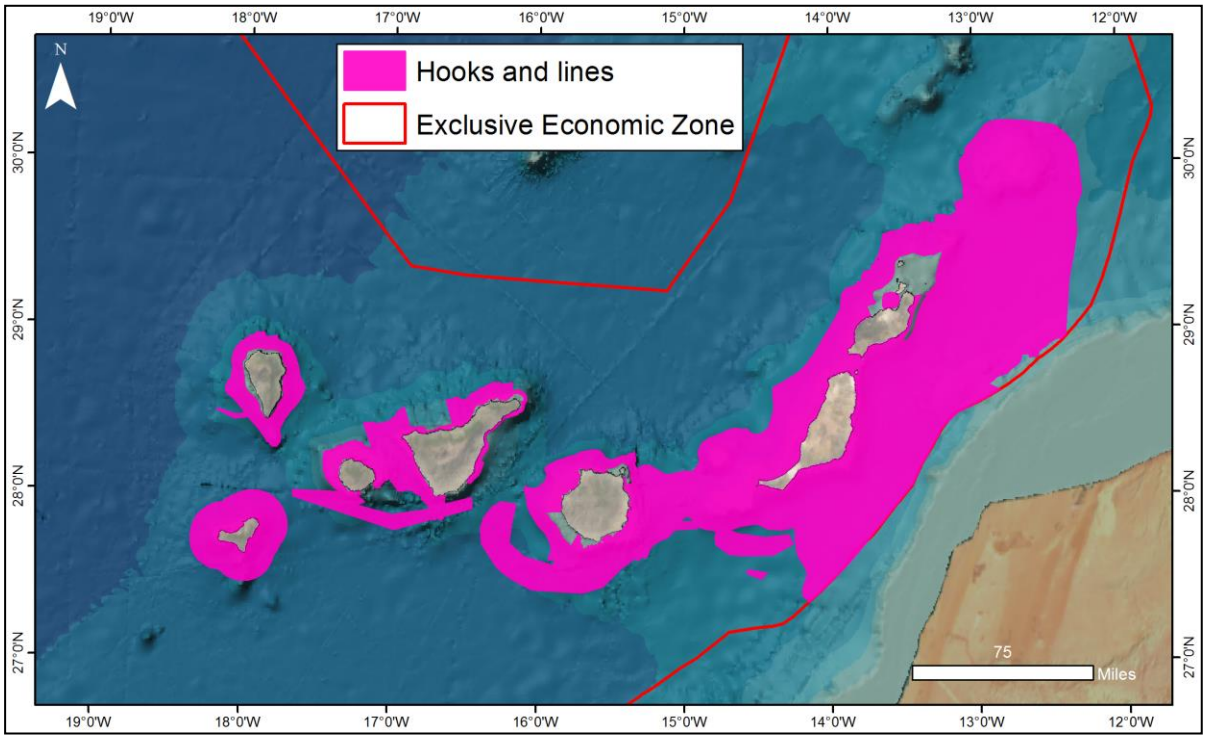


Figure 233. Fishing areas of hooks and lines (source: IU-ECOAQUA, 2019).

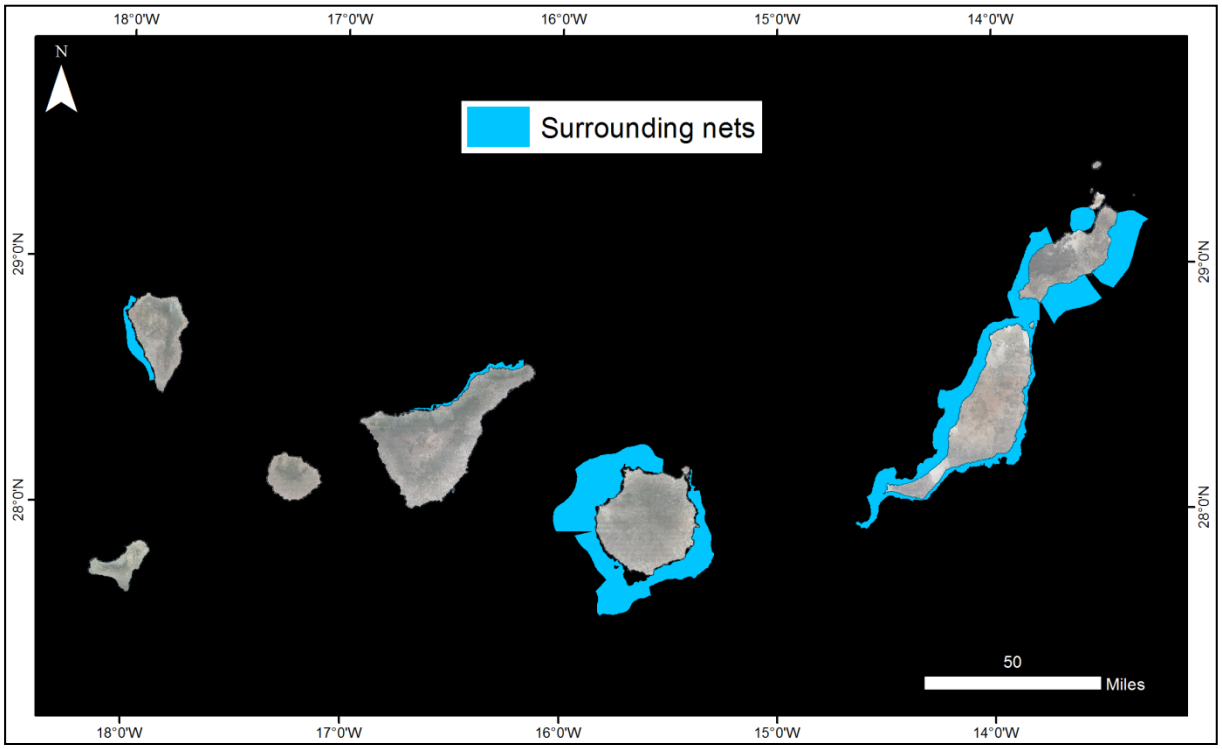


Figure 234. Fishing areas of surrounding nets (source: IU-ECOAQUA, 2019).

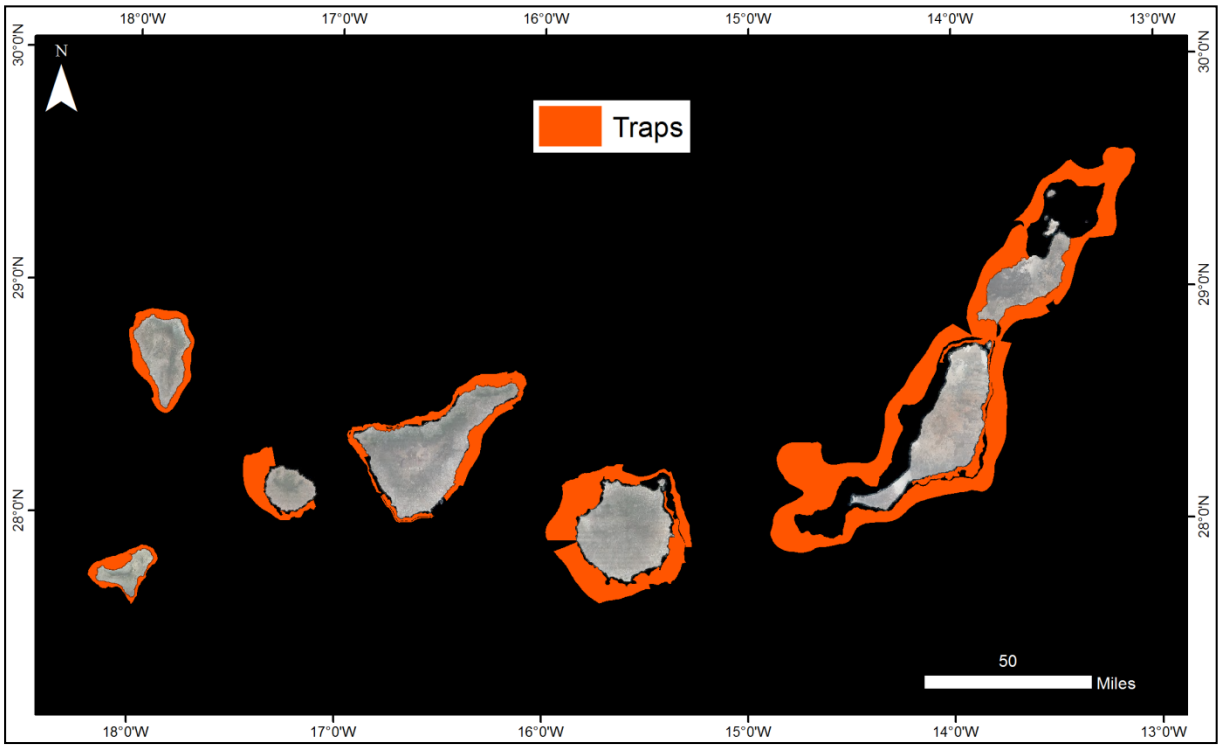


Figure 235. Fishing areas of traps (source: IU-ECOAQUA, 2019).

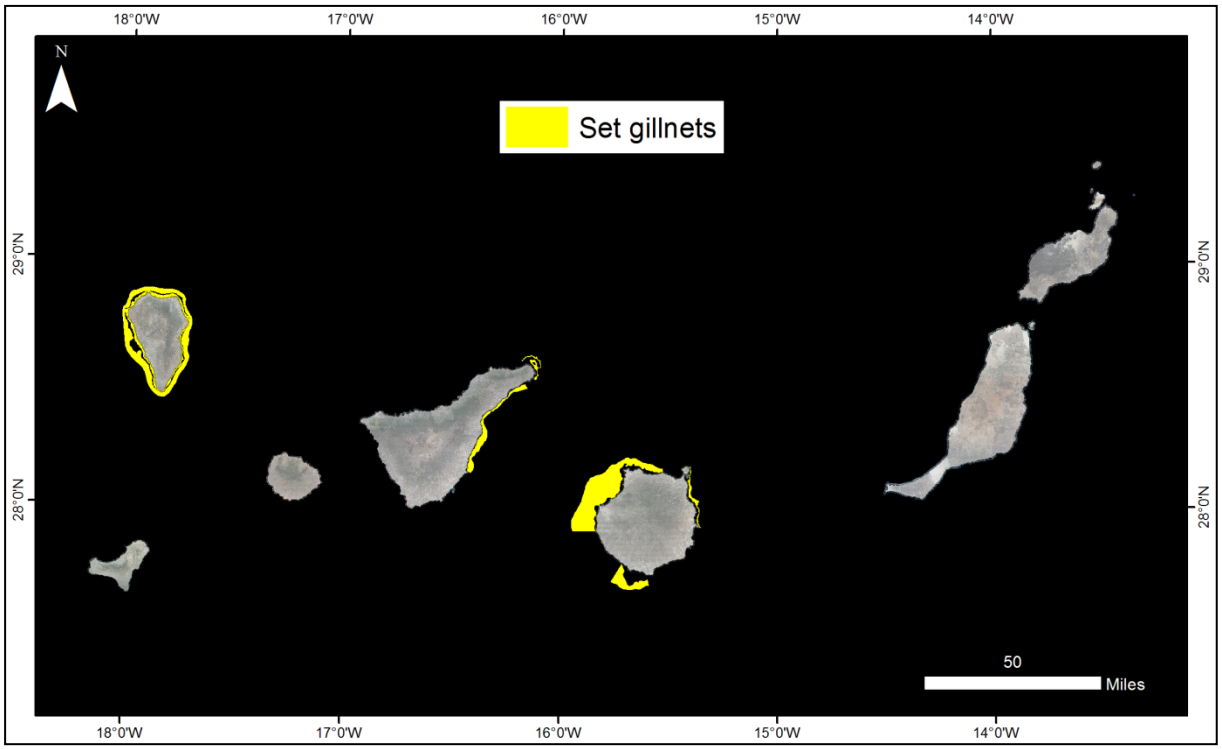


Figure 236. Fishing areas of set gillnets (source: IU-ECOAQUA, 2019).

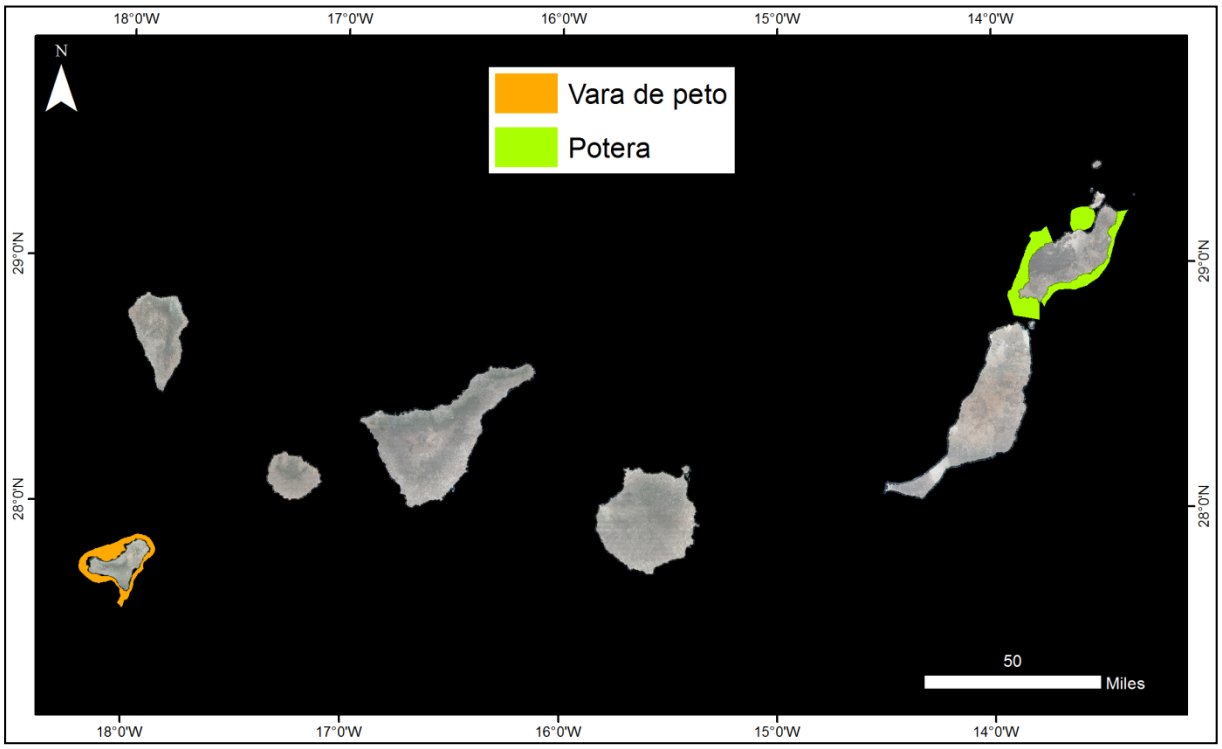


Figure 237. Areas of other fishing gear (source: IU-ECOAQUA, 2019).

PART III

Analysis of interactions

Interaction with other sectors

Fisheries have multiple synergies with other sectors (see table below), especially with ports, scientific research and environmental conservation (high synergy); and aquaculture, infrastructures and tourism. Artisanal fisheries for example can be a tourism attraction and represent a source of revenues for fishers. Also the development of pescatourism activities can benefit fishing communities. Neutral synergies were identified with defence and cultural heritage (MarSP, 2019).

Table 81. Degree of synergy of the fisheries sector with other maritime sectors (source: MarSP, 2019)

Fisheries			
Aquaculture		Infrastructures	
Mineral resources		Tourism	
Energy		Scientific research and marine biotechnology	
Defence		Underwater archaeology and cultural heritage	
Ports		Environmental conservation and Marine Protected Areas	
Navigation and maritime transportation		Scale: No information, Neutral, Low, High	

Participants identified medium conflicts between fisheries and most of the other sectors (see table below) except for mineral resources (high conflict); and scientific research, cultural heritage and energy (low conflict). In the case of the energy sector and despite the favourable conditions that wind turbines present (e.g. as artificial reefs) fisheries are not allowed in these areas (MarSP, 2019).

Table 82. Degree of conflicts of the fisheries sector with other maritime sectors (source: MarSP, 2019)

Fisheries			
Aquaculture		Infrastructures	
Mineral resources		Tourism	
Energy		Scientific research and marine biotechnology	
Defence		Underwater archaeology and cultural heritage	
Ports		Environmental conservation and Marine Protected Areas	
Navigation and maritime transportation		Scale: No information, Neutral, Low, High	

Land-sea interactions

Regarding synergies with land uses (see table below), fisheries present high synergy with MPAs since these are fundamental as reserve for juveniles and fishing resources. Medium synergies were identified with terrestrial protected areas, roads, airports and tourism areas. Neutral synergies were identified with bathing areas and agriculture though (MarSP, 2019).

Table 83. Degree of synergy of the fisheries sector with land-use sectors (source: MarSP, 2019)

Fisheries		
	Scale: No information, Neutral, Low → High	
A	Natural, cultural and landscape areas	
B	Bathing areas	
C	Built-up areas in risk zones	
D	Marine Protected Areas	
E	Terrestrial Protected Areas	
F	Built-up areas	
G	Agriculture, forestry and other uses	
H	Tourism potential areas	
I	Airports	
J	Roads	

Participants identified high conflicts (see table below) with tourism potential areas and medium conflict with agriculture, natural, cultural and landscape areas, built-up areas in risk and MPAs. Neutral conflicts are recognised for airports, roads and terrestrial protected areas (MarSP, 2019).

Table 84. Degree of conflict of the fisheries sector with land-use sectors (source: MarSP, 2019)

Fisheries		
	Scale: No information, Neutral, Low → High	
A	Natural, cultural and landscape areas	
B	Bathing areas	
C	Built-up areas in risk zones	
D	Marine Protected Areas	
E	Terrestrial Protected Areas	
F	Built-up areas	
G	Agriculture, forestry and other uses	
H	Tourism potential areas	
I	Airports	
J	Roads	

MINERAL RESOURCES

PART I

Sector characterization

Rising demand for minerals and metals, in tandem with the depletion of land-based resources, has led to a surge of interest in marine mineral resources. Although no commercial scale deep-sea mining has taken place, a range of mining operations are active in the shallow seabed. However, exploration contracts for deep-sea resources have been awarded to companies from countries including China, the United Kingdom, Belgium, Germany, France and Japan for three different mineral resources: seafloor massive sulfides (SMS), ferromanganese crusts and polymetallic nodules (Miller *et al*. 2018).

In the explorations carried out in recent years, geologists have taken material to the laboratories with clues that eventually can turn the Canary Islands into a kind of high-value mining reserve with elements such as tellurium, cobalt, hafnium, nickel or platinum, all of them components of great economic value due to their habitual use in the new technologies industry (Figure 238).

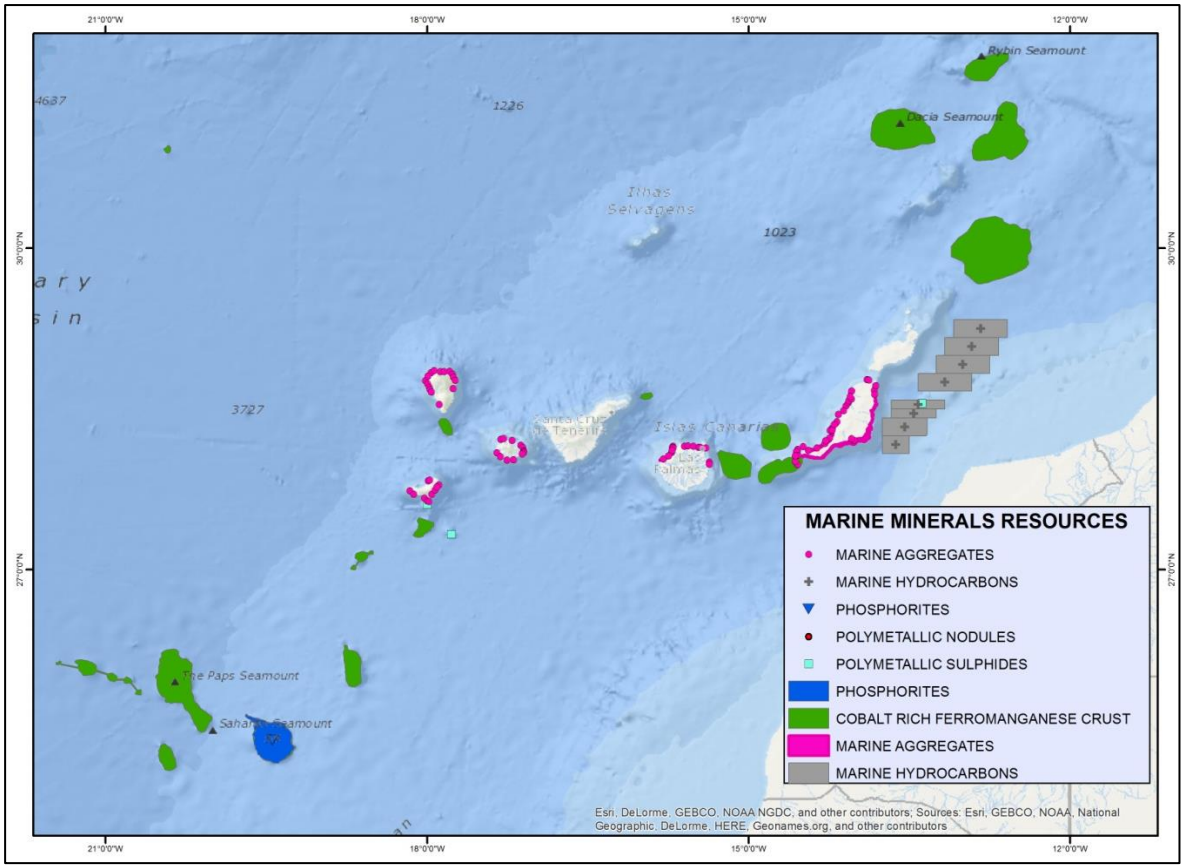


Figure 238. Marine mineral resources of the Canary Islands (updated to May 2019, EMODNET-Geology Portal, http://www.emodnet-geology.eu/map-viewer/?bmagic=y&baslay=baseMapEEA,baseMapGEUS&optlay=&extent=-2179400,-295790,7283560,5318790&layers=emodnet_mineral_occurrences)

For instance, recent studies show that in the Canary Islands Seamounts Province (CISP) located in the southwest of the archipelago (Figure 239), there is a set of more than 100 mountains and reliefs elevated submarines up to 3000 m that contain concentrations of thick ferromanganese (Fe-Mn) crusts between one hundred and one thousand times higher than the average of metals declared strategic by the EU for their scarcity and their interest for the technological industry and renewable energy (Marino *et al*. 2018).

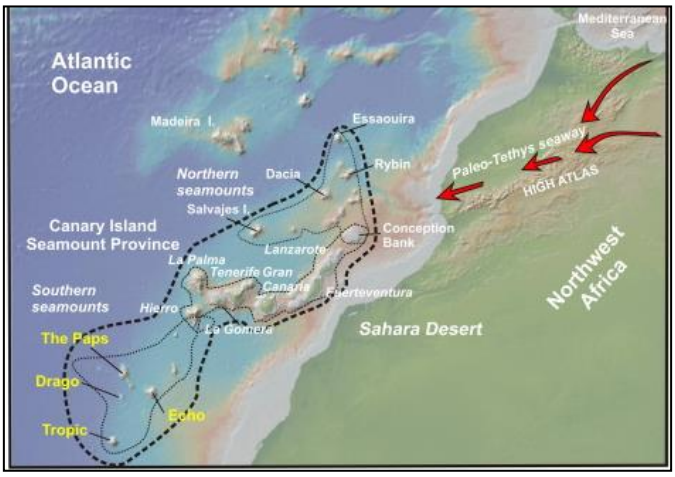


Figure 239. Regional setting of the Canary Islands Seamounts Province (CISP). Taken from (Marino *et al*. 2018)

The richest and thickest crusts are located on the summits and flanks of the submarine mountains of the southwest, essentially in the Echo, The Paps, Tropic, Drago and Bimbache mountains. These ferromanganese deposits are rich in iron (20%), manganese (14%) and trace elements such as cobalt (0.5%), nickel (0.25%), vanadium (0.2%), rare earths (0.25%) and elements of the group of platinum (0.02%). Mining Cobalt-rich-crusts deposits on seamounts will cause direct mortality to sessile organisms. Levin *et al*. (2016) suggest that such mining may also cause benthic, mesopelagic (200–1,000 m) and bathypelagic (1,000–4,000 m) fish mortality. The extent of mining on seamounts will dictate the level of impact, but it is likely that intensive mining could disrupt pelagic species aggregations due to the removal of benthic fauna, the presence of machinery and disruption as a result of noise, light and suspended sediments in the water column.

However, underwater mining is in an initial process of development and important investments are necessary for the knowledge of existing resources, as well as technological developments for a future environmentally sustainable exploitation. Underwater mining at great depth is a technological, economic and environmental challenge that is going to be examined first with the production of copper and gold in 2019 at 1600 meters depth in the Solwara project (Papua New Guinea) (Nautilus Minerals, 2017).

Discussions are underway to develop the legal framework to regulate exploitation, including issues of environmental protection, accountability, interactions across international and national boundaries, and also between claims, with input from marine scientists, legal specialists, and non-governmental organizations. Uncertainties surrounding deep-sea ecology and ecological responses to mining-related activities mean that environmental management strategies would need to be tailored to incorporate natural temporal and spatial variability of deep-sea ecosystems (Clark *et al*., 2010).

On the other hand, the extraction of marine aggregates in Spain is allowed only for regeneration and creation of beaches, as well as dredging and filling in ports (Law 22/1998 de Costas). The extraction of sediments from the seabed leads, among other impacts, to the loss of substrate and the modification of the background profile and thus, it had been named as one of the main pressures and impacts in the maritime demarcation.

In the Canary Islands, according to information from the General Directorate of Sustainability of the Coast and Sea, since 1990 there is only record of sand extractions from underwater deposits in the period 1993-1996. Therefore, for more than 15 years they have not taken carry out actions of this type in the Demarcation. However some exceptions have been done since then, and thus only extractions of sand have been made in the dry zone of Las Canteras (Gran Canaria). In this beach, the urban development of the city of Las Palmas has increased the processes of accretion versus erosion, transforming it into an area "Surplus" of sand. In this way, the Ministry of Environment, and Rural and Marino promoted in 2009 the "Extraction and transfer of sand from the beach Las Canteras to several beaches on the island of Gran Canaria", allowing the extraction of 60,000 m^3 of sand from this beach. In addition, there is a sand bank located in front of the town of Pasito Blanco, in the southwest of the island, very close to the Maspalomas dune system, proposed as a source of sand for the regeneration of the dunes as well as for the regeneration of some nearby beaches. As a conclusion, it can be said that no sand extractions have been carried out in the Canary Islands in recent years, although there are some sand banks in an exploitation project on the island of Tenerife. In addition, port dredging made in recent years is not very relevant, without trends to increase. Therefore, the effect of the extractions on the total demarcation is scarce, since in general affect small surfaces (EEMM Document, 2012).

Legal framework and constraints

Constraints

Participants of the 2nd MarSP stakeholder workshop of the Canary Islands identified several constraints to the development of the mineral resources sector (see table below). From the environmental point of view, this sector needs to assess impacts before and during the activity. This sector also faces social rejection for these reasons. On the legal and administrative side, the need for specific legislation and application of the plans are recognised as the main constraints. Lack or out-of-date data constitutes a technological constraint too (MarSP, 2019).

Table 85. Constraints to the development of the mineral resources extraction sector (source: MarSP, 2019)

Mineral resources	
Legal	Need to develop legislation There is no governance plan but management plan, which are not applied later on
Administrative	Lack of will from local, island and regional administrations to reach consensus and execute the plans
Technological	Lack of data. Out-of-date data
Social	Social rejection
Environmental	Need to assess the impacts before allowing the extraction of mineral resources Water pollution resulting from extractive activities

PART II

Current spatial distribution

From the EMODnet website the ports where dredging occurs are shown. The geodatabase on dredging in the EU was created in 2014 by AZTI-Tecnalia, the result of the aggregation and harmonization of the datasets provided by various sources throughout the EU.

Table 86. Cartographic information available for mineral resources.

Name	Source	Organization	Date	Definition
Dredging	EMODnet Human Activities	EMODnet	2018	Information: points with the position, country, marine basin and name of the extraction area. In viewer and WMS: Year, Allowed quantity (m^3), Allowed quantity (t), Quantity extracted (m^3), Quantity extracted (t), Type of extraction, Purpose, End Use, type of material, notes, link to web sources).
Link: http://www.emodnet-humanactivities.eu/search-results.php?dataname=Dredging				

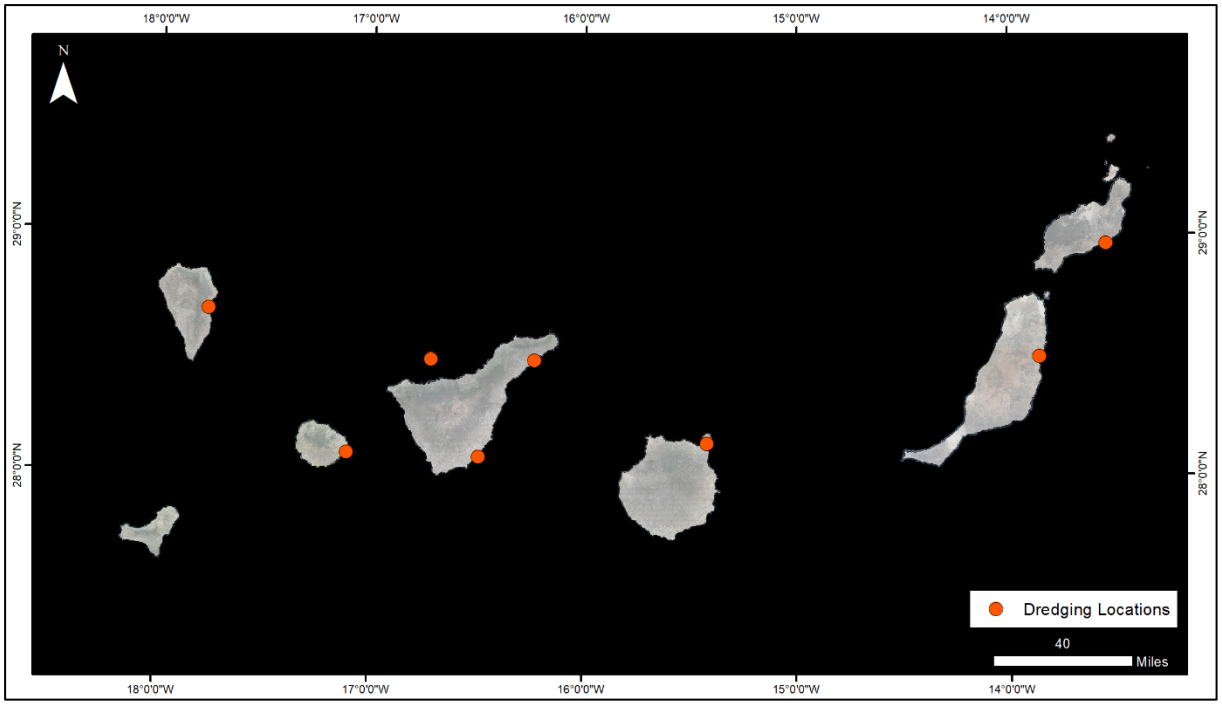


Figure 240. Dredging locations (source: EMODnet Human Activities, 2019).

PART III

Analysis of interactions

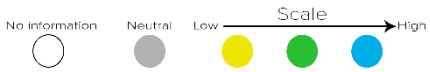
Interaction with other sectors

Synergies between this sector and other maritime sectors were recognised (see table below), particularly with infrastructures (high synergy), ports and scientific research. Neutral

synergies was identified for aquaculture, energy, tourism and underwater cultural heritage (MarSP, 2019).

Table 87. Degree of synergy of the mineral resources extraction sector with other maritime sectors (source: MarSP, 2019)

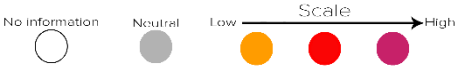
Mineral resources			
Aquaculture		Infrastructures	
Fisheries		Tourism	
Energy		Scientific research and marine biotechnology	
Defence		Underwater archaeology and cultural heritage	
Ports		Environmental conservation and Marine Protected Areas	
Navigation and maritime transportation			



More conflicts were identified for this sector (see table below), especially with aquaculture, fisheries tourism and environmental conservation (high conflict). Medium conflicts were identified with ports, scientific research and cultural heritage. Neutral conflict was recognised with energy, defence and navigation though (MarSP, 2019).

Table 88. Degree of conflicts of the mineral resources extraction sector with other maritime sectors (source: MarSP, 2019)

Mineral resources			
Aquaculture		Infrastructures	
Fisheries		Tourism	
Energy		Scientific research and marine biotechnology	
Defence		Underwater archaeology and cultural heritage	
Ports		Environmental conservation and Marine Protected Areas	
Navigation and maritime transportation			

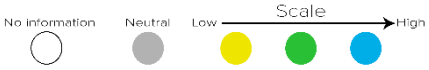


Land-sea interactions

Just a few synergies were recognised for this sector (see table below) with land uses such as MPAs and roads (low synergy). Neutral synergies were identified with natural and cultural areas, bathing areas as well as terrestrial protected areas (MarSP, 2019).

Table 89. Degree of synergy of the mineral resources extraction sector with land-use sectors (source: MarSP, 2019)

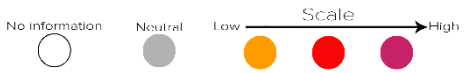
Mineral resources



A	Natural, cultural and landscape areas	
B	Bathing areas	
C	Built-up areas in risk zones	
D	Marine Protected Areas	
E	Terrestrial Protected Areas	
F	Built-up areas	
G	Agriculture, forestry and other uses	
H	Tourism potential areas	
I	Airports	
J	Roads	

Many high conflicts have been identified for this sector (see table below) with natural and cultural areas, bathing areas, MPAs, terrestrial protected areas, and potential tourism areas. Neutral conflict is identified with built-up areas in risk zones (MarSP, 2019).

Table 90. Degree of conflict of the mineral resources extraction sector with land-use sectors (source: MarSP, 2019)

Mineral resources		
		
A	Natural, cultural and landscape areas	
B	Bathing areas	
C	Built-up areas in risk zones	
D	Marine Protected Areas	
E	Terrestrial Protected Areas	
F	Built-up areas	
G	Agriculture, forestry and other uses	
H	Tourism potential areas	
I	Airports	
J	Roads	

ENERGY

PART I

Sector characterization

The electric power system of the Canary Islands is made up of six small-sized electrically isolated systems and a network of electricity infrastructure that is weakly meshed (www.ree.es). There is an electrical system for each island, with the exception of Fuerteventura and Lanzarote, which are interconnected, the smallest being those of La Palma, La Gomera and El Hierro. There are a series of peculiarities that make the Canary Islands electrical system less stable and safer than the large interconnected systems. Among others, we can highlight the following: a) It is small in comparison with the peninsular system, which prevents the use of economies of scale, generating higher investment and exploitation costs in power generation plants; b) It is isolated from large electricity networks, which requires maintaining a greater capacity of electricity generation to adequately ensure supply and avoid power cuts; c) Currently, there are no more electrical interconnections between islands due to the great sea depths that make the laying of submarine cables difficult; d) Most of the electric generation technologies use fossil fuels, which makes it a more vulnerable system against changes in the price of oil, implying greater dependence on foreign energy.

Renewable energies- The supply of energy demand through renewable sources (sun, wind, water, etc.) presents innumerable advantages. First, the environmental effects that result from the use of these sources are much lower than those caused by conventional fuels. And second, it is generally about resources available in the place of use, so that their use decreases the dependence on the outside and the vulnerability of energy systems, while isolating them from price tensions in international markets.

Wind energy- The Canary Islands present optimal conditions for the large-scale exploitation of wind energy. One of the factors that determines the climate of the Canary Islands, besides the cold marine current, the relief and the proximity to the African continent, are the Alisios winds. The winds regime in the Canary Islands shows a clear seasonal variation and a marked directional component, with the frequency of the winds of the northwest minimum component in the winter months, of the order of 50%, and maximum in the summer months, between 90 -95%. In addition, the magnitude of such winds means that in places where the proximity to the sea combines the Alisio with local currents (breezes) and with accelerations due to orography, very high wind potentials are produced, optimal for its energetic exploitation (Martín-Mederos *et al*. 2011). The Canary Islands has a vast wind park distributed along the islands, and thus, El Hierro has 2, La Gomera 1, La Palma 3 and Tenerife 8; Gran Canaria has 33, Fuerteventura 4 and Lanzarote 3. That is a total of 56 wind parks (Figure 241) (https://www.aeeolica.org/sobre-la-eolica/la-eolica-espana/mapa-eolico/canarias).

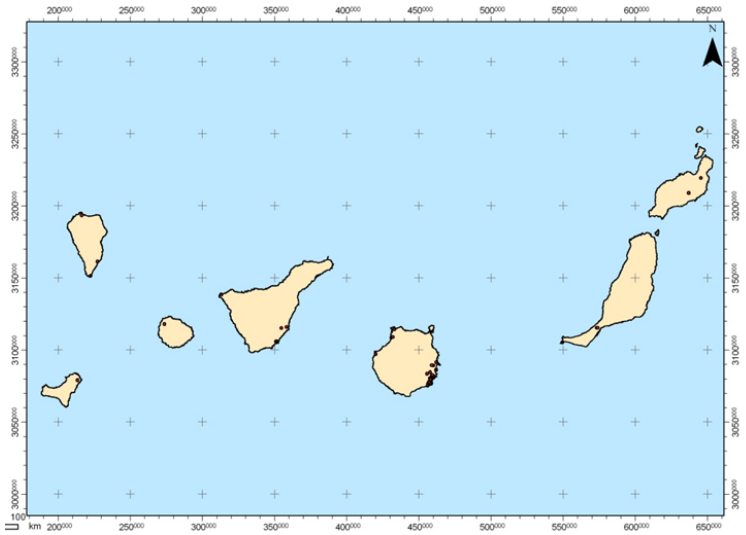


Figure 241. Wind parks located in the Canary Islands. Data from the Instituto Tecnológico de Canarias- ITC (http://www.itccanarias.org/recursoeolico/maps/mapa_parques_eolicos_canarias.jpg)

However, in the last three years, the installed wind power in the Canary Islands has experienced a spectacular growth of 137.77%, reaching 390 MW in December 2018, thanks to the Canary Islands Wind Power Plan. This capacity is sufficient to supply 43% of the existing homes in the archipelago. The immediate future is to continue increasing the megawatts generated by the force of the wind, an abundant resource on the islands. Red Eléctrica de España (REE) has been responsible for efficiently integrating this generation into the electric transport network. At the end of December 2018 the works of the new electric transport infrastructures foreseen in the Canary Islands Wind Plan ended, in which REE has invested 434 million Euros. The Canary Islands Wind Plan is part of an investment volume of more than 2,800 million Euros provided by the operator between 2010 and 2025. Among the programmed actions is the deployment of infrastructure and technological projects for the development of the transport network, interconnections between islands, the renovation and improvement of all existing infrastructures and the start-up of the Soria-Chira reversible pumping hydraulic power plant.

Before the Wind Plan, the installed wind power in the Canary Islands was 162 MW. The modernization of transport infrastructures has allowed the connection of 278 new MW, which means in January 2019 a capacity of 440 MW (Figure 242).

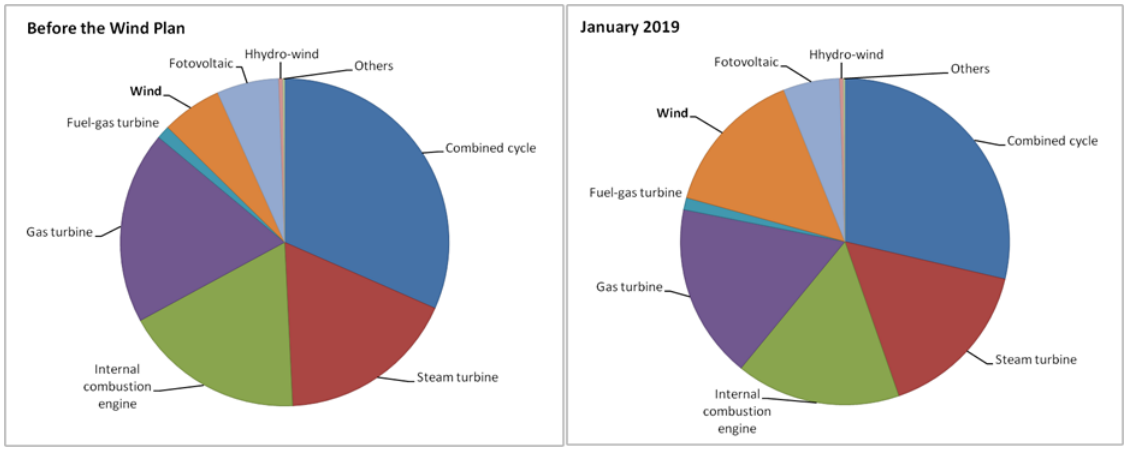


Figure 242. Power installed in the Canary Islands before and after the wind plan. Data as of December 2018 (graphic provided by Red Eléctrica Española, www.ree.es)

The Canary Wind Plan is a necessary and very significant step towards the energy transition of the islands. In fact, the Government of the Canary Islands is convinced that the wind sector has a great weight in achieving the 2025 objectives. For that year, the regional government has proposed that 45% of electricity generation in the islands come from renewable sources (http://www.gobiernodecanarias.org/ceic/energia/eolica/).

The offshore wind energy has enormous potential in the Canary Islands: the Islands could cover 22 times their electricity consumption with only that type of wind turbines, using 12% of their territorial waters and at a cost 23 % cheaper. Studies show that there are 3,950 km² of marine surface in the Canary Islands, with room for 1,980 fixed wind turbines and 9,465 floating wind turbines that could produce 178,988 gigawatts / hour per year (22 times the total annual electricity consumption of the Islands) (Schallenberg-Rodríguez and Montesdeoca, 2018). According to their data, Fuerteventura, Lanzarote, Gran Canaria and Tenerife could be supplied 100% only with fixed marine wind turbines in depths less than 50 meters, La Gomera would require 70% of fixed turbines and 30% floating and La Palma and El Hierro would depend mainly on the latter, but also at viable costs (30% cheaper than the current one).

In 2018, the first marine wind turbine in the fixed bottom of all southern Europe was installed in PLOCAN (the Oceanic Platform of the Canary Islands) in Gran Canaria (Figure 243). This project has had a budget of 20 million €, financed for the European program H2020. According to the project, the prototype tower MLRT weighs 273 tons and the rotor is 132 meters in diameter and has a power of generation of 5 MW (https://www.esteyco.com/projects/elican/).

Figure 243. Offshore marine wind turbine in Gran Canaria (photo from PLOCAN, www.plocan.eu)

The Government of the Canary Islands has taken a step forward and will allow the installation of the first large offshore wind farm in Spain by the Norwegian oil company Equinor, which will invest more than 860 million Euros in the project in the coming years. This floating marine park is equivalent to one third of the total renewable power installed on the islands and it will be operative by 2024 (https://renewablesnow.com/news/equinor-to-build-200-mw-floating-wind-farm-near-canary-islands-656528/).

Photovoltaic energy- Photovoltaic energy produces electricity through the reception of sunlight. The Canary Islands, due to its geographical location, is the region of Europe that receives more hours of sunlight per year, and which also has sufficient intensity to be used as an energy source. In the month of July, the highest peaks of solar irradiation are registered, and December is the month with the least irradiation.

In the case of photovoltaic power, the 160 MW target set in the Plan Energético de Canarias 2006 (Canarias Energetic Plan) for the 2015 was exceeded, reaching the figure of 180.2 MW in 2015. In the present, the Plan aims to achieve a target of 300 MW of photovoltaic power in the Canary Islands in the year 2025. However, to avoid excessive occupation of land, which is very scarce in the insular territories, photovoltaic installations on roofs in areas will be prioritized to industrial and

commercial sectors, as well as in greenhouses, compared to large photovoltaic plants on soil, trying to restrict the development of the latter to those locations where other strategic renewable facilities are already located, mainly wind farms, minimizing the impact of these infrastructures both at the territorial as visual or landscape (*www.gobcan.es/ceic/.../planificacion/EECan25_DocumentoPreliminar_junio2017.pdf*). Various studies carried out by the Technological Institute of the Canary Islands indicate that the photovoltaic power planned for the year 2025 can be reached using only the covers of the areas indicated above.

According to the Anuario Energético de Canarias of 2017 (*datosdelanzarote.com/.../Anuario-energético-de-Canarias-(2017)-20190403092041849*) the total photovoltaic power installed in the Canary Islands on December 31, 2017 was 182,845 kWp, corresponding 99.5% (181,987 kWp) to the facilities connected to the network and the remaining 0.4% (859 kWp) to the isolated (Table 91). Power was distributed mainly between Tenerife and Gran Canaria with 63.4% and 22.2%, respectively.

Table 91. Photovoltaic power installed in the Canary Islands as for December 31st, 2017 datosdelanzarote.com/.../Anuario-energético-de-Canarias-(2017)-20190403092041849).

Island	Conected		Isolated		Total
	kWp	%	kWp	%	kWp
Gran Canaria	40.387,38	99,6%	163,46	0,4%	40.550,84
Tenerife	115.342,35	99,8%	184,01	0,2%	115.526,36
Lanzarote	8.058,44	97,6%	195,09	2,4%	8.253,53
Fuerteventura	13.471,77	98,3%	228,63	1,7%	13.700,40
La Palma	4.648,41	99,0%	47,07	1,0%	4.695,49
La Gomera	44,84	65,3%	23,83	34,7%	68,67
El Hierro	33,77	67,1%	16,55	32,9%	50,32
Canarias	**181.986,96**	**99,5%**	**858,64**	**0,5%**	**182.845,60**

Solar thermal energy- Solar thermal energy consists of collecting the heat of the sun in the middle of the so-called solar collectors, solar collectors or thermal solar panels. These increases in fluid temperature are in the middle of consumption. Solar thermal energy can be used to produce domestic hot water (DHW), heating systems and cooling systems by means of absorption and pool heating machine. The surface of solar thermal panels installed in the Canary Islands in December 2017 was estimated at 121,035 m^2, mainly in Tenerife (38.7%) and Gran Canaria (37.4%), which represented an increase of 0.9% compared to previous period (*datosdelanzarote.com/.../Anuario-energético-de-Canarias-(2017)-20190403092041849*.

Hydraulic power energy- Since the hydrological resources of some of the islands are very limited, in the Canary Islands there are only three mini-hydraulic power stations, specifically on the islands with the greatest potential hydraulic. Thus, La Palma has the El Mulato plant that was the first mini-hydraulic power plant in Canary Islands, with an installed power of 800 kW (although the installation has been stopped since 2004, it is accounted as it is still administratively registered. Currently, it is without a concession for its exploitation). And in Tenerife, where the Vergara-La Guancha and Altos de Icod-El Reventón plants are located, with installed powers of 463 kW and 757 kW respectively in 2017 (*datosdelanzarote.com/.../Anuario-energético-de-Canarias-(2017)-20190403092041849*). According to the 2017 Anuario Energético de Canarias the electrical production of mini-hydraulic origin in the Canary Islands, in the year 2017 was 3,281.1 MWh, 5.5% less than the previous year, corresponding only to the island of Tenerife.

Hydroelectric energy- In 2014, the installation called "Hydroelectric Exploitation of El Hierro" comes into operation, obtaining the definitive start-up on August 26, 2014. This project integrates a wind farm, a pumping station and a hydroelectric plant. The wind farm is capable of supplying electricity directly to the grid and, simultaneously, feed the pumping station that stores water in a tank elevated, as an energy storage system. Until the upper tank rises water from the lower reservoir taking advantage of the surplus of wind energy that they produce the wind turbines. In times of wind shortage, that volume of accumulated water in height is used to produce electric power from a hydraulic system. The electricity production of El Hierro Hydroelectric Plant reached at the end of 2017, 20,398.5 MWh, which meant an increase of 12.7% compared to the previous year (*datosdelanzarote.com/.../Anuario-energético-de-Canarias-(2017)-20190403092041849*). That way, the 46.5% of the total annual demand for El Hierro during 2017 came from the Hydroelectric power station, reaching a 100% renewable integration of the demand for 1,415 hours.

Landfill biogas- In the Canary Islands there is a biogas plant for the use of urban solids waste since 2008, in the Arico Environmental Complex on the island of Tenerife. The power of this installation is 1.6 MW and during the year 2017 it discharged 8,915 MWh to the electricity grid, which meant an increase of 1% compared to the previous year. On the other hand, the electric biomethanization power plant of Zonzamas in Lanzarote started to pour electricity into the grid in 2013. Therefore, in summary for the Canary Islands, electricity production through this source of energy in 2017 was 9,502 MWh, 1.8% higher than in 2016 (*datosdelanzarote.com/.../Anuario-energético-de-Canarias-(2017)-20190403092041849*).

Legal framework and constraints

Legislation applicable to the Canary Islands context: summarize the applicable legislation and the developed matters (Marine renewable energies)

The development of renewable energies in the sea and, in particular, of offshore wind farms (being the technique currently more developed and concretely possible in the short term), is one of the most important issues for the economic development and the energy survival of the Canary Islands. On the basis, in fact, of the continuous depletion of energy resources from fossil resources, only the development of renewable energy can guarantee the production of energy for all islands, even in the long term, and guarantee respect for the marine environment. Due to the geographical position of the Canary Islands, in fact, the depletion of oil resources also on the continent, will lead to a critical situation.

If the energy depends on other countries, in fact, what could happen in case of a power failure? Any form of transportation, sustenance and nutrition could end, without having the possibility of accessing another form of regeneration. For these reasons, energy self-sufficiency is fundamental and, at the moment, to focus on the inexhaustible energy of nature, seems to be, to date, the most effective solution.

The geographical position of the Canary Islands, in fact, allows the presence of many constant natural energies throughout the year and superior to many places in the world. It is no coincidence that the only island in the world that currently operates solely with the contribution of renewable energy is the island of El Hierro, and that Gran Canaria has the advantage of having installed the first marine energy offshore in Spain. Finally, in 2018, the University of Las Palmas de

Gran Canaria (ULPGC) presented a project of a floating marine wind farm that could become today the largest and most productive floating wind farm in the world. And this is because the wind, in the Canary Islands, is one of the most constant and strong resources that is present.

For these reasons, linked to the energy survival of the islands and their economic development, which could also make them pioneers in this field and example throughout the world, the production of renewable energy at sea becomes a fundamental issue in the planning of the Maritime Spatial in the Canary Archipelago. But the concrete problems of this development are multiple.

One of the most delicate problems in this area, which affects most of the doctrine, refers to the assignment of competencies in the subject between the State and the Autonomous Communities.

In fact, it seems that competition in energy in general is attributed to the State, but, considering all the issues that are interconnected with energy matter, even the Autonomous Communities are given a wide margin of intervention, creating interpretative and application problems.

In particular, the Spanish Constitution grants the State the exclusive competence to:

- Art.149, c.1, 22.ª, CE, the bases of the mining and energy regimes and
- Art.149, c.1, 25.ª, CE, the legislation, ordination and granting of resources and hydraulic uses when the waters run through more than one Autonomous Community, and the authorization of the electrical installations when their use affects another Community or the transport of energy out of its territorial scope.

The constitutional court has also included, through an extensive interpretation, the issue of renewable energies as part of state-level competences, since it turns out to be a topic directly linked to other state issues and, in particular:

- Art.149, c.1, 15.ª, CE, The promotion and general coordination of scientific and technical research;
- Art.149, c.1, n. 13.ª, CE, the bases and coordination of the general planning of the economic activity.

In addition, in some crucial sentences (for example, Judgment No. 29/1986 and Judgment No. 18/2011), its stated that energy policies play a strategic role for the functioning of the country's economy and that, where the main objective of any intervention is that of the national economic policy, it is preferable a unitary state intervention instead of a differentiated regional intervention.

The situation is complicated, still, when considering also the matter related to the protection of the environment. In fact, the competence in this matter is granted to the State for what concerns "the bases", while granting the competence of the Autonomous Communities the opportunity to establish "additional rules of protection". In particular, the State has exclusive competence over basic legislation on environmental protection, without prejudice to the authorities of the Autonomous Communities to establish additional protection standards (Art.149, c.1, n.13.ª, EC) and the Autonomous Communities may assume authorities in the management of environmental protection (Article 148, c.1, n.9.ª, EC).

Respect to administrative provisions and concessions, it is recognized that the State has exclusive competence to issue basic laws, while the Autonomous Communities have the specific competence of the authorization activity (Article 148, c.1, n.18.ª, CE). Therefore, only through the joint reading of the Constitution and each of the Statutes of Autonomy it can get to a concrete knowledge of the competence on the subject of the production of energy from renewable sources. Substantially, there has been a transfer of competence in favour of the Autonomous Communities, based on the possibilities granted to the State in accordance with art. 150 of the Constitution. This has meant that it finds explicit references to the production of energy from renewable sources contained in the individual Statutes of some Autonomous Communities, such as Catalonia, Andalusia and Castilla y León.

Canary Islands Autonomous Community, the new Statute of Autonomy recognizes the Canary community:

- Article 3: Given the remoteness, insularity and outermost condition of the Canary Islands, recognized by the Treaties constituting the European Union, the Constitution and this Statute, the public authorities, within the scope of their respective competences, will take these circumstances into account when it is necessary to adapt their policies and legislative and regulatory actions, as well as their financial and budgetary decisions, when said circumstances have a decisive influence on such competences, setting the specific conditions for their application in the Archipelago. Especially, this adaptation will occur in the matter of "energy"; "environment" and so on;

- Article 37. Guiding principles. The Canary public authorities assume as guiding principles of their policy (...): Energy saving and the promotion of renewable energies, especially in what refers to the transport and communications policy;

- Article 163. Energy, hydrocarbons and mines.

1. Corresponds to the Autonomous Community of the Canary Islands, without prejudice to the provisions of article 149.1. 13.ª and 25ª of the Constitution, the competence on the following matters:

- Energy production, distribution and transport facilities, when they are not located in the territorial sea, this transport passes entirely through the territory of the Canary Islands and its use does not affect another territory, without prejudice to its general authorities over industry.
- Promotion and management of renewable energies and energy efficiency.
- The mining regime in relation to the regulation and the intervention regime administrative, as well as the control of mines and mining resources that are located in the Canary Islands and the extractive activities that are carried out.
- Authorization of production, deposit and transportation of energy facilities, as well as their inspection and control, in accordance with the bases and coordination of the general planning of the economic activity provided for in article 149.1.13 of the Constitution;

2. The Administration of the Autonomous Community of the Canary Islands will participate in the regulation and state planning of the energy sector that affects the Canary Islands.

3. The Autonomous Community of the Canary Islands will issue a report in the areas of state competence when energy products are generated outside their spatial scope and affect the Autonomous Community.

Currently the doctrine is divided between those who consider it possible to regulate the issue of renewable energies (and, especially, its authorization regulation) through the competence of the Autonomous Communities and those who kept that the main competence of all the matter is in the hands of the State. In the specific case in which we are interested, in the management of the Maritime Spatial in Canary Islands, the regulation of renewable sources of wind at sea faces a new limit in its management. In fact, the territorial sea is a space dedicated to state competition, as holder a control, as established by the United Nations Convention on the Law of the Sea. Therefore, the State, precisely by virtue of its exclusive competence in international relations, will have recognized an absolute power in this space and the regulation of renewable energy at sea could only be within its competence. However, part of the doctrine has already responded that the Autonomous Communities are also competent for the execution of international treaties (149.1.3 CE) in matters that are specific to them, in accordance with their respective Statutes. In addition, the interpretation was also criticized according to which public property would hinder the competence of another public administration other than its owner. In particular, in the case of wind energy in the sea, in fact, the resource that is exploited is the natural wind and not the sea, and the energy produced will still be processed and distributed throughout the regional territory and not directly in the sea. Therefore, it would be very possible that an Autonomous Community as Canary Archipelago, totally independent from the other Autonomous Communities, could be competent to decide the necessary and peculiar authorizations for marine renewable energies, including offshore wind farms. The only condition is that the energy will be transported and distributed in its territory.

Eventual administrative derivative acts: explain the required procedure (Marine renewable energies)

The regulation of the procedure for the authorization of marine energy offshore, is designed by **Royal Decree 1028/2007, of July 20,** which establishes the administrative procedure for the processing of applications for authorization of electric generation facilities in the territorial sea.

In its preamble it can read that: "The special characteristics that the authorizations and permits procedures entail, for the execution of power generation projects at sea, the plurality of administrations involved and the diversity of regulations that for these cases are applicable, they advise to dictate a single norm that contemplates in its totality said procedure ".

Then, Royal Decree 1028/2007 **aims to bring together** in a single administrative procedure the majority of authorizations necessary to start up offshore wind power installations. In particular, the Royal Decree tries in this objective to regulate:

In Title I the object, scope of application and competences on the subject, the wind farm or offshore wind generation facility as "any investment project that materializes in the integrated installation of one or more wind turbines, electrically interconnected through their own networks, sharing the same structure of access and control, with own energy measurement and with connection to the transport network, and physically located in the territorial sea".

In Title II, it regulates administrative procedures for offshore wind generation facilities and, in particular:

CHAPTER I Authorization and administrative concession regime;
CHAPTER II Authorization procedure for the installation and, specifically:
SECTION 1. START OF THE PROCEDURE

SECTION 2. MARINE WATER AREA CHARACTERIZATION PROCEDURE
SECTION 3. CONCURRENCE PROCEDURE
SECTION 4. RESERVATION OF ZONE
SECTION 5. PROCESSING OF THE INSTALLATION AUTHORIZATION PROCEDURE
SECTION 6. EVALUATION OF ENVIRONMENTAL IMPACT
SECTION 7. CONCESSION OF THE MARITIME TERRESTRIAL PUBLIC DOMAIN

Finally, in TITLE III, the Royal Decree regulates the administrative procedures for other marine generation technologies.

It should be noted that, on the part of the doctrine, the Royal Decree still "does not achieve its objective of integrating in a single procedure all the relevant procedures for the authorization and commissioning of offshore wind turbine installations", and "greatly limits the participation of the Autonomous Communities in such procedure, thus generating important dysfunctions in the integral management of the sectors, matters and competing interests in all procedure of authorization of offshore wind farm installations ".

Constraints

The energy sector faces many constraints for its development according to the stakeholder participating in the 2nd MarSP stakeholder workshop of the Canary Islands (see table below). These constraints often come from legal and administrative aspects (unclear legislation and plans, exclusion areas, lack of political will, etc.). Technological and economic burdens such as costly infrastructures for distant and deep waters installations or the lack of prototypes were recognised by participants. Society challenges such as the acceptance of wind turbines were also mentioned (MarSP, 2019).

Table 92. Constraints to the development of the energy sector (source: MarSP, 2019)

Energy	
Legal	✓ Exclusion areas for offshore wind ✓ Regulation is unclear for the installation of wave and wind farms ✓ Need to clarify national and regional competences following the new Statute of Autonomy of Canarias ✓ There is no governance plan but management plan, which are not applied later on
Administrative	✓ Administrations need to speed up renewable energy production to advance towards energy independence ✓ Lack of will from local, island and regional administrations to reach consensus and execute the plans
Economic	✓ Economic costs increase further seaward and with deeper bathymetry
Technological	✓ Prototypes are being currently developed for deep waters. Distance to shore is still an important constrain ✓ Deep waters prototypes are being tested ✓ Lack of data. Out-of-date data
Social	✓ Renewable energy is not accepted by society ✓ Rejection to the visual impact of wind turbines

PART II

Current spatial distribution

In the tool named ***Herramienta de Pilotaje del Litoral Canario*** **(HPL)**, developed by the Coastal Management Service of the Vice-Ministry for Territorial Policy of the Canary Islands Government, the following information regarding the energy sector is presented:

- **Canary Islands Wind Resource:** Prepared by the Technological Institute of the Canary Islands (ITC, of its initials in Spanish), it describes the main characteristics of the existing wind (speed, direction and other parameters). The points of interest are integrated into a 100-m-resolution mesh, both in the North-South and East-West directions. The information of each point is detailed in a line that describes the most probable behaviour of the wind at that point, and ordered by the respective UTM coordinates. The information is only estimated, because the wind data have not been measured, but calculated. From a simulation based on the use of maps of average wind speeds, speed distribution curve, wind roses and turbulence intensity at 40, 60 and 80 m in height, for the Canary archipelago. This group, therefore, has the following layers: Wind Roses, Turbulence Intensity, Wind Resource or average wind speed and Roughness or influence of obstacles and contour of the terrain on the wind.

- **Marine Wind Areas:** distribution cells. Zones of exclusion located at 24 miles away, appropriate and suitable for the installation of offshore wind farms. Information from *Estudio ambiental para la instalación de Parques Eólicos Marinos* (2009).

The location of the offshore wind farms in the planning, construction and production phases is found at the **EMODnet** website.

Table 93. Cartographic information available for energy.

Name	Source	Organization	Date	Definition
Wind Resource of the Canary Islands	IDECanarias	ITC	2007	Main characteristics of the existing wind (speed, direction and other parameters) for specific coordinates in the archipelago. The spots of the study are integrated in a 100-m-resolution mesh. Layers: Wind Roses, Turbulence Intensity, Wind Resource and Roughness.
Link: http://www.itccanarias.org/recursoeolico/ **WMS:** https://idecan1.grafcan.es/ServicioWMS/RecursoEolico?				
Marine Wind Areas	HPL	Government of the Canary Islands	2009	Exclusion area at 24 miles, appropriate and suitable. Distribution cells. Info from *Estudio ambiental para la instalación de Parques Eólicos Marinos* (2009).
Link HPL: http://www.pilotajelitoralcanario.es/				
Wind Farms	EMODnet Human Activities	EMODnet		Database on offshore wind farms in the EU was created in 2014 by CETMAR for EMODnet. Database contains points and/or (where available) polygons representing offshore wind farms. Each feature has the following attributes (where available): Name, N° of turbines, Status, Country, Year, Power, Distance to coast and Perimeter, Surface.
Link: http://www.emodnet-humanactivities.eu/search-results.php?dataname=Wind+Farms+%28Polygons%29				

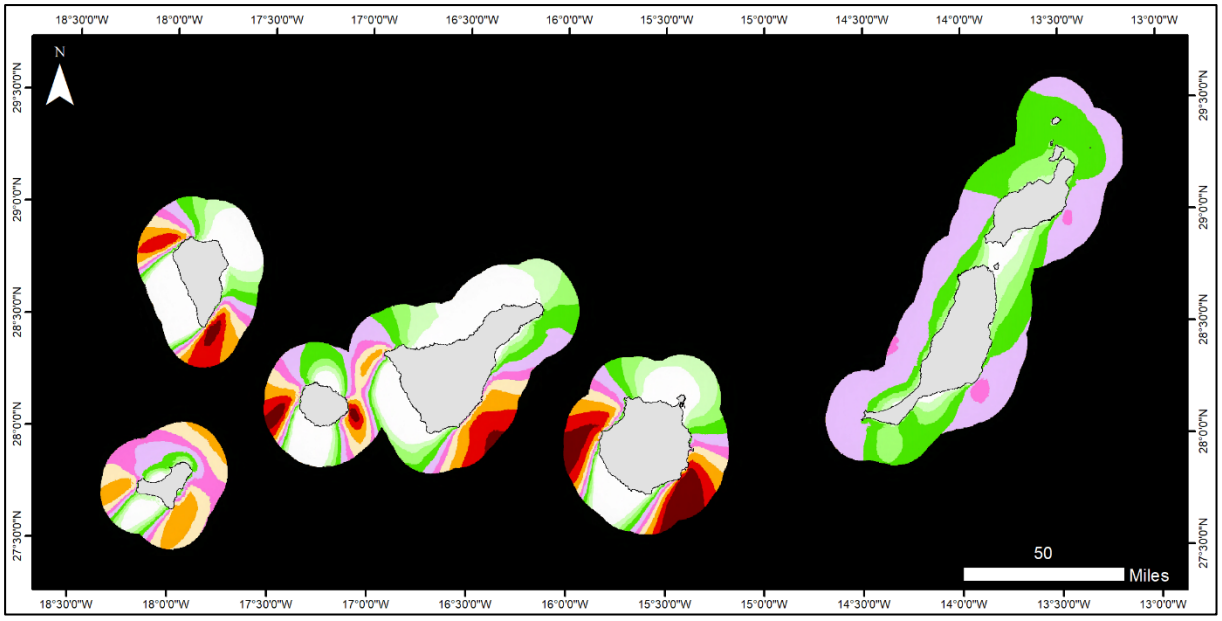


Figure 244. Wind resource at 40 m altitude (source: IDECanarias, 2019).

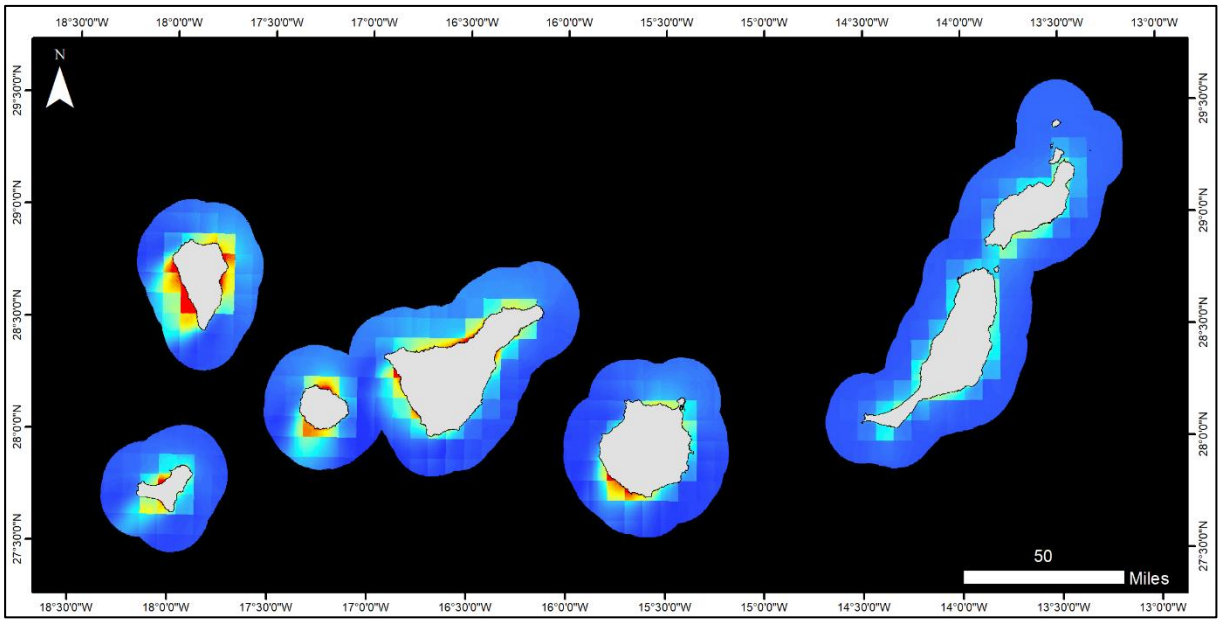


Figure 245. Turbulence intensity at 40 meters altitude (source: IDECanarias, 2019).

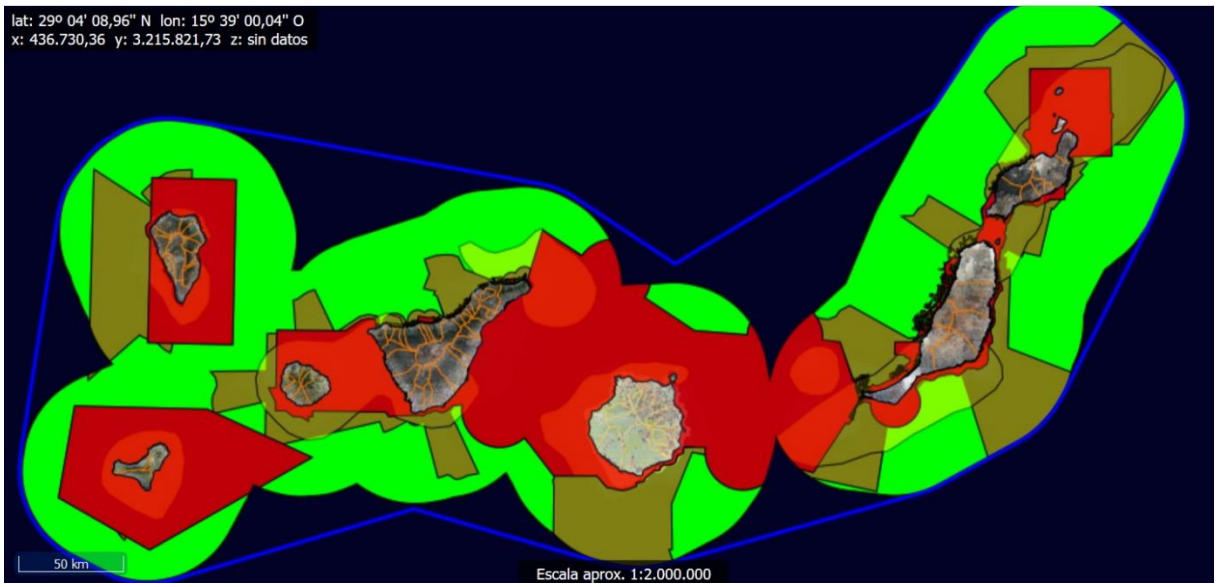


Figure 246. Marine Wind Area. Red=Exclusion Area, Yellow=appropriate area, Green=suitable area (source: viewer HPL, 2019).

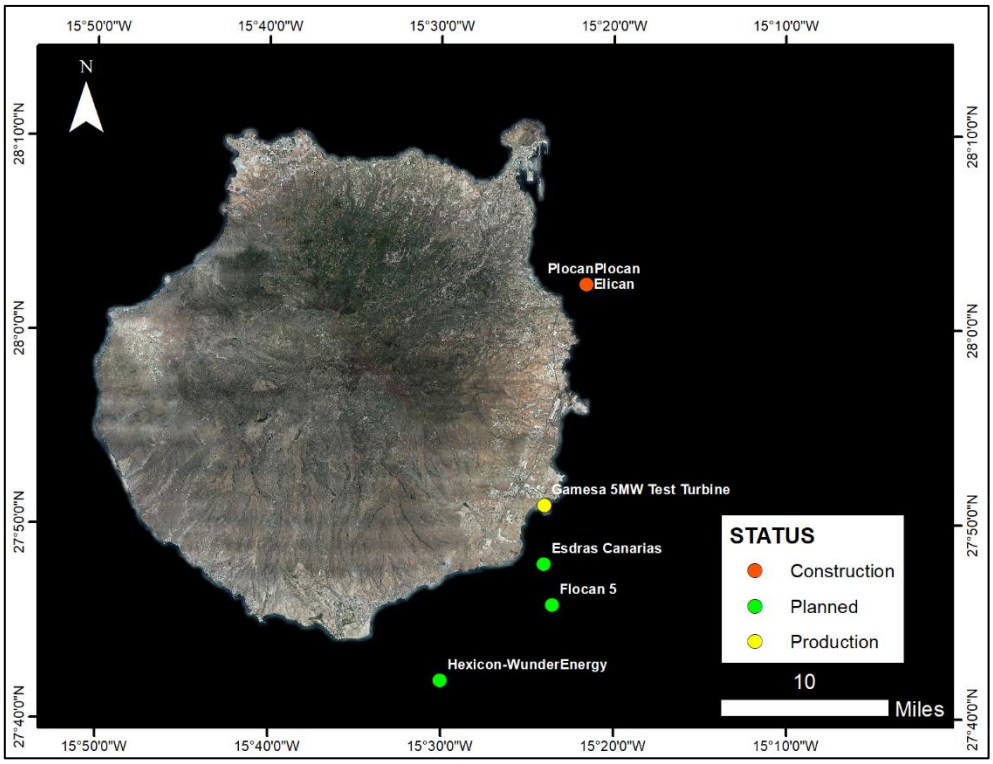


Figure 247. Wind farms in Gran Canaria (source: EMODnet Human Activities, 2019).

PART III

Analysis of interactions

Interaction with other sectors

The energy sector is recognised to have synergies with several maritime sectors (see table below), such as infrastructures, tourism and environmental conservation (high synergy) and aquaculture, ports and scientific research (medium synergy). Floating energy installations might be combined with other uses such as aquaculture in prototypes. Large energy facilities may serve as fishing reserve for fishers (low synergy) (MarSP, 2019).

Table 94. Degree of synergy of the energy sector with other maritime sectors (source: MarSP, 2019)

Energy			
Aquaculture		Infrastructures	
Fisheries		Tourism	
Mineral resources		Scientific research and marine biotechnology	
Defence		Underwater archaeology and cultural heritage	
Ports		Environmental conservation and Marine Protected Areas	
Navigation and maritime transportation			

Scale: No information | Neutral | Low | High

The energy sector has conflicts with most of the maritime uses (see table below). Underwater heritage and environmental conservation are the ones identified with higher conflict. This is motivated by the impacts that wind turbines can have on the seabed and routes of marine species. Other maritime uses with an important conflict with the energy sector are: infrastructures, tourism and scientific research (MarSP, 2019).

Table 95. Degree of conflicts of the energy sector with other maritime sectors (source: MarSP, 2019)

Energy			
Aquaculture		Infrastructures	
Fisheries		Tourism	
Mineral resources		Scientific research and marine biotechnology	
Defence		Underwater archaeology and cultural heritage	
Ports		Environmental conservation and Marine Protected Areas	
Navigation and maritime transportation			

No information · Neutral · Low → High (Scale)

Land-sea interactions

The higher synergies identified (see table below) for the energy sector are with MPAs, terrestrial protected areas and airports. Built-up areas and natural, cultural and landscape areas also present important synergies. The new landscapes created with the establishment of wind parks could attract 'green' tourism (MarSP, 2019).

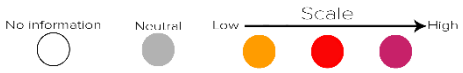
Table 96. Degree of synergy of the energy sector with land-use sectors (source: MarSP, 2019)

Energy		
A	Natural, cultural and landscape areas	
B	Bathing areas	
C	Built-up areas in risk zones	
D	Marine Protected Areas	
E	Terrestrial Protected Areas	
F	Built-up areas	
G	Agriculture, forestry and other uses	
H	Tourism potential areas	
I	Airports	
J	Roads	

No information · Neutral · Low → High (Scale)

The energy sector presents conflict with several land uses (see table below) such as MPAs and terrestrial protected areas and airports (high conflict); bathing areas and landscape areas (medium conflict). Wind turbines can damage important natural or cultural landscapes (MarSP, 2019).

Table 97. Degree of conflict of the energy sector with land-use sectors (source: MarSP, 2019)

Energy		
		
A	Natural, cultural and landscape areas	
B	Bathing areas	
C	Built-up areas in risk zones	
D	Marine Protected Areas	
E	Terrestrial Protected Areas	
F	Built-up areas	
G	Agriculture, forestry and other uses	
H	Tourism potential areas	
I	Airports	
J	Roads	

DEFENCE

PART I

Sector characterization

The military space is delimited by the Law 8/1975, of March 12, of zones and facilities of interest for National Defense, and by the Royal Decree 689/1978, of February 10, which approves the Regulation of zones and facilities of interest for National Defense, developed by Law 8/1975, of March 12, on areas and facilities of interest for National Defense. In order to safeguard the interests of the National Defense and the security and efficiency of its organizations and facilities, the rights set forth in this Law shall be subject to the limitations on assets located in those areas of the national territory that are configured therein. following classification:

- Of interest to the National Defense: extensions of land, sea or airspace that are thus declared in attention to constitute or may constitute a permanent basis to an effective support of the offensive or defensive actions necessary for such purpose.

- Security of military installations or declared civilian facilities of military interest: those located around them, which are subject to the limitations established by this Law, in order to ensure the effective performance of the means at their disposal, as well as the suitable isolation to guarantee its security and, in its case, the one of the next properties, when they entail danger for them.

- Restricted access to property by foreigners: property that due to the requirements of the National Defense or the free exercise of the sovereign powers of the State, it is convenient to prohibit, limit or condition the acquisition of property and other real rights by natural persons or legal entities of nationality or under foreign control.

These three classes are compatible with each other, so that due to their nature and situation, certain extensions of the national territory may be included simultaneously in zones of different class.

As an example, Figure 248 shows military areas for the islands of Gran Canaria and Tenerife (IHM, 2019).

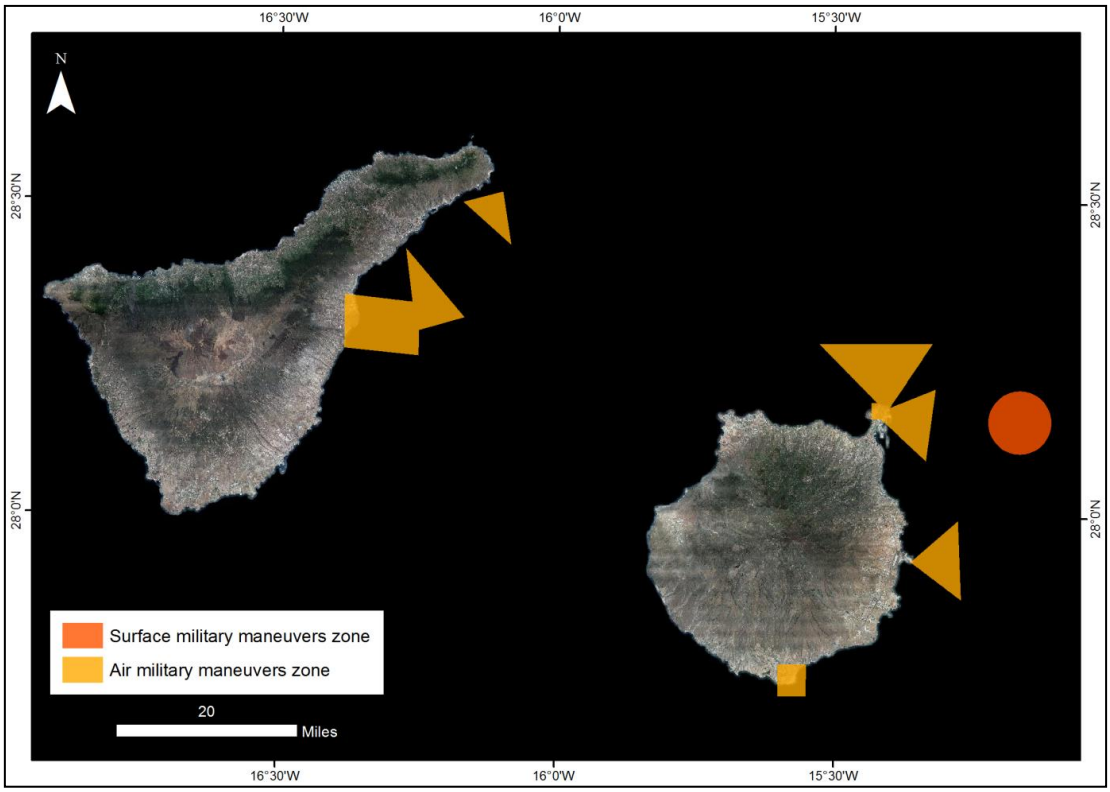


Figure 248. Military restricted areas for the islands of Gran Canaria and Tenerife (source: IHM, 2019).

In the Canary Islands there are some military fields like La Isleta in Gran Canaria and La Pájara in Fuerteventura that enclose faunal singularities of great interest (Tornero, 2007). In particular, more than 45 Km^2 in Fuerteventura are occupied by The Pájara firing camp, which is used for military manoeuvres since 1977, in an inventory of natural resources and highlights the existence of habitats protected by the European Union. Specifically, 586 hectares of cliffs with endemic vegetation of the Macaronesian coasts, mobile dunes and areas of valuable interest. Within the limits of the firing range is also the Special Area of Conservation (SAC) Cueva de Lobos, with more than 623 hectares of surface (https://www.ecologistasenaccion.org/35600/inventario-recursos-naturales-propiedad-del-ministerio-defensa/).

Legal framework and constraints

Constraints

The main constraints identified by participants of the 2nd MarSP stakeholder workshop in the Canary Islands for the defence sector (see table below) refers to legal restrictions for the area where military exercises can take place, the opacity of the military actions and the lack of data or execution of plans (MarSP, 2019).

Table 98. Constraints to the development of the defence sector (source: MarSP, 2019)

Defence	
Legal	✓ Ban on military exercises up to 50nm ✓ There is no governance plan but management plan, which is not applied later on
Administrative	✓ Lack of will from local, island and regional administrations to reach consensus and execute the plans
Technological	✓ Lack of data. Out-of-date data
Social	✓ Opacity of military actions in the maritime space, particularly regarding their environmental effects

PART II

Current spatial distribution

In Geoportal of the **Spatial Data Infrastructure of the Marine Hydrographic Institute** (IHM of its initials in Spanish) it is possible to view and download "Areas of Military Exercises" that affect the Spanish coast and are included in the OF Chart. It includes areas of aerial, amphibious, surface and underwater exercises. For the Canary Islands, the existing areas are for aerial and surface exercises:

- Surface exercises: An area for launching depth charges and an explosive dump.

- Aerial exercises: 13 areas of shooting exercises and aircraft training.

Table 99. Cartographic information available for Defence.

Name	Source	Organization	Date	Definition
Military restricted areas (oF Chart)	IDE IHM	IHM	2015	"Areas of Military Exercises" that affect the Spanish coast and are included in the OF Chart.
Link: http://ideihm.covam.es/servicios.html				

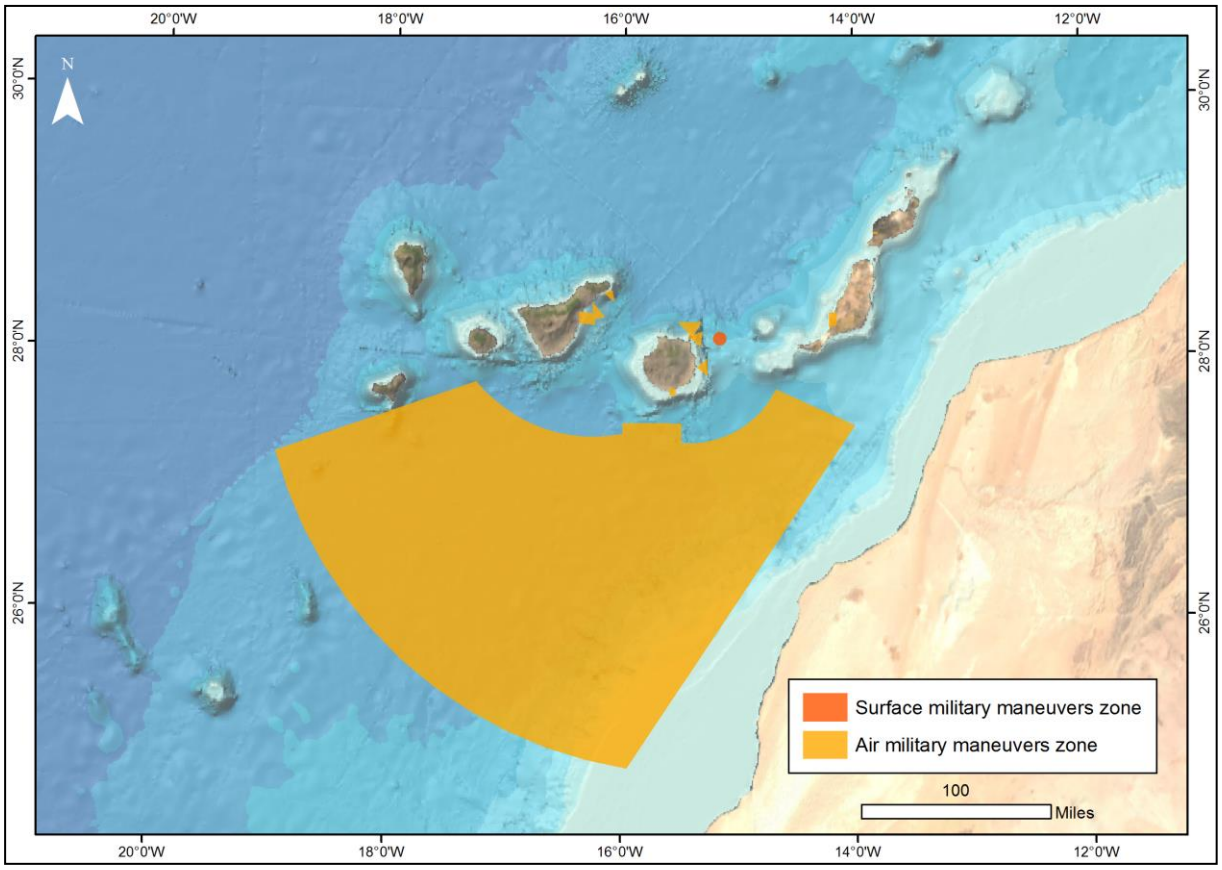


Figure 249. Military restricted areas in Canary Islands.

PART III

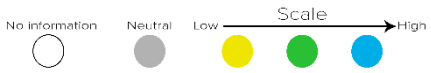
Analysis of interactions

Interaction with other sectors

Only low synergies were identified for this sector (see table below) with aquaculture, mineral resources and navigation. No synergies were identified for the other sectors (MarSP, 2019).

Table 100. Degree of synergy of the defence sector with other maritime sectors (source: MarSP, 2019)

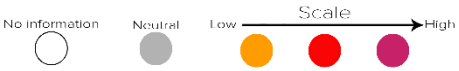
Defence			
Aquaculture		Infrastructures	
Fisheries		Tourism	
Mineral resources		Scientific research and marine biotechnology	
Energy		Underwater archaeology and cultural heritage	
Ports		Environmental conservation and Marine Protected Areas	
Navigation and maritime transportation			



Many conflicts were recognised though (see table below) with sectors such as aquaculture and environmental conservation (high conflict); fisheries, tourism and scientific research (medium conflict), etc. Mineral resources and ports have neutral synergy (MarSP, 2019).

Table 101. Degree of conflicts of the defence sector with other maritime sectors (source: MarSP, 2019)

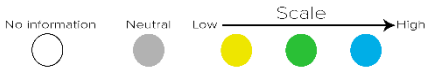
Defence			
Aquaculture		Infrastructures	
Fisheries		Tourism	
Mineral resources		Scientific research and marine biotechnology	
Energy		Underwater archaeology and cultural heritage	
Ports		Environmental conservation and Marine Protected Areas	
Navigation and maritime transportation			



Land-sea interactions

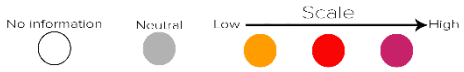
The most important synergies identified for defence are with MPAs (high); roads, airports, tourism areas and terrestrial protected areas. On the neutral side are bathing areas, agriculture and forestry (MarSP, 2019).

Table 102. Degree of synergy of the defence sector with land-use sectors (source: MarSP, 2019)

Defence		
		
A	Natural, cultural and landscape areas	
B	Bathing areas	
C	Built-up areas in risk zones	
D	Marine Protected Areas	
E	Terrestrial Protected Areas	
F	Built-up areas	
G	Agriculture, forestry and other uses	
H	Tourism potential areas	
I	Airports	
J	Roads	

Important conflicts were recognised with bathing areas (high), natural landscape areas, MPAs, terrestrial protected areas (MarSP, 2019).

Table 103. Degree of conflict of the defence sector with land-use sectors (source: MarSP, 2019)

Defence		
		
A	Natural, cultural and landscape areas	
B	Bathing areas	
C	Built-up areas in risk zones	
D	Marine Protected Areas	
E	Terrestrial Protected Areas	
F	Built-up areas	
G	Agriculture, forestry and other uses	
H	Tourism potential areas	
I	Airports	
J	Roads	

PORTS

PART I

Sector characterization

The port system in the Canary Islands constitutes an essential element of social and economic life, which has traditionally facilitated the mobility of citizens, to satisfy the needs of passenger transport and to provide to the fisheries, commercial and industrial sectors of essential facilities and infrastructure for the accomplishment of the tasks of economic exchange and freight traffic.

As said in the maritime transport and navigation sector, out of the 28 port authorities existing in Spain, there are two Port Authorities located in the Canary Islands, the Port Authority of Las Palmas and the Port Authority of Santa Cruz de Tenerife (Puertos del Estado, www.puertos.es).

The **Port Authority of Las Palmas** manages the following 5 ports (http://www.palmasport.es/):

- The Port of La Luz, also known as the Port of Las Palmas in Gran Canaria. The exceptional geographic location of this port, located in the northeast of the island of Gran Canaria (28°09'N-15°25'W), has made it the most important port precinct in the Mid-Atlantic. This strategic situation has consolidated this port as a first-class logistics hub, with more than thirty maritime lines connecting with more than 180 ports around the planet. The La Luz Port in Gran Canaria is the largest port in the Canary Islands and one of the most important goods distribution links in Spain. It currently has almost 16 Km of berthing line, distributed among all its docks, with depths ranging from 3 to 45 meters. Over time it has become a commercial port providing quality services in cruise ships, bunkering, fishing, containers, naval repairs, freight and passengers. It also has a free trade zone and border facilities for the control of goods. Over the course of 2018, 13,241 ship stopovers were registered, 900 more stopovers than in 2017 (7.29% more). Total freight traffic exceeded 23.3 million tons. As for containers, the La Luz Port recorded the movement in 2018 of 1,034,063 units. Another aspect in which this port has considerable scope for future development is the cruise sector. Around 674,000 cruise passengers passed through its docks, an increase of almost 5% compared to 2017.

- The port of Salinetas (Gran Canaria), located on the east coast of the island, about 10 miles south of Puerto de Las Palmas. It specializes in the reception of liquid bulk cargo (fuel and alcohol).

- The port of Arinaga, located on the Gran Canaria island's south-eastern coast, about 18 nautical miles south of Las Palmas Port. It was designed as a pier to meet the needs of the industries based in the Arinaga industrial estate and, with a view to the tourist resorts in the south of the island, to complement the offering of Las Palmas Port. The port is equipped for future bulk and roll-on/roll-off traffic, although in certain types of bulk cargo this is already a reality.

- The port of Arrecife (Lanzarote). Situated in Lanzarote's capital, Arrecife (28°58'0''N-13°31'8''W), this port started life essentially as a fishing harbour. Over time, and given the

extraordinary growth of the tourist industry on the island, it has become the Canaries' third goods port. Lanzarote is situated at a distance of 68 nautical miles from the African continent and is in a key geostrategic position, on the route between the European, African and American continents. Every year, more than 65000 TEUs pass through its terminal, which already boasts three gantry cranes.

- The port of Rosario (Fuerteventura) is located in the capital, Puerto del Rosario (28°58'N-13°33'W) and is the island's top port area. It has a berthing line of more than 1.3 Km, with depths ranging from three to twelve meters. During 2018 this port was a stopover for 891 ships, most of them merchant vessels, with total gross tonnage of 16406372 tones. Its main traffic is general goods.

The Port Authority of **Santa Cruz de Tenerife** currently manages the following 6 ports (https://www.puertosdetenerife.org/):

- The port of Santa Cruz de Tenerife in the island of Tenerife. It is the main port of the island, followed by the Port of Los Cristianos (in the south). The Port of Santa Cruz de Tenerife is the most important of the Canary Islands in terms of passengers, as 23% of the transport of passengers by sea of the Canary Islands is realized through this port. Apart from receiving marine connections inter island, the port of Santa Cruz de Tenerife is point of call of numerous marine lines that connect it with the main ports of Europe, Africa and America. Not in vain, it is connected with 278 international ports. Located in the Bay of Santa Cruz is divided into four docks: Los Llanos, Anaga, fishing dock and East Dock.

- The port of Granadilla is an industrial post located in the municipality of Granadilla de Abona in the southeast of the island of Tenerife. It is a complementary work of the port of Santa Cruz de Tenerife and aimed at providing necessary facilities for different types of traffic. It is the biggest industrial port of the Canary Islands.

- The port area of Los Cristianos (Tenerife) is the first port of Spain in terms of passenger traffic due to the links offered by the ports of San Sebastián de La Gomera, La Estaca on the island of El Hierro and Santa Cruz.

- El Puerto de Santa Cruz de La Palma is located in the island of La Palma (28° 40.67' N -17° 46.07' W), with 1,043 meters berthing consists of a multipurpose dock with container terminal, with four self-propelled cranes, a dock for freight traffic in general and traffic of fruits for export.

- The port of San Sebastián de La Gomera in the island of La Gomera is presented as a dock protected by a breakwater 400 meters long with two distinct sections.

- The port of La Estaca is the main port on the island of El Hierro and it is located in Valverde. It is the gateway to the island by sea, being the only port where passenger ships dock. It has 250 meters berthing and ready for passenger traffic and ro-ro cargo. It has a mobile ramp, storage shed, boathouse and a maritime station.

In accordance with article 5 of Council Regulation (EC) No 1005/2008 of 29 September 2008 establishing a Community system to prevent, deter and eliminate illegal, unreported and unregulated fishing, amending Regulations (EEC) No 2847/93, (EC) No 1936/2001 and (EC) No 601/2004 and repealing Regulations (EC) No 1093/94 and (EC) No 1447/1999, the access to port

services and the conduct of landing or transshipment operations third country fishing vessels shall be authorized only in designated port (https://www.mscbs.gob.es/profesionales/saludPublica/sanidadExterior/controlesSanitarios/instaAlmacen/puertos.htm). Santa Cruz de Tenerife and Las Palmas de Gran Canaria are two of the 22 Spanish ports where landings and transhipment operations of fishery products by third-country fishing vessels shall be authorized and allowed.

On the other hand, **Puertos Canarios** (Canary regional ports (https://puertoscanarios.es/) is a public company attached to the Ministry of Public Works of the Government of Canarias, which manages about 50 ports of general interest, port facilities, shelters, seawalls as well as sport ports exploited under administrative concession distributed among all the islands. The planning, operation and management of the port system is competence of the Canary ports. According to their data there are a total of:

- 16 Ports of general interest- Ports of general interest are those that have any of the following circumstances: ports that have international maritime commercial activities and whose area of commercial influence affects more than one Autonomous Community; with an annual volume and maritime commercial activities sufficiently relevant to the essential needs of the general economic activity of the State; with industries or establishments of strategic importance for the national economy and that due to its special technical or geographical conditions constitute essential elements for the safety of maritime traffic, especially in island territories. According to this, the Canary Islands have 16 ports of general interest distributed along its islands: Puerto de Órzola, Puerto del Carmen and Puerto de Playa Blanca in Lanzarote, Puerto de Corralejo, Puerto de Gran Tarajal y Puerto de Morro Jable in Fuerteventura, Puerto de Las Nieves and Puerto de Arguineguín in Gran Canaria, Puerto de la Cruz, Puerto de Garachico and Puerto de Playa San Juan in Tenerife, Puerto de las Vueltas and Puerto de Playa Santiago in La Gomera, Puerto e Tazacorte in La Palma and Puerto de La Restinga in El Hierro (Figure 250).

Figure 250. Ports of general interest in the Canary Islands (https://puertoscanarios.es/puertos/)

- 12 Port facilities- As shown in Figure 251 there are 12 port facilities distributed along the islands. Six of them are located in Tenerife (Puerto de la Cruz, Radazul, Candelaria, Puertito de Güímar, Amarilla Golf, Las Galletas and Los Acantilados de los Gigantes) and four in Gran Canaria (Sardina del Norte, San Cristobal, Castillo del Romeral and La Aldea de San Nicolás). Fuerteventura and La Palma have one port facility (named El Cotillo and Puerto Espíndola respectively).

Figure 251. Port facilities in the Canary Islands (https://puertoscanarios.es/puertos/)

- 14 Licensed marinas- Canary Islands has 14 marinas situated in port areas under administrative concession and distributed along the islands. Seven of them are located in the island of Tenerife (Puerto de la Cruz, Radazul, Candelaria, Puertito de Güímar, Amarilla Golf, Las Galletas Colón and Los acantilados de los Gigantes) and four in Gran Canaria (Taliarte, pasito Blanco, Puerto Rico and Mogán). The Island of Lanzarote has two marinas (Marina Rubicón y Puerto Calero) while Fuerteventura only has one marina (Puerto Castillo) (Figure 252). Marinas in the Canaries ports have an occupation of almost 100% between September and December, when the ocean races are held, also acting as a base port for between 30 and 50% of the boats moored.

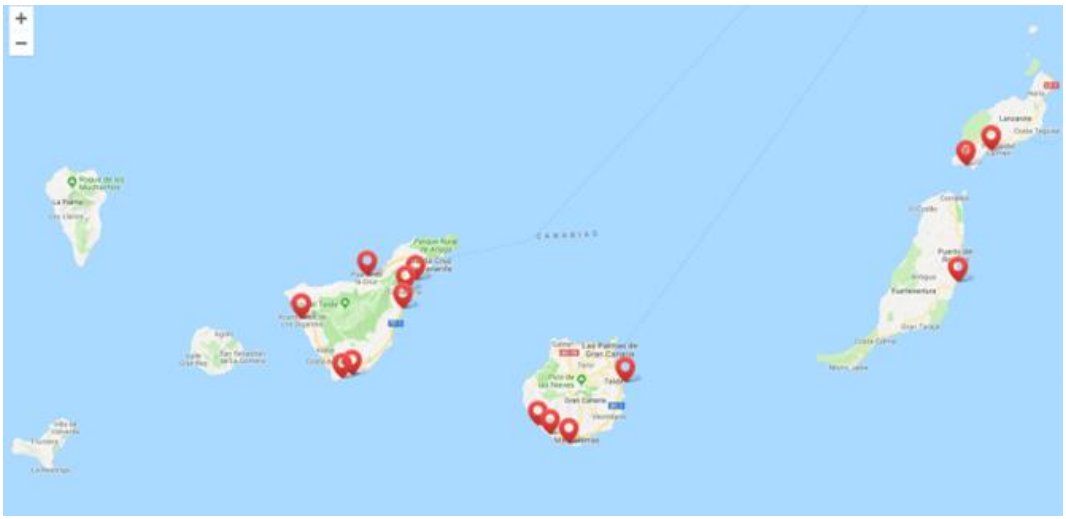


Figure 252. Marinas in the Canary Islands (https://puertoscanarios.es/puertos/)

Finally, Table 104 shows the number of passengers and vehicles using the Canary ports during 2018 and in the first three months of 2019.

Table 104. Shows data from Puertos Canarios related to the number of passengers and transport vehicles (any type) during the period January to April 2019 in comparison to those of 2018 (https://puertoscanarios.es/estadisticas/).

			Jan-April 2019	TOTAL 2018
	Embarked	Disembarked		
Passengers (regular line)	719227	716517	1435744	5011946
Passengers (cruises)			1471	1959
Passengers (others)			58146	455689
Motorcycles	3222	3266		21850
Cars	158475	157472	6488	1072465
Bus	858	854	315947	5752
Industrial vehicles (trucks, containers…)	27583	26871	54454	185935

Legal framework and constraints

Constraints

Constraints for the development of the port sector (see table below) are due to environmental aspects such as impacts on the environment or restrictions imposed by protected areas; and economic and social factors such as the lack of human resources or awareness on the strategic importance of this sector (MarSP, 2019).

Table 105. Constraints to the development of the port sector (source: MarSP, 2019)

	Ports
Legal	✓ Development of legislation without the support of port authorities. Need of multidisciplinary and sectorial teams. New legislation without increasing human makes difficult its implementation and monitoring ✓ There is no governance plan but management plan, which is not applied later on
Administrative	✓ Lack of will from local, island and regional administrations to reach consensus and execute the plans ✓ Administrative and public domain concessions restrict the development of fisheries
Economic	✓ Lack of human resources (freeze in the public employment)
Social	✓ Society is not always aware about the strategic, economic and social importance of the ports of general interest in Canarias ✓ Lack of berths for the development of economic activities. Lack of land and environmental impact for port development and expansion
Environmental	✓ Need of maritime transport minimising the risk of invasive species introduction in the ports ✓ The overlapping of protected areas with port areas hinders port management. The declaration of protected areas was not consulted with port authorities. But seeking compatibilities with sustainable development is possible.

	✓ Lack of berths for the development of economic activities. Lack of land and environmental impact for port development and expansion

PART II

Current spatial distribution

In the tool named as ***Herramienta de Pilotaje del Litoral Canario*** **(HPL)**, developed by the Coastal Management Service of the Vice-Ministry for Territorial Policy of the Canary Islands Government, the following information regarding the ports sector is presented.

- **Port Public Domain**: Lighthouses, Ports of insular interest, Ports of general interest of the Canary Islands and Ports of the State.
- **Nautical stations**: identification of the ports of the nautical stations based on the information published by the Spanish Association of Nautical Stations.

In addition, the **IDE Gran Canaria** shows the delimitation of zones and uses of the ports of Las Palmas, Salinetas and Arinaga (Order FOM/371/2016, of March 9, which approves the substantial modification of the delimitation of spaces and port uses of the Port of Las Palmas, which includes Salinetas and Arinaga).

Table 106. Cartographic information available for ports.

Name	Source	Organization	Date	Definition
Port Public Domain	HPL	Government of the Canary Islands		Lighthouses Ports of insular interest Ports of general interest of Canary Islands Ports of the State Delimitations port public domain (plans)
Nautical stations	HPL	Government of the Canary Islands		Identification of the ports of the nautical stations of Canary Islands.
Link HPL: http://www.pilotajelitoralcanario.es/				
Delimitation of zones and uses of the ports of Las Palmas	IDE Gran Canaria	Cabildo de Gran Canaria	2017	Delimitation of zones and uses of the ports of Las Palmas, Salinetas and Arinaga.
Link: https://www.idegrancanaria.es/catalogo/delimitacion-espacios-usos-portuarios-puertos-las-palmas **WMS:** http://ide2.idegrancanaria.es/wms/DEUP?				

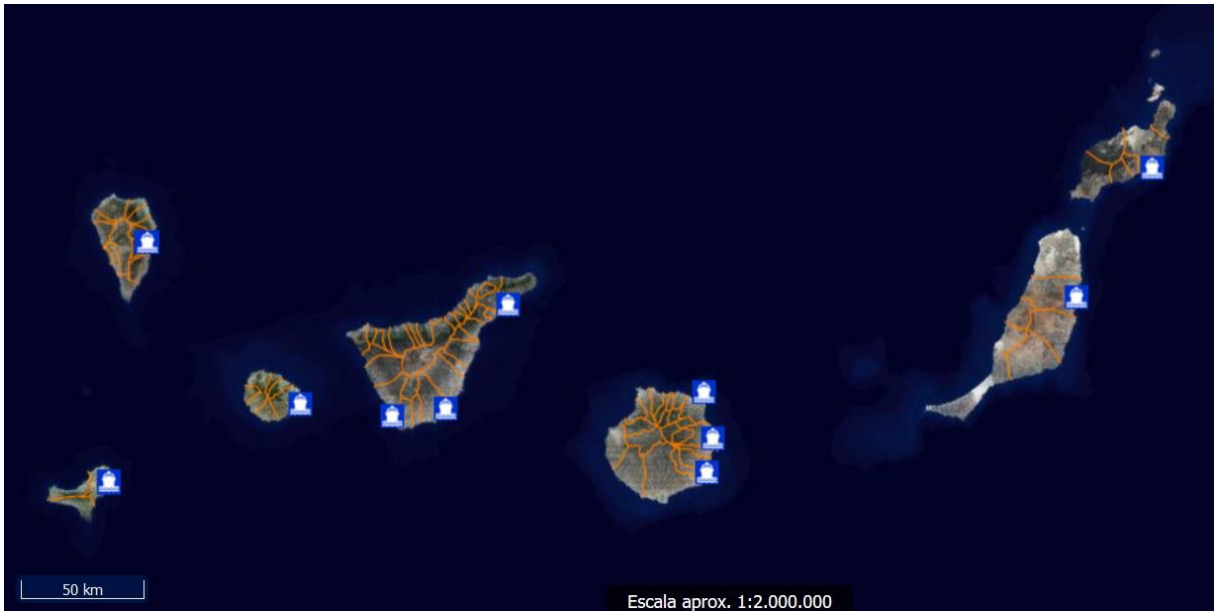


Figure 253. Ports of the State (source: viewer HPL, 2019).

Figure 254. Ports of general interest of Canary Islands (source: viewer HPL, 2019).

Figure 255. Ports of insular interest (source: viewer HPL, 2019).

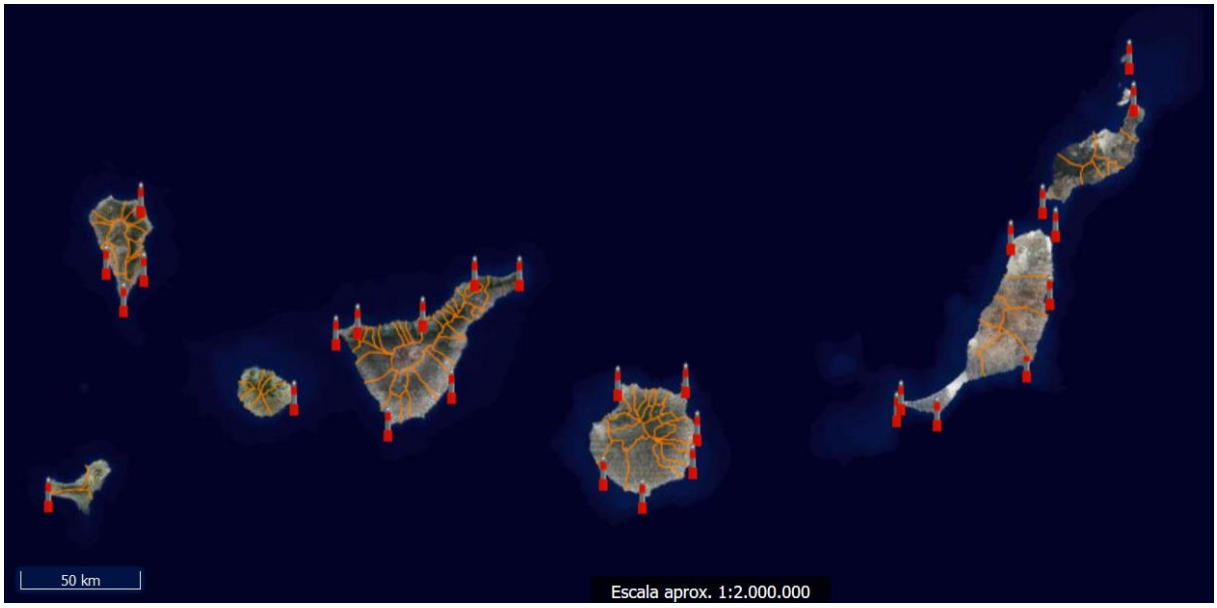


Figure 256. Lighthouses (source: viewer HPL, 2019).

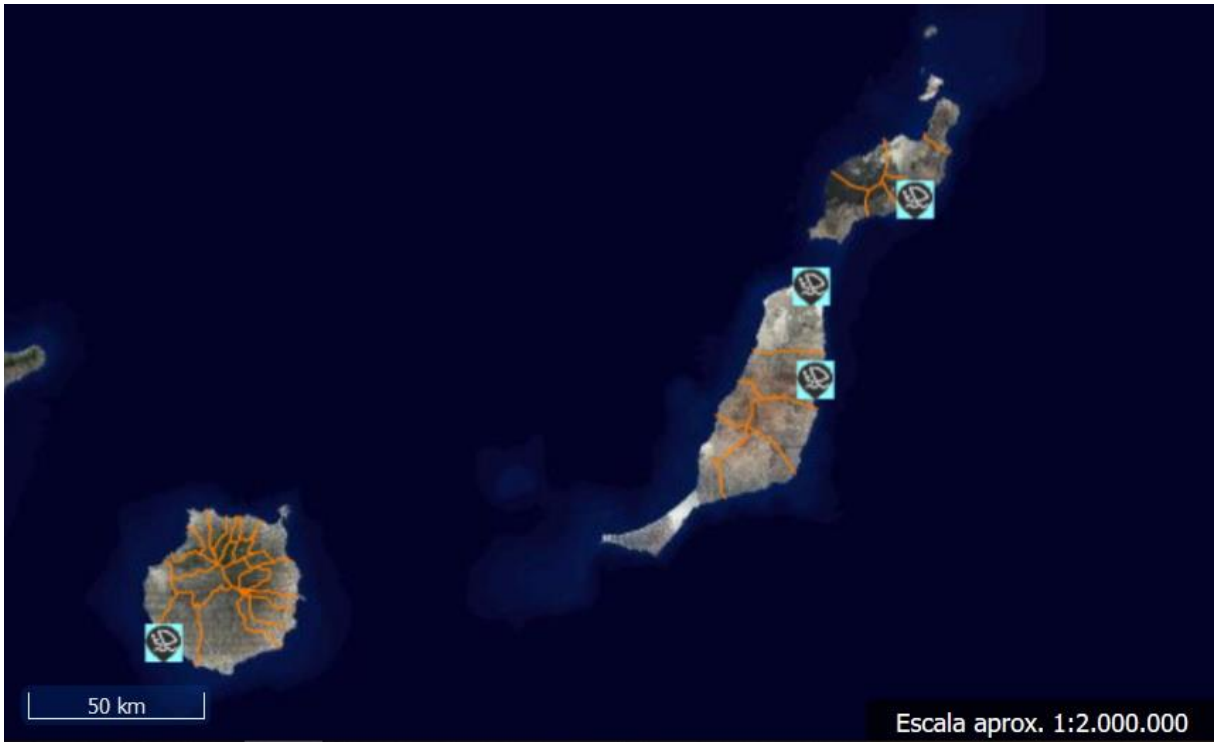


Figure 257. Nautical stations (source: viewer HPL, 2019).

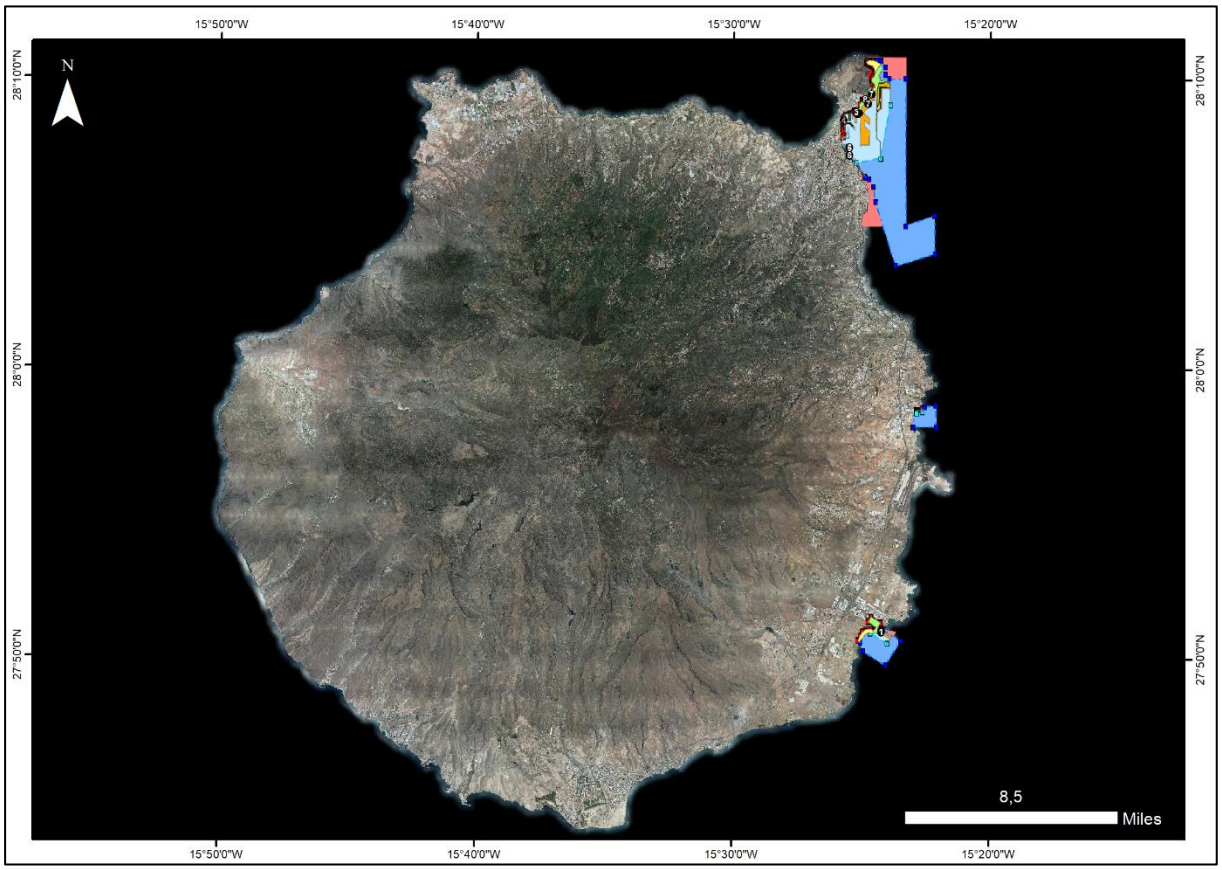


Figure 258. Delimitation of zones and uses of the ports of Las Palmas (source: IDE Gran Canaria, 2019).

PART III

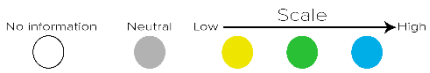
Analysis of interactions

Interaction with other sectors

The synergies identified for this sector are many (see table below) but particularly important for aquaculture, fisheries, infrastructures, tourism and navigation (high synergy); energy and mineral resources (medium synergy). These synergetic interactions are explained by the support that port facilities and infrastructures provide to the rest of the maritime activities. Low synergies were found with environmental conservation and underwater archaeology. Dredging activities and archaeological surveys are often conducted by ports allowing the discovery and monitoring of wrecks and other cultural heritage. Besides, environmental monitoring conducted in port areas contributes to environmental conservation (MarSP, 2019).

Table 107. Degree of synergy of the port sector with other maritime sectors (source: MarSP, 2019)

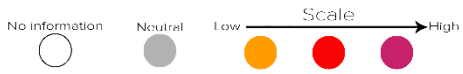
Ports			
Aquaculture		Infrastructures	
Fisheries		Tourism	
Mineral resources		Scientific research and marine biotechnology	
Energy		Underwater archaeology and cultural heritage	
Defence		Environmental conservation and Marine Protected Areas	
Navigation and maritime transportation			



Ports also create important conflicts with other maritime activities (see table below), especially with scientific research and environmental conservation (high conflict); and fisheries, mineral resources and underwater heritage (medium conflict). Port authorities delay fisheries licencing. Port works also modify coastal sediment dynamics and can destroy meadows, which areas important for fish juveniles (and fisheries then). Underwater archaeology and protected areas also impose some restrictions to the development of port activities (MarSP, 2019).

Table 108. Degree of conflicts of the port sector with other maritime sectors (source: MarSP, 2019)

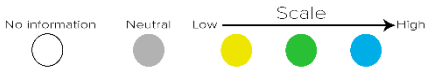
Ports			
Aquaculture		Infrastructures	
Fisheries		Tourism	
Mineral resources		Scientific research and marine biotechnology	
Energy		Underwater archaeology and cultural heritage	
Defence		Environmental conservation and Marine Protected Areas	
Navigation and maritime transportation			



Land-sea interactions

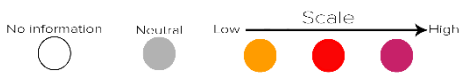
High synergies were recognised by participants (see table below) between the port sector and airports and roads as intermodality is crucial for the archipelago's economy. Natural, cultural and landscape areas, bathing areas, MPAs and terrestrial protected areas present low synergies since they beneficiate from the environmental monitoring and corrective measures undertaking by ports (MarSP, 2019).

Table 109. Degree of synergy of the port sector with land-use sectors (source: MarSP, 2019)

	Ports 	
A	Natural, cultural and landscape areas	
B	Bathing areas	
C	Built-up areas in risk zones	
D	Marine Protected Areas	
E	Terrestrial Protected Areas	
F	Built-up areas	
G	Agriculture, forestry and other uses	
H	Tourism potential areas	
I	Airports	
J	Roads	

Important conflicts (see table below) were identified in MPAs (high conflict), as well as in tourism areas, built-up areas, terrestrial protected areas, natural, cultural and landscape areas, and bathing areas (medium conflict). Tourism pressure may compromise the security of the ports. Built-up areas in risk zones (low conflict) draining to ravines and polluting marine waters put social pressure on the ports (MarSP, 2019).

Table 110. Degree of conflict of the port sector with land-use sectors (source: MarSP, 2019)

	Ports 	
A	Natural, cultural and landscape areas	
B	Bathing areas	
C	Built-up areas in risk zones	
D	Marine Protected Areas	
E	Terrestrial Protected Areas	
F	Built-up areas	
G	Agriculture, forestry and other uses	
H	Tourism potential areas	
I	Airports	
J	Roads	

NAVIGATION AND MARITIME TRANSPORTATION

PART I

Sector characterization

There are currently 28 port authorities managing the 46 Spanish seaports of general interest, under the coordination of the public body Ports of the State (Puertos del Estado, https://apps.fomento.gob.es/BoletinOnline/?nivel=2&orden=04000000). Each Port Authority manages a port or several Spanish ports. According to the data from the Government of Spain, the total maritime traffic of merchandise that moved by the 46 ports of the country in 2018 yields a result of 563,475,196 tons, which means an increment of a 3.3% with respect to the previous year (Table 111). Total goods traffic includes the total movements of cargo and unloading of bulk, general merchandise and fishing, carried out in State ports, including the provisioning of vessels.

Table 111. Maritime port traffic in Spain during the last five years. Data from Ente Público. Puertos del Estado (https://apps.fomento.gob.es/BoletinOnline/?nivel=2&orden=04000000)

PERIOD	PORT TRAFFIC (TONS)									
	TOTAL PUERTOS DEL ESTADO (Spain National Port Authority)	GOODS TRAFFIC						OTHER MARITIME TRAFFIC		
		BULK			GENERAL GOODS			TOTAL	LOCAL TRAFFIC AND PROVISIONING OF VESSELS	FISHING
		TOTAL	LIQUIDS	SOLIDS	TOTAL	CONTAINERS	CONVENTIONAL			
2018	563.446.093	283.271.999	180.913.023	102.358.977	267.471.653	191.299.918	76.171.737	12.702.441	12.481.051	221.395
2017	545.222.364	279.671.541	178.242.825	101.428.715	252.466.016	181.452.921	71.013.096	13.084.808	12.841.733	243.076
2016	509.504.636	259.576.765	167.583.316	91.993.447	236.031.220	168.294.214	67.737.010	13.896.648	13.663.715	232.932
2015	502.413.561	264.018.613	168.051.083	95.967.533	224.388.900	159.276.137	65.112.762	14.006.050	13.786.116	219.933
2014	482.083.944	250.274.183	160.713.208	89.560.973	217.827.886	155.488.676	62.339.209	13.981.873	13.744.678	237.200

The remote and fragmented island nature of the Canary Islands makes its ports an essential element, not only as a point of entry and exit for all types of goods, but as a fundamental part of the inter insular passenger traffic. Thus, maritime transport is a key factor in economic and social development in the Canary Islands that depends on maritime transport for its communications, both outside and among the islands. Large oceanic routes between Europe and Africa, as well as the routes to the ports of Central America and South America pass through the Canary Island's waters.

There are two Port Authorities in the Canary Islands, the Port Authority of Las Palmas and the Port Authority of Santa Cruz de Tenerife. Both have a network of infrastructures present in all the islands of the Archipelago. The Port Authority of Las Palmas manages 5 ports of the province of Las Palmas (Puerto de la Luz y de Las Palmas, Puerto de Arinaga and Puerto de Salinetas in Gran Canaria Island, Puerto de Arrecife in the island of Lanzarote and Puerto del Rosario in Fuerteventura. The headquarters are located in Las Palmas de Gran Canaria. Located in a privileged enclave on the route of 3 continents, Africa, America and Europe, the Port of Las Palmas is a very important hub, linking the European continent with Africa and America and is the first port in the Middle Atlantic. Also, the rich fisheries of the Canary-Saharan Bank led to a strong development and so, for five centuries it has become the traditional base of scale and supply of ships in their passage through the Middle Atlantic and one of the most important ports of Spain.

The Port Authority of Santa Cruz de Tenerife currently manages under its jurisdiction the ports of Santa Cruz de Tenerife (headquarters) and Los Cristianos in the island of Tenerife, Santa Cruz in La Palma Island, San Sebastián de La Gomera in La Gomera and La Estaca in the island of El Hierro. The port of Santa Cruz begins to be considered as the ideal Atlantic platform for the international transfer of containers with origin or destiny in Europe and America, given its proximity to the emerging markets of the West African coast as well as an important logistic platform where the ships make port of call for their refueling and victualling. Besides, it links the island with Gran Canaria and other Spanish ports in the peninsula as important as Cadiz or Barcelona.

Following the data from Puertos del Estado, the ports of the Canary Islands totaled 40,004,391 tons of goods in 2018, 692 tons less than in the previous year (Table 112 and Table 113).

Table 112. Maritime port traffic in the Port Authority of Las Palmas along the last five years. Data from Ente Público. Puertos del Estado (https://apps.fomento.gob.es/BoletinOnline/?nivel=2&orden=04000000)

PERIOD	PORT TRAFFIC (TONS)									
	TOTAL PORT AUTHORITY OF LAS PALMAS	GOODS TRAFFIC						OTHER MARITIME TRAFFIC		
		BULK			GENERAL GOODS			TOTAL	LOCAL TRAFFIC AND PROVISIONING OF VESSELS	FISHING
		TOTAL	LIQUIDS	SOLIDS	TOTAL	CONTAINERS	CONVENTIONAL			
2018	26.967.181	7.627.475	7.153.265	474.211	16.708.869	12.228.103	4.480.764	2.630.840	2.629.638	1.203
2017	27.021.629	7.409.111	6.849.515	559.600	16.933.001	12.806.963	4.126.038	2.679.515	2.678.808	708
2016	22.801.745	6.653.963	6.119.850	534.113	13.538.657	9.427.479	4.111.180	2.609.123	2.607.283	1.840
2015	23.579.755	6.869.879	6.385.971	483.910	14.111.481	10.332.427	3.779.055	2.598.396	2.596.612	1.784
2014	22.216.940	5.322.693	4.845.160	477.532	14.747.009	11.192.596	3.554.413	2.147.239	2.145.697	1.545

Table 113. Maritime port traffic in the Port Authority of Santa Cruz de Tenerife along the last five years. Data from Ente Público. Puertos del Estado (https://apps.fomento.gob.es/BoletinOnline/?nivel=2&orden=04000000)

PERIOD	PORT TRAFFIC (TONS)									
	TOTAL PORT AUTHORITY OF SANTA CRUZ DE TENERIFE	GOODS TRAFFIC						OTHER MARITIME TRAFFIC		
		BULK			GENERAL GOODS			TOTAL	LOCAL TRAFFIC AND PROVISIONING OF VESSELS	FISHING
		TOTAL	LIQUIDS	SOLIDS	TOTAL	CONTAINERS	CONVENTIONAL			
2018	13.037.210	4.948.053	4.501.127	446.929	7.408.998	3.625.038	3.783.959	680.159	674.682	5.477
2017	13.674.877	5.551.432	5.137.880	413.555	7.391.133	3.699.949	3.691.184	732.315	726.394	5.921
2016	13.613.973	6.572.860	6.157.862	414.999	6.385.031	2.870.636	3.514.396	656.084	648.423	7.661
2015	12.617.991	6.139.437	5.732.682	406.750	5.901.513	2.628.614	3.272.896	577.041	571.573	5.468
2014	12.411.315	6.173.537	5.735.979	437.558	5.507.140	2.483.855	3.023.285	730.635	724.109	6.526

The most important port of the archipelago is the port of Las Palmas, the capital of Gran Canaria, with total maritime traffic of almost 27 million tons of goods. When talking about total goods, that involve tons of goods loaded, unloaded and transshipped into ports, that is, sea traffics in liquid bulk (petroleum products, natural gas and liquids), solid bulk (cement, coal, cereals, minerals, etc.), general merchandise (goods whose presentation form is not in bulk, such as bottled liquids, packaged cement, etc.) (Figure 259 and Figure 260).

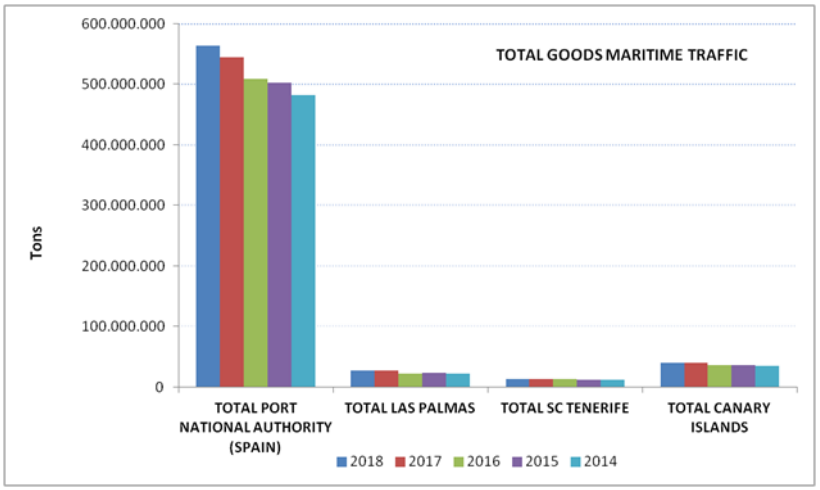


Figure 259. Tons of total goods (goods loaded, unloaded and transhipped into ports; that is, sea traffics in liquid bulk (petroleum products, natural gas and liquids), solid bulk (cement, coal, cereals, minerals, etc.), general merchandise (goods whose presentation form is not in bulk, such as bottled liquids, packaged cement, etc.) during the last 5 years for the Canary Islands in comparison to those of the National Authority Ports of Spain.

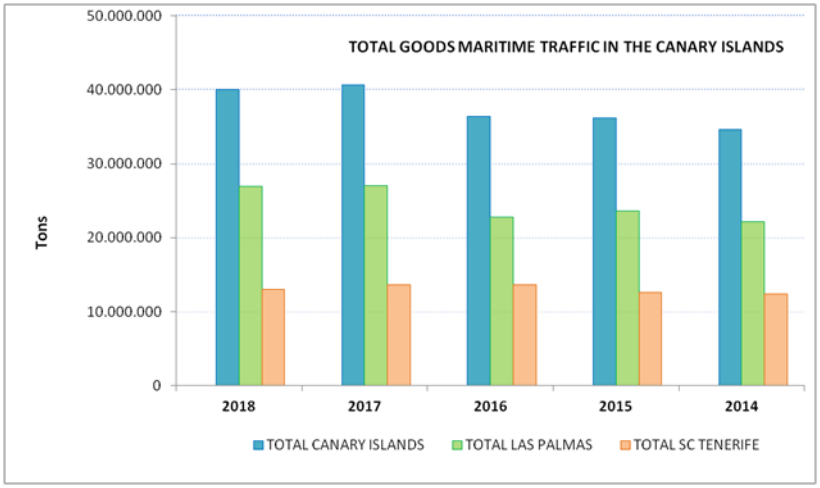


Figure 260. Tons of total goods (goods loaded, unloaded and transhipped into ports; that is, sea traffics in liquid bulk (petroleum products, natural gas and liquids), solid bulk (cement, coal, cereals, minerals, etc.), general merchandise (goods whose presentation form is not in bulk, such as bottled liquids, packaged cement, etc.) during the last 5 years for the Canary Islands and for the two port authorities located in the islands.

In 2018 the Canary ports moved nearly 9 million of passengers (8,786,477) in the ports of Santa Cruz de Tenerife and Las Palmas (Figure 261) which represents an historic maximum value in the context of the positive trend, always according to data compiled by Puertos del Estado (www.puertos.es, https://apps.fomento.gob.es/BoletinOnline/?nivel=2&orden=04000000).

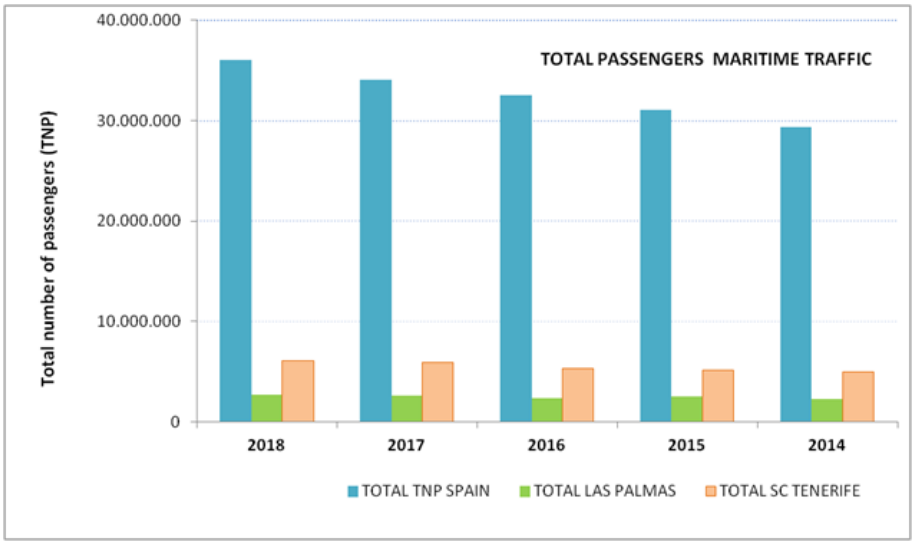


Figure 261. Total number of passengers using marine trafficking in Spain and in the two port authorities of the Islands. Passenger is in this case any person who travels on any type of merchant ship entering or leaving the ports, due to any type of navigation (external or cabotage).

Figure 262 shows the total number of passengers using marine transportation in the Islands according to the data from the ISTAC (Canarian Institute of Statistics) whose primary font uses data from Puertos Canarios (www.gobiernodecanarias.org/istac). Thus, nearly 5 million passengers were using marine transportation and regular lines in 2018.

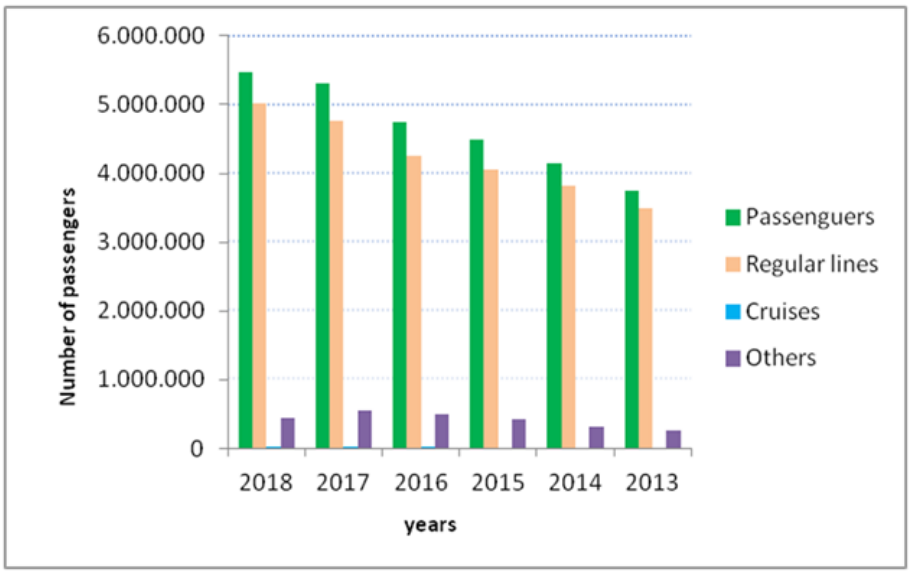


Figure 262. Total number of passengers using marine transportation in the Canary Islands. "Others" is in this case any person using marine transportation for sport fishing or touristic excursions.

Canary ports moved nearly 29 000 vessels (Figure 263) which in terms of gross registration tons (GRT: Volume or inland capacity of a vessel, measured in Morson tonnes or registered tones) makes a total of 447,750,864 Tons in 2018 (Figure 264), according to Puertos del Estado data (https://apps.fomento.gob.es/BoletinOnline/?nivel=2&orden=04000000).

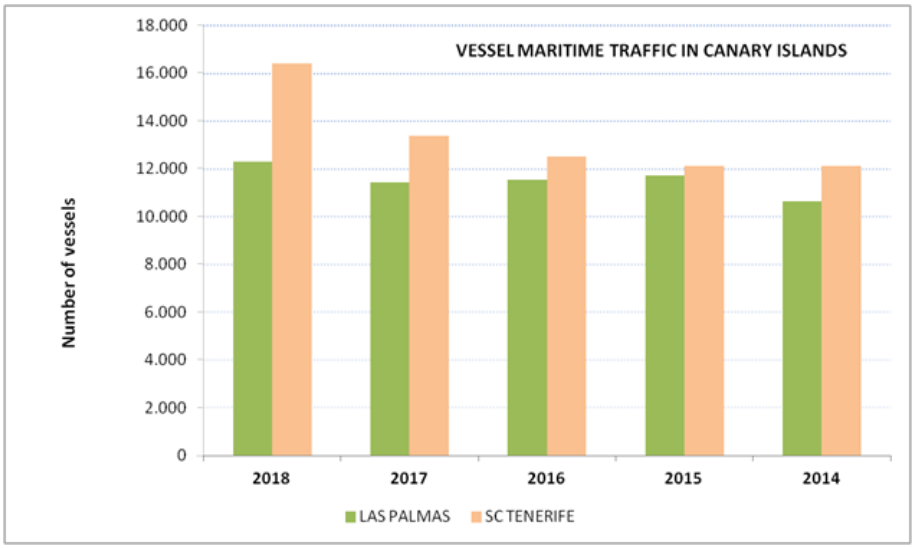


Figure 263. Number of vessels used in maritime traffic in Canary Islands represented by Port Authorities. The term vessel includes merchant ships entering each port, irrespective of type of navigation (cabotage or offshore) or nationality (Spanish or foreign) or type of vessel (tanks, bulk carriers, container carriers, general cargo, etc).

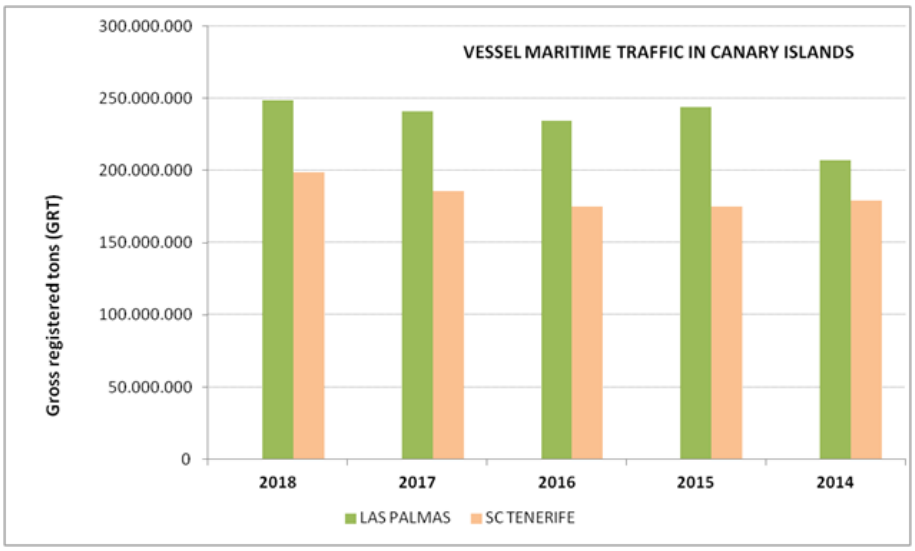


Figure 264. Number of GRT (gross registration tons, registered tones) transported by vessels in the Canary Islands represented by Port Authorities.

Legal framework and constraints

Legislation applicable to the Canary Islands context: summarize the applicable legislation and the developed matters

The environmental regulations related to maritime transport refer to the following topics:

- Port facilities receiving waste generated by ships or cargo residues: it provides for the compulsory disposal of used oils, oily mixtures and waste generated by ships and cargo residues in ports, and provides the necessary control mechanism for their application.

- Prohibition of organotin compounds in ships: these compounds were used mainly as anti-fouling agents, to prevent the growth of organisms in the hulls of ships, but cause serious damage to the environment; by means of this Regulation, the AFS-Convention adopted by the International Maritime Organization on October 5, 2001, is applied.

- Pollution from ships and the introduction of sanctions for infractions.

The regulation of maritime transport is scattered and covers very varied topics. The main rules are the following:

- Order 10.6.83. Complementary norms to the SOLAS 74/78 Convention. Application to recreational and fishing vessels.

- Royal Decree 1041/97. Rules of protection in the transport of live animals.

- Royal Decree 963/2013, of December 5, which establishes the minimum safety crews of fishing vessels and fishing auxiliaries and regulates the procedure for their assignment.

- Royal Decree 145/89. On admission, handling and storage of dangerous goods in ports.

- Royal Decree 210/2004, of February 6, which establishes a system of monitoring and information on maritime traffic.

- Royal Decree 1952/95. Approval of the Commission for the coordination of the transport of dangerous goods.

Eventual administrative derivative acts: explain the required procedure

The present study will be carried out following an order of the most general subjects to the individuals.

1.- **Monitoring and information on maritime traffic**. It incorporates Directive 2002/59/EC of the European Parliament and the Council, concerning the establishment of a Community system of monitoring and information on maritime traffic.

- Royal Decree 210/2004, of February 6, which establishes a system of monitoring and information on maritime traffic. This Royal Decree aims to establish a monitoring system and about information on maritime traffic in waters in which Spain has control, sovereign rights or jurisdiction, in order to increase maritime safety and the effectiveness of such traffic, improve the capacity of the maritime Administration to respond to any problem, accident or potentially dangerous situations at sea, including search and rescue operations and contribute to an earlier detection and better prevention of pollution that may be caused by ships.

The main obligation that it imposes is the previous notification upon entry into Spanish ports. Thus, the operator, agent or captain of a vessel bound for a Spanish port will notify the information collected in section 1 of Annex I to the port's managing entity, at least 24 hours before arrival at the port or when the vessel leaves the previous port, if the duration of the voyage is less

than 24 hours, or as soon as said information is available, if the port of call is not known or has changed during the crossing.

Additionally, Ships coming from a non-EU port and bound for a Spanish port carrying dangerous or polluting goods must comply with the notification obligations set out in Article 13.

2.- **Admission, handling and storage of dangerous goods in ports.** The regulation that regulates this issue is the Royal Decree 145/89. On admission, handling and storage of dangerous goods in ports. The purpose of this regulation is to complement the regulation that exists internationally on the safety of human life at sea. Specifically, it is about completing the regulation that the Ministerial Order of June 10, 1983 made of the International Convention for the Safety of Human Life in the Sea of 1974, amended by its Protocol of 1978 and its implementing regulations called SOLAS 74/78, Chapter VII of which regulates the transport of dangerous goods by sea, and which, as mentioned, was developed by Ministerial Order of June 10, 1983, with the inclusion of a rule relative to the above-mentioned chapter in which it is declared compliance with the International Maritime Dangerous Goods Code (IMDG Code) of the IMO (International Maritime Organization), for national or foreign vessels that load or unload dangerous goods in Spanish ports. There are also the ADR and TPC Codes, and the RID and TPF that regulate the international and national transport of dangerous goods by road and rail, respectively. It is, therefore, appropriate to regulate the conditions under which the admission, handling and storage of dangerous goods in ports must be carried out, in accordance with the above-mentioned IMO recommendations, covering this facet within the context global transport of dangerous goods safely.

The regulation regulates Prohibition, withdrawal of dangerous goods, embarkation and disembarkation, storage limitation, Inspection of suspicious packages, and Customs inspections. In addition, there is a series of goods whose entry into the port requires special authorization (Article 15). In addition, it is expected that in the ports there is an area of berths and anchorages specially enabled

3.-**Transpotrte of live animals.** The applicable norm is the Royal Decree 1041/97, on rules of protection in the transport of live animals. This norm incorporates the community regulations that aim to eliminate technical obstacles in the trade of live animals and allow the proper functioning of the corresponding market organizations, while ensuring a satisfactory level of protection of the animals transported. Specifically, it is Directive 95/29/EC, of the Council, of June 29, which modifies Directive 91/628/EEC on the protection of animals during transport, to harmonize the periods of transport, the intervals of feeding and water supply to animals, resting times and space available for certain types of animals.

Two aspects deserve to be highlighted. On the one hand, Article 4, which provides that the competent authority shall adopt the appropriate measures so that animals, throughout the journey, are identified and registered in accordance with paragraph c) of section 1 of article 3 of Royal Decree 1316/1992 and are accompanied by documentation that allows the competent authority to determine: a) The origin and the owner. b) The place of departure and destination. c) The date and time of departure. On the other hand, article 5 regulates the responsibility in transport, establishing that the competent authorities will adopt the necessary measures so that: All carriers meet the following requirements:

- Be registered in the corresponding register so that the competent authority can quickly identify it in case of non-compliance with the requirements of this Royal Decree.

- Possess a valid authorization for all transport of vertebrate animals that is carried out throughout the territory of the European Union, granted by the competent authority of the Member State of establishment, or, in the case of companies established in third countries, by an authority competent of a Member State of the European Union, previous written commitment of the head of the transport company to meet the requirements of current veterinary legislation.

  This commitment will specify in particular that:

  - The carrier referred to in section 2, has adopted all the necessary measures to comply with the requirements of this Royal Decree up to the place of destination and, more particularly in case of export to a third country, to the place of destination such as it is defined in the relevant EU legislation.

  - Without prejudice to the provisions of paragraph b) of section 6 of section A of chapter I of the annex to this Royal Decree, the personnel referred to in paragraph a) of section 2 of this article, have specific training acquired either in the company, or in a training institution, or has equivalent professional experience to proceed with the handling and transport of vertebrate animals, as well as to provide adequate care for the animals transported if necessary.

- Not transporting or transporting animals in conditions that may cause injuries or unnecessary suffering.

Use, for the transport of the animals referred to in this Royal Decree, adequate means of transport to guarantee compliance with the community requirements regarding welfare during transport and, in particular, the requirements established in the annex of this provision and that can be determined according to the Community procedure provided.

Constraints

Most of the constraints identified for this sector (see table below) are environmental aspects such as collision with marine mammals, pollutants and invasive species. Social pressure because of these impacts and non-available technology for their mitigation are also constraining the activity. The no correct execution of the plans is seen as the main legal-administrative burden (MarSP, 2019).

Table 114. Constraints to the development of the navigation and maritime transportation sector (source: MarSP, 2019)

Navigation and maritime transportation	
Legal	✓ There is no governance plan but management plan, which is not applied later on
Administrative	✓ Lack of will from local, island and regional administrations to reach consensus and execute the plans
Technological	✓ Lack of data. Out-of-date data. ✓ Lack of technology for maritime transport to be more sustainable
Social	✓ Social pressure makes maritime navigation prioritising environmental conservation over speed. Lack of awareness
Environmental	✓ Discharge of pollutants ✓ Introduction of invasive species (ballast water) ✓ Death of cetaceans due to the increase of ferry routes ✓ Living components of the marine environment (good environmental status). Cetaceans ✓ Take more seriously and mitigate antifouling impacts ✓ Many ferries have collisions with cetaceans or navigate in protected areas

PART II

Current spatial distribution

From **IEO Particularly Sensitive Sea Areas (PSSA)** data are obtained. The restricted navigation Areas constitute a protection figure associated with the Particularly Sensitive Sea Areas (PSSA), which only allows artisanal fishing under the authorization of the maritime authorities, navigation between the islands and navigation between the ports of these islands. The international Maritime Organization, a UN agency, establishes the guideline to identify and designate PSSA in 2001. According to paragraph 1.2 of Annex 2 of resolution A.927 (22) of November 29, 2001 "A PSSA is an area that requires special protection through the action of IMO due to its significance for recognized ecological, socio-economic of scientific reasons and because it may be vulnerable to damage caused by the activities of international vessels". In 2003, the designation was approved as ZMES of the waters of the Canary Islands (Marine Environment Protection Committee, 51st session, Agenda item 8.24 October 2003 International Maritime Organization). These zones reflect the areas of Restricted Navigation in the waters of the Canary Islands. They are areas of ecological importance recognized by the European Union. They present a great concentration of marine and terrestrial species, both migratory and native.

From the portal of **National Geographic Institute (IGN, of its initials in Spanish)** the canarian ports and navigation routes are shown. In Geoportal of the **Spatial Data Infrastructure of the Marine Hydrographic Institute** (IHM) it is possible to view and download to existing maritime signaling data in the publications "Faros y Señales Marítimas, Partes I y II". This publication shows the characteristics of 399 signals from lighthouses, buoys, port facilities, anchorage areas, port works, aquaculture facilities and oceanographic activities in Canary Islands.

Furthermore, the **EMODnet** website shows the density of traffic in the Canary Islands EEZ referring to 2017.

Table 115. Cartographic information available for navigation and maritime transportation.

Name	Source	Organization	Date	Definition
Particularly Sensitive Sea Areas (PSSA)	IEO	IEO		Regulations for navigation.
WMS: http://barreto.md.ieo.es/arcgis/services/wms/wmsBase/MapServer/WMSServer?				
Transport networks	IGN	IGN	2018	Navigation ways: ports and routes.
Link: http://centrodedescargas.cnig.es/CentroDescargas/index.jsp				
Lighthouses and maritime signals	IDE IHM	IHM		Data on maritime signaling in the publications "Faros y Señales Marítimas, Partes I y II".
Link: http://ideihm.covam.es/servicios.html				
WMS: http://ideihm.covam.es/wms/lucesIHM?service=WMS&request=GetCapabilities				
Maritime traffic density	EMODnet Human Activities	EMODnet	2017	This facility provides free access to GIS data on European vessel density. The Vessel Density data is provided monthly by vessel type along with an average for the whole year.
Link: http://www.emodnet-humanactivities.eu/search-results.php?dataname=Vessel+Density+				

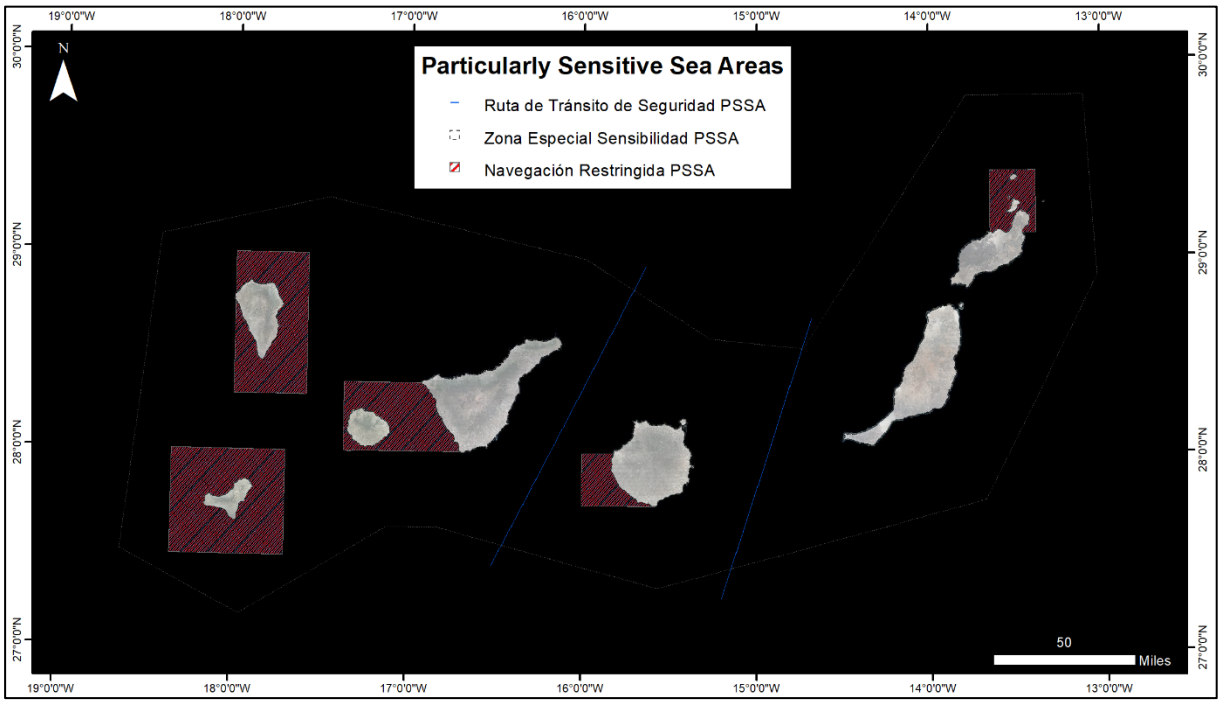


Figure 265. Particularly Sensitive Sea Areas (source: IEO, 2019).

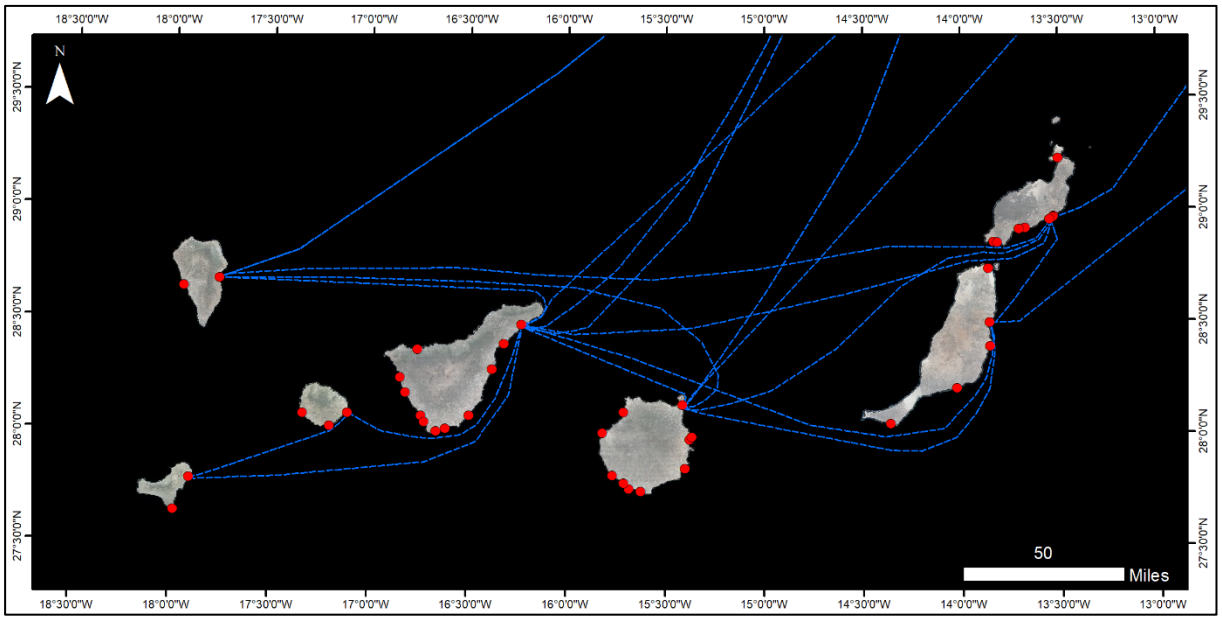


Figure 266. Navigation ways (source: Centro de Descargas del IGN, 2019).

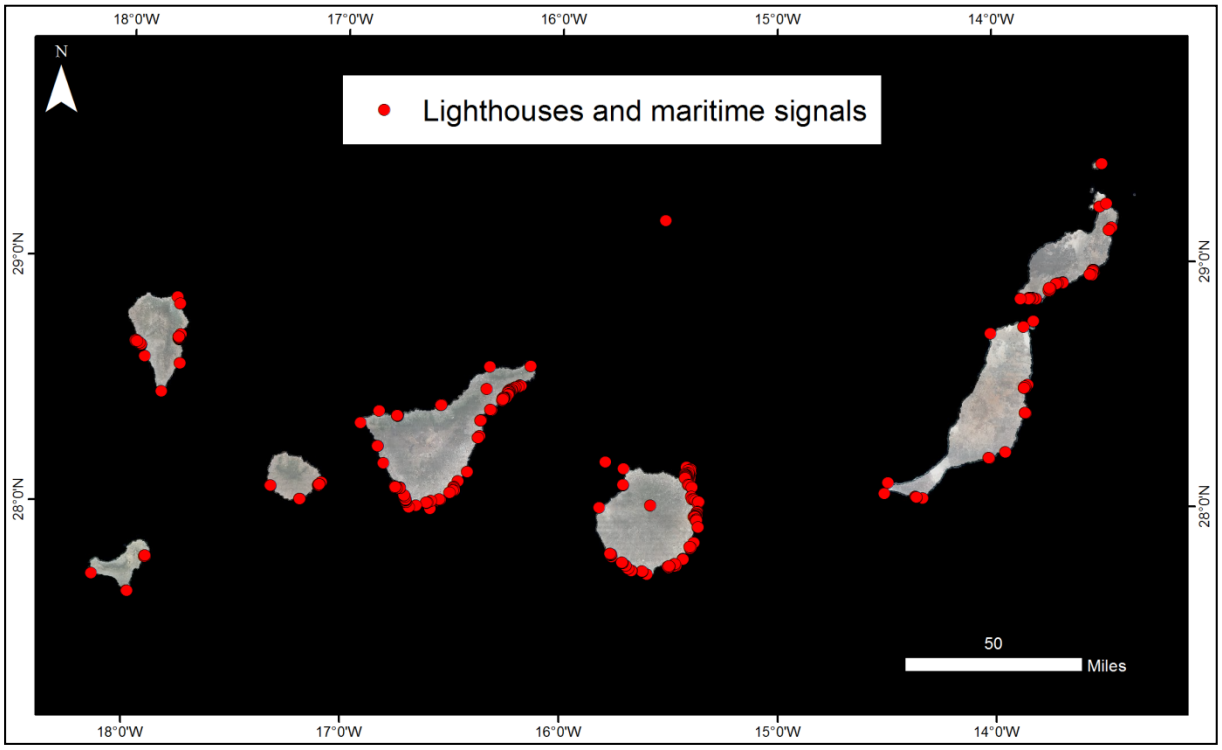


Figure 267. Lighthouses and maritime signals (source: IHM)

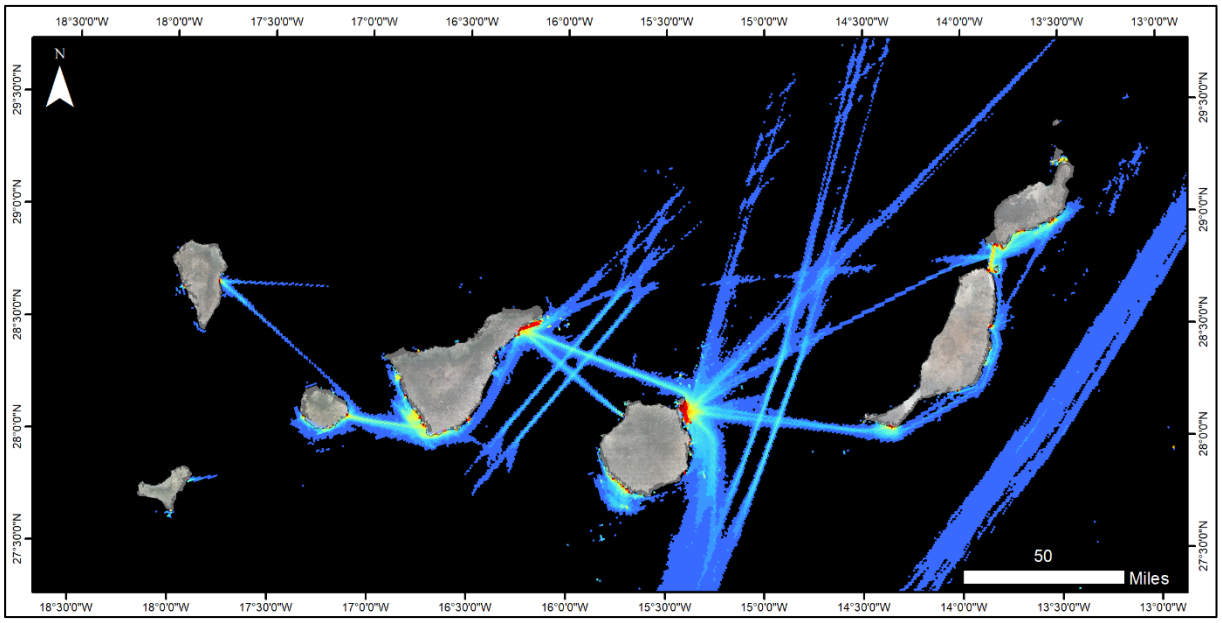


Figure 268. Maritime traffic density in 2017 (source: EMODnet Human Activities, 2019).

PART III

Analysis of interactions

Interaction with other sectors

Synergies with other sectors were mainly identified (see table below) in infrastructures, tourism, ports (high synergy); and scientific research (medium synergy). This last is motivated by the advancements in oceanography and navigation technologies and data that benefit maritime transportation (MarSP, 2019).

Table 116. Degree of synergy of the navigation and maritime transportation sector with other maritime sectors (source: MarSP, 2019)

Navigation and maritime transportation			
Aquaculture		Infrastructures	
Fisheries		Tourism	
Mineral resources		Scientific research and marine biotechnology	
Energy		Underwater archaeology and cultural heritage	
Defence		Environmental conservation and Marine Protected Areas	
Ports		Scale: No information, Neutral, Low, High	

Important conflicts were identified (see table below) with aquaculture, scientific research and environmental conservation (high conflict); fisheries, tourism and underwater archaeology

(medium conflict). Collisions with cetaceans severely affect environmental conservation and the introduction of invasive species damage fisheries (MarSP, 2019).

Table 117. Degree of conflicts of the navigation and maritime transportation sector with other maritime sectors (source: MarSP, 2019)

Navigation and maritime transportation			
Aquaculture		Infrastructures	
Fisheries		Tourism	
Mineral resources		Scientific research and marine biotechnology	
Energy		Underwater archaeology and cultural heritage	
Defence		Environmental conservation and Marine Protected Areas	
Ports		Scale: No information, Neutral, Low, High	

Land-sea interactions

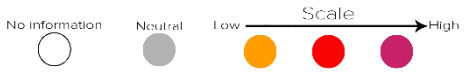
Only medium synergies were identified with land uses (see table below) such as built-up areas, agriculture, tourism areas, roads and airports. No other synergies were valued by participants of the 2nd MarSP stakeholder workshop in the Canary Islands (MarSP, 2019).

Table 118. Degree of synergy of the navigation and maritime transportation sectors with land-use sectors (source: MarSP, 2019)

Navigation and maritime transportation		
Scale: No information, Neutral, Low, High		
A	Natural, cultural and landscape areas	
B	Bathing areas	
C	Built-up areas in risk zones	
D	Marine Protected Areas	
E	Terrestrial Protected Areas	
F	Built-up areas	
G	Agriculture, forestry and other uses	
H	Tourism potential areas	
I	Airports	
J	Roads	

Medium conflicts were recognised (see table below) with natural and cultural areas, built-up areas in risk zones, MPAs, terrestrial protected areas and tourism areas. The danger for living species in protected areas where navigation goes was mentioned by stakeholders. Bathing areas were identified as high conflict (MarSP, 2019).

Table 119. Degree of conflict of the navigation and maritime transportation sector with land-use sectors (source: MarSP, 2019)

Navigation and maritime transportation		
		
A	Natural, cultural and landscape areas	
B	Bathing areas	
C	Built-up areas in risk zones	
D	Marine Protected Areas	
E	Terrestrial Protected Areas	
F	Built-up areas	
G	Agriculture, forestry and other uses	
H	Tourism potential areas	
I	Airports	
J	Roads	

INFRASTRUCTURES

PART I

Sector characterization

Submarine cables- Submarine cables play a critical role in global interconnected networks, carrying about 99% of international communications traffic (Wayne *et al.* 2015). Sharp growth in demand for data, fueled by bandwidth-intensive applications such as video and a proliferation of cloud-based services has driven a considerable uptick in global submarine cable deployments. The last five years have seen an average 26% increase in available capacity per year on major routes (Submarine Telecoms Forum Report at 13). There were approximately 378 submarine cables in service as of early 2019, traversing roughly 1.2 million kilometers, connecting virtually all countries with a coastline (Figure 269) (Brakes 2019 and https://www2.telegeography.com/submarine-cable-faqs-frequently-asked-questions). The cables run along the ocean floor joining nations that have large volumes of traffic to exchange. Near to shore, the cables are shielded and buried to protect against potential run-ins with anchors, wildlife, fishing trawlers, etcetera. However, in deeper parts of the ocean, where damage is less likely, cables run along the surface of the ocean floor and are as thin as a garden hose. Even with shielding and burying, each year sees more than 100 cable faults on average, usually due to fishing trawlers or anchors, but occasionally from natural disasters such as earthquakes.

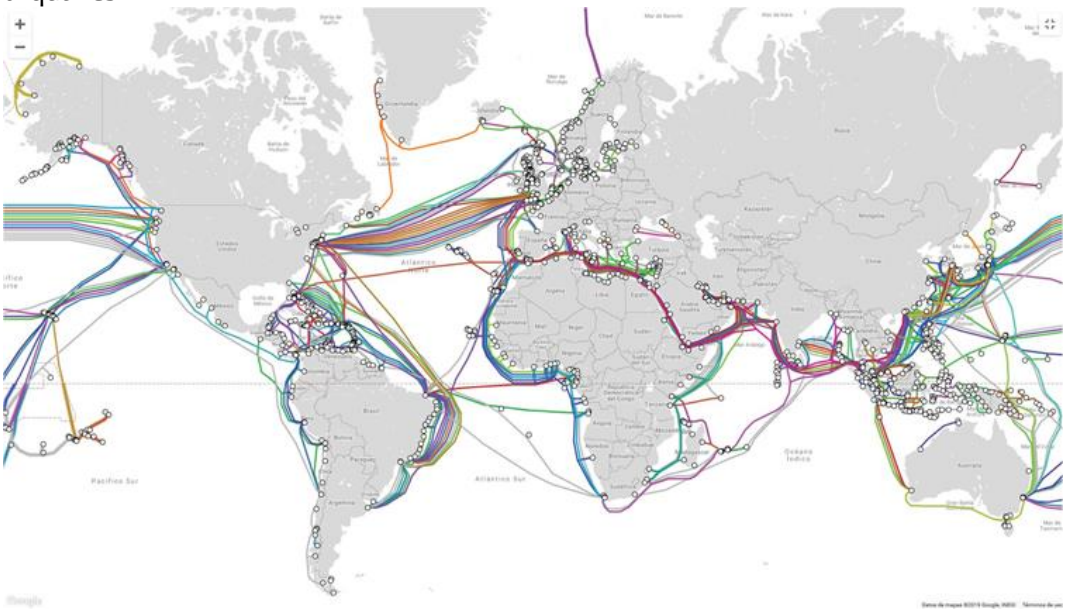


Figure 269. Submarine cable map of the World

Spain has almost ten points for which the Internet enters our country. The cables Pencan-6 and 9, Canalink, Alpal-2, Penbal-5, Barsav, Tata TGN, Balalink, or Flag Europe-Asia, are just some of these infrastructures that cross the country, stopping at points like Rota, Chipiona, Cádiz, Estepona, Valencia, Palma, Ses Covetes, Barcelona, Gava or Bilbao. The Canary Islands is one of the most important nerve centers and a key intersection for submarine cables that extend from Europe to Africa (Figure 270).

The submarine cables in the Canary Islands that connect the islands with the Iberian Peninsula are shown in Figure 270 and are:

- **Pencan-6**- This fiber optic submarine telecommunications cable system became ready for service around 2000. The system has a length of 1,854 Kilometers and is owned and/or operated by Telxius. It links Conil (Cadiz) to El Médano (Tenerife).

- **Pencan-7**- It connects Gran Canaria to Candelaria (Tenerife) and Chipiona (Cádiz).

- **Pencan-8**- Owned by Telefonica, it has a length of 1,400 km and connects Candelaria (Tenerife) and Las Palmas (Gran Canaria) to Conil (Cádiz).

- **Pencan-9**- Links Chipiona (Cadiz) to Tarahales (Gran Canaria) and has a lenght of 1398 km.

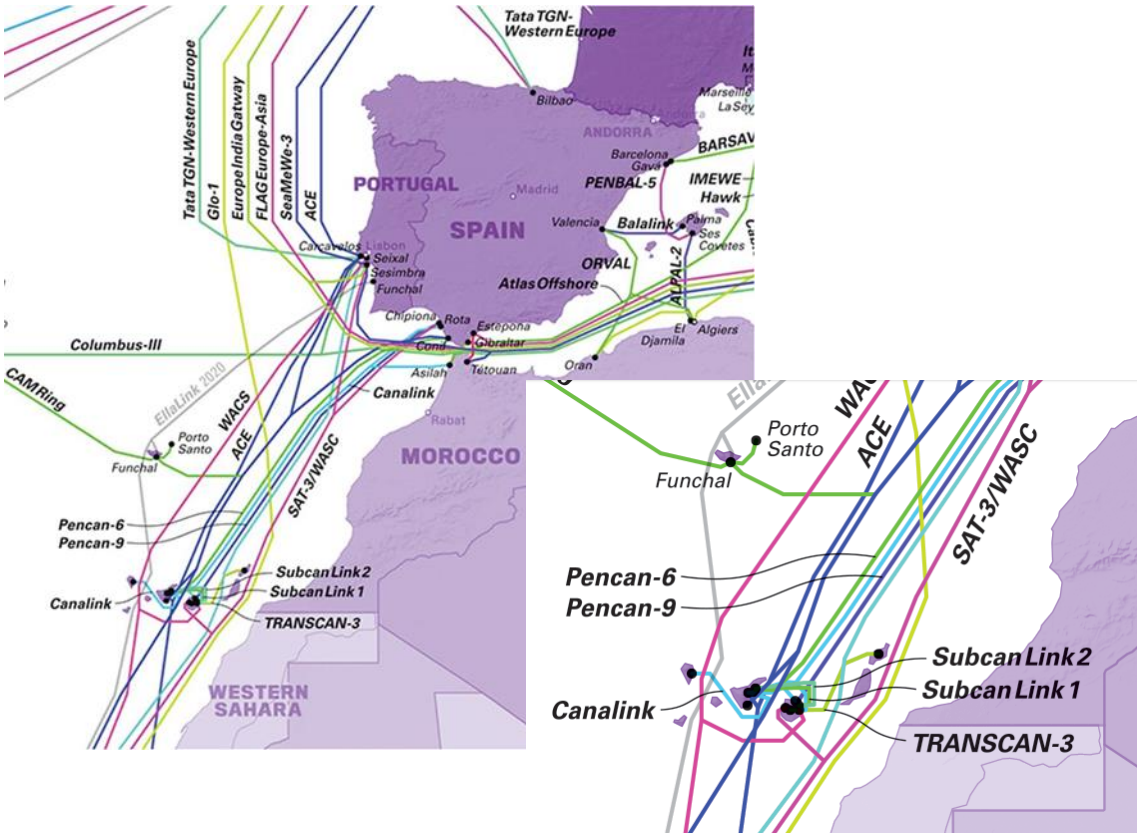


Figure 270. Cable map showing cables that pass throughout Spain. Data from April 2019 (https://submarine-cable-map-2019.telegeography.com/).

The Canary Islands are also connected to the world with the following cable systems as shown in Figure 270, Figure 271 and Figure 272:

- **West African Cable System (WACS)**- It is a cable that goes from United Kingdom to South Africa and has a connection to Gran Canaria. The WACS uses 100Gbit/s technology and links 14 countries across two continents. It uses leading transmission technology and provides seamless high-speed connection with low-latency over its 14,500 km route. (https://wacscable.com/).

- **Africa Coast to Europe (ACE)-** The **ACE** submarine communications cable is a cable system along the west coast of Africa between France and South Africa managed by a consortium of 19 operators and administrations headed by Orange. It is connected to the island of Tenerife The system has a length of 17,000 km (https://www.submarinecablemap.com/#/submarine-cable/africa-coast-to-europe-ace).

- **SAT-3/WASC**- This cable system has a total lengh of 14350 Kilometers and it links Portugal and Spain (the peninsula) to South Africa with landing points in Côte d'Ivoire, Ghana, Spain, Angola, Benin, Senegal, Cameroon, Nigeria, Gabon, South Africa and Portugal (https://www.submarinecablemap.com/#/submarine-cable/sat-3wasc).

- **Atlantis-2**- Cable Length of 8,500 km, linking Spain and Portugal to Las Toninas (Argentina). Has connections to El Medano in Tenerife (https://www.submarinecablemap.com/#/submarine-cable/atlantis-2).

- **Canalink**- Canalink is the first neutral and independent Spanish operator that connects the Canary Islands with the Peninsula through submarine broadband communications, with a length of 1,835 km. The objective of Canalink is to improve the quality and competitiveness of the sector the new alternatives to operators with the expansion plans in the Canary Islands (http://canalink.iter.es/). In its route, the submarine cable also bifurcates to Morocco, being able to connect the Iberian Peninsula and the Canary Islands with a continent as important as Africa.

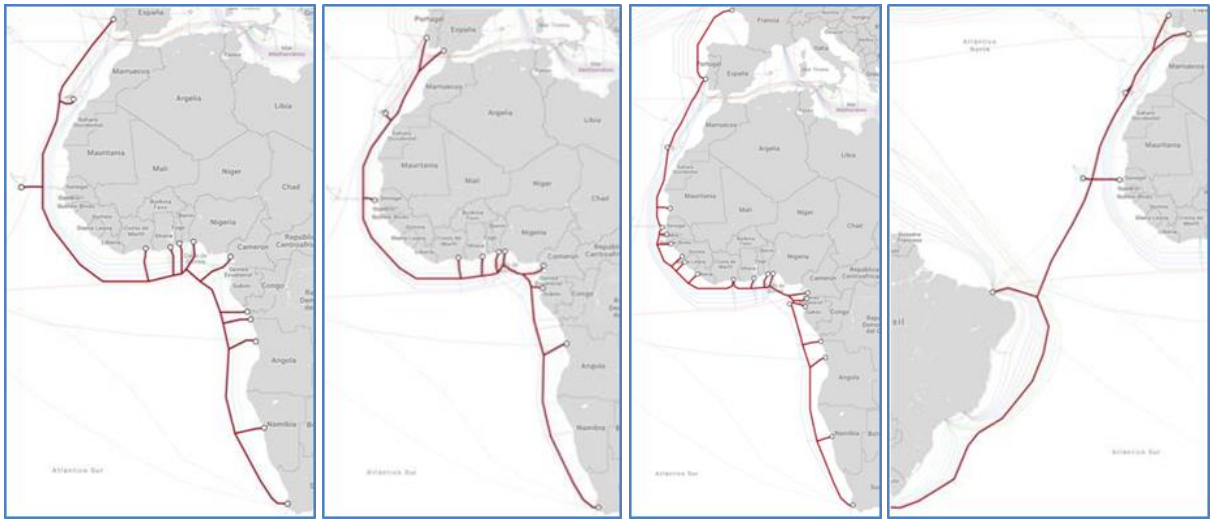


Figure 271. Cable systems crossing and linking the Canary Islands to the rest of the world. From left to right: WASC, SAT-3/WASC, ACE and Atlantis-2. Data from April 2019 (https://www.submarinecablemap.com/#/)

Figure 272. Canalink cable system showing the connections inter-islands and with Morocco (http://canalink.iter.es/)

The Canary Islands also have a web of submarine cables that interconnect the islands between them. Some of these cables are:

- Transcan-3- Owned by Telefonica and with a Cable length of 210 km linking Gran Canaria to Lanzarote.

- **Telefonica inter-cellular cables**- connect La Palma with Tenerife, La Palma with La Gomera, La Gomera with El Hierro, La Gomera with Tenerife, Fuerteventura with Lanzarote, Gran Canaria with Fuerteventura, Lanzarote with Gran Canaria, and finally Tenerife and Gran Canaria through three cables. Except in the case of El Hierro, its configuration in rings prevents an island from being disconnected due to a broken cable.

- **Canalink** (see above and Figure 272): it has two submarine cables between Tenerife and Gran Canaria and one between Tenerife and La Palma.

  - Subcanalink-1- It is a fiber optic submarine telecommunications cable system **with** a length of 143 Kilometers owned and/or operated by Cable Submarine de Canarias that links Gran Canaria to Tenerife.
  - Subcanalink-2- The system has a length of 136 Kilometers and is owned and/or operated by Cable Submarine de Canarias. It also links Gran Canaria to Tenerife.

At the beginning of 2019 the construction of the EllaLink system between Portugal and Brazil began, with links to Madeira and Cape Verde. Among the members of the consortium is the initiative of the European Union Building the Europe Link with Latin America (BELLA), thanks to which this cable is the first stone in the construction of a communications infrastructure that will solve the needs of interconnection to long-term research and education communities in Europe and South America and facilitate their collaboration in areas such as astronomy, particle physics or Earth observation. In addition to the new cable, BELLA will promote interconnection between South American countries, initially Brazil, Chile, Colombia and Ecuador (https://www.octsi.es/octsi/noticias-del-octsi/cables-submarinos-en-las-islas-canaria).

Pipelines- In the island of Tenerife there is a pipeline that allows the supply of aviation fuel by sea to the Tenerife Sur Airport aircrafts. This infrastructure is located just 50 meters from the shore of the beach La Tejita in a protected area belonging to the Natural Reserve Montaña Roja, and includes several buoys, hoses and a pumping station, which has a capacity for 3,000 cubic meters. As said, this installation allows the supply of aviation fuel by sea to the Tenerife Sur Airport aircrafts at least once a month. The supply is made through an oil pipeline from the La Tejita marine

buoy to the airport storage tanks. The supply to aircraft is done directly through the hydrant network or by refueling units (Plan Director del Aeropuerto de Tenerife Sur, https://www.fomento.gob.es/areas-de-actividad/aviacion-civil/politicas-aeroportuarias/integracion-territorial-aeroportuaria/planes-directores/sur/plan-director-del-aeropuerto-de-tenerife).

There is also a refinery sited in Santa Cruz de Tenerife since June 1930. However, the growth of the population has made the industrial facilities have gone from being in the perimeter to being in the urban center. For that reason, in June 2018, the dismantling of the refinery was announced. That hindered the development and expansion of the city to the south. It is expected that by 2030 the industry will definitely leave the city, and in the land it occupies, a new urban grid will be built with homes, hotels, shops and green areas (https://www.eleconomista.es/empresas-finanzas/noticias/9512100/11/18/Cepsa-empezara-a-desmantelar-la-refineria-de-Tenerife-a-inicios-de-2019.html).

Legal framework and constraints

Legislation applicable to the Canary Islands context: summarize the applicable legislation and the developed matters (Submarine cables)

The Law of January 12, 1887, "Gaceta" No. 13, incorporated in Spain the International Convention on Submarine Cables. On the other hand, in Spain, Law 15/78, of February 20, on Exclusive Economic Zone provides, in its article 5, that the establishment of this does not affect the freedom of submarine cables laying. The Law of January 12, 1887, "Gaceta" no. 13, incorporated in Spain the International Convention on Submarine Cables, signed in Paris on March 14, 1884 and that our country ratified by means of an instrument published in the "Gaceta" no. 140 of 1888.

That legal standard criminalizes the breakage or deterioration of a submarine cable committed fraudulently or culpably, punishing this behaviour with minor prison in its medium or maximum degrees, except those cases in which the authors had no other purpose than to protect their life or the safety of their vessels and have taken all the necessary precautions to avoid such breakages or deterioration. In any case what always comes is civil compensation for damages.

Similarly, this legal norm contemplates the cases of indemnification of the owner of a cable for damages caused to another when laying or repairing the cable, and those corresponding to the owners of ships in cases of loss of anchors, nets or other fishing tools that would have been abandoned in order not to cause damage to a submarine cable; which, on the other hand, if duly signposted, having the Spanish jurisdictional waters an area on each side of a quarter of a mile, in which the vessels cannot anchor, drag nets or other gear that may render it unusable.

Eventual administrative derivative acts: explain the required procedure (Submarine cables)

The Geneva Conventions of April 29, 1958 and, above all, the Jamaica Law of the Sea Convention in 1982 have established that the principle of the freedom of laying submarine cables and pipelines in open waters. On the continental shelf, the coastal state cannot prevent such cable laying, subject to its right to take reasonable measures for the exploration of that area, the exploitation of its resources and control of the pollution that may be caused, and without prejudice to the layout of the line for the cable laying of the above-mentioned pipes is subject to your consent.

In Spain, Law 15/78, of February 20, on Exclusive Economic Zone provides, in its article 5, that the establishment of the same does not affect the freedom of laying submarine cables. Finally, in the territorial sea, as zone of sovereignty, the coastal state has all the powers in this respect, pointing in turn to art. 149.21 of the Constitution, which is the State that holds the exclusive competence in this matter.

Constraints

General legal, administrative and technological aspects were pointed out as constraints for this sector (see table below) such as data gaps and non-execution of plans. Other constraints such as the occupation of space by infrastructures, which removes other sectors from the area; and the negative environmental consequences of the works, were also mentioned (MarSP, 2019).

Table 120. Constraints to the development of the infrastructure sector (source: MarSP, 2019)

	Infrastructures
Legal	✓ There is no governance plan but management plan, which is not applied later on
Administrative	✓ Lack of will from local, island and regional administrations to reach consensus and execute the plans
Technological	✓ Lack of data. Out-of-date data
Social	✓ Infrastructures remove space from other sectors (e.g. fisheries)
Environmental	✓ Creating artificial beaches affects protected habitats and consolidated activities in the maritime space

PART II

Current spatial distribution

For **telecommunication cables** there exists three sources with different information. From the HPL viewer you can see the cable of www.submarinecablemap.com/ and www.cablemap.info/. On the other hand, from the EMODnet is available online at https://github.com/telegeography/www.submarinecablemap.com.

The only information obtained with exact position data is that from the WACS cable. The WACS communications cable was installed in 2011, connecting Gran Canaria Island to 14 other countries in Europe and West Africa. It carries internet, telephone, fax, data and other communications (Sea Risk Solutions LLC, 2014).

In addition to the telecommunications cables, the **electric cable** that connects the islands of Lanzarote and Fuerteventura and the location of the **hydrocarbon transfer buoys** are available in the HPL viewer.

Table 121. Cartographic information available for submarine cable and pipeline routes.

Name	Source	Organization	Date	Definition
Cables	HPL	Networkatlas Greg's Cable Map	2019	Data Cables (www.submarinecablemap.com/) (www.cablemap.info/) and electric cables.
Natural Risks (buoys)	HPL	Government of the Canary Islands		Hydrocarbon transfer buoys.
Link: http://www.pilotajelitoralcanario.es/				
Telecommunication Cables (schematic routes)	EMODnet Human Activities	EMODnet	2016	The dataset on submarine telecom cables was created by Cogea in 2014 for the European Marine Observation and Data Network. The underlying data is property of Telegeography.
Link: http://www.emodnet-humanactivities.eu/search-results.php?dataname=Telecommunication+Cables+%28schematic+routes%29				
Telecommunication cable WACS	ULPGC	Sea Risk Solutions LLC	2017	
Link: http://www.emodnet-humanactivities.eu/search-results.php?dataname=Telecommunication+Cables+%28schematic+routes%29				

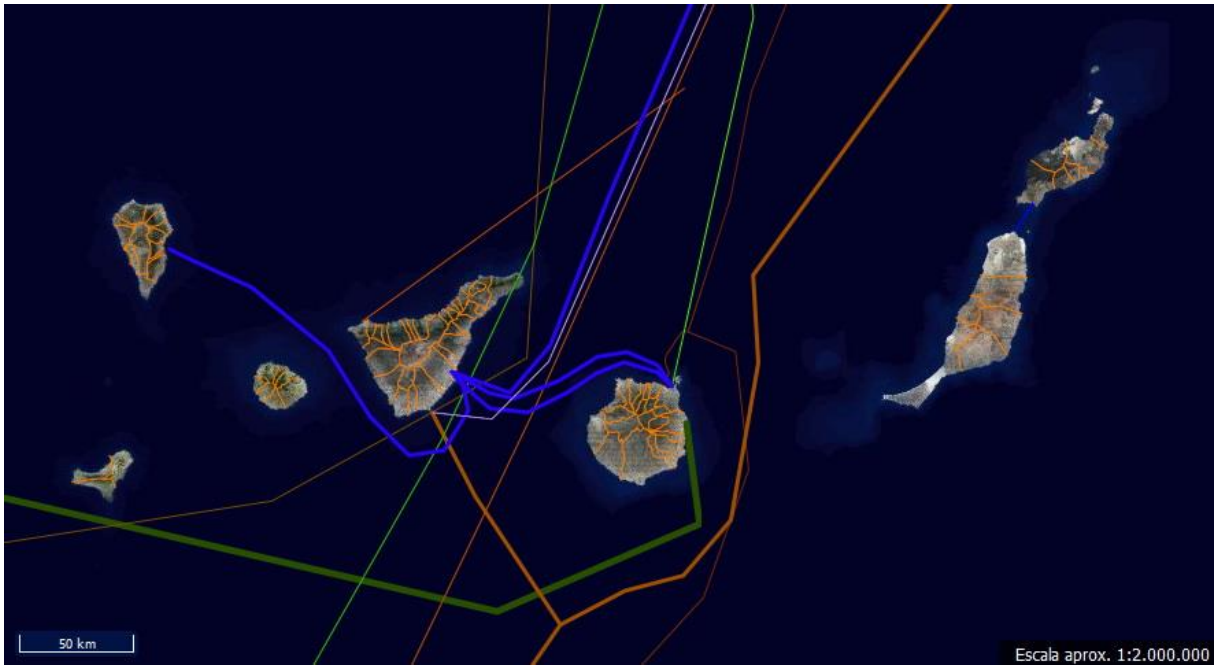


Figure 273. Telecommunication cables (source: cablemap.info) and electric cable (source: viewer HPL, 2019).

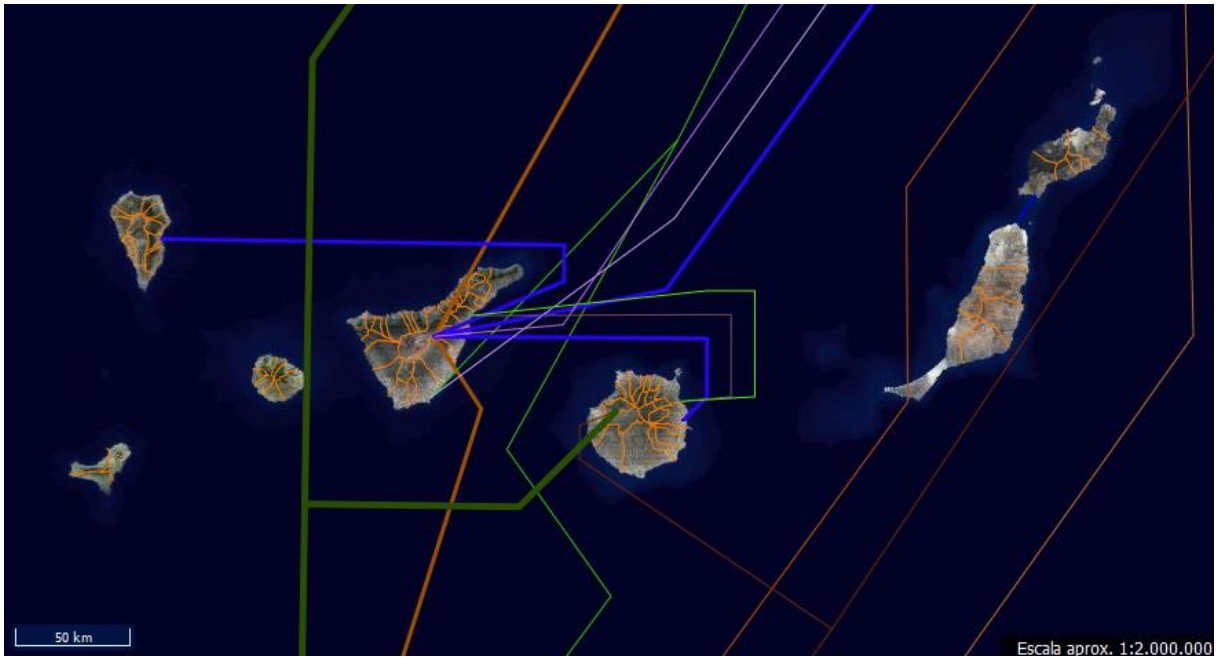


Figure 274. Telecommunication cables (Source: submarinecablemap.com) and electric cable (source: viewer HPL, 2019).

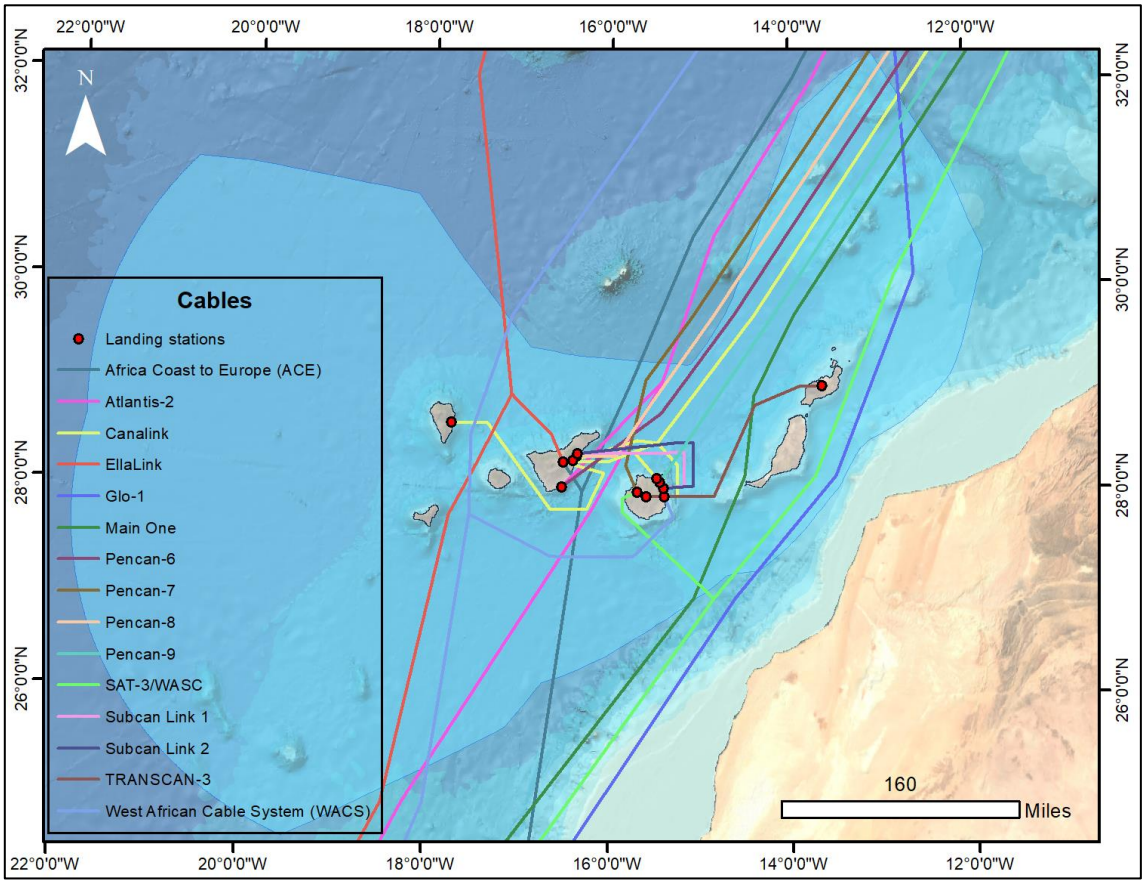


Figure 275. Telecommunication cables (EMODnet Human Activities, 2019).

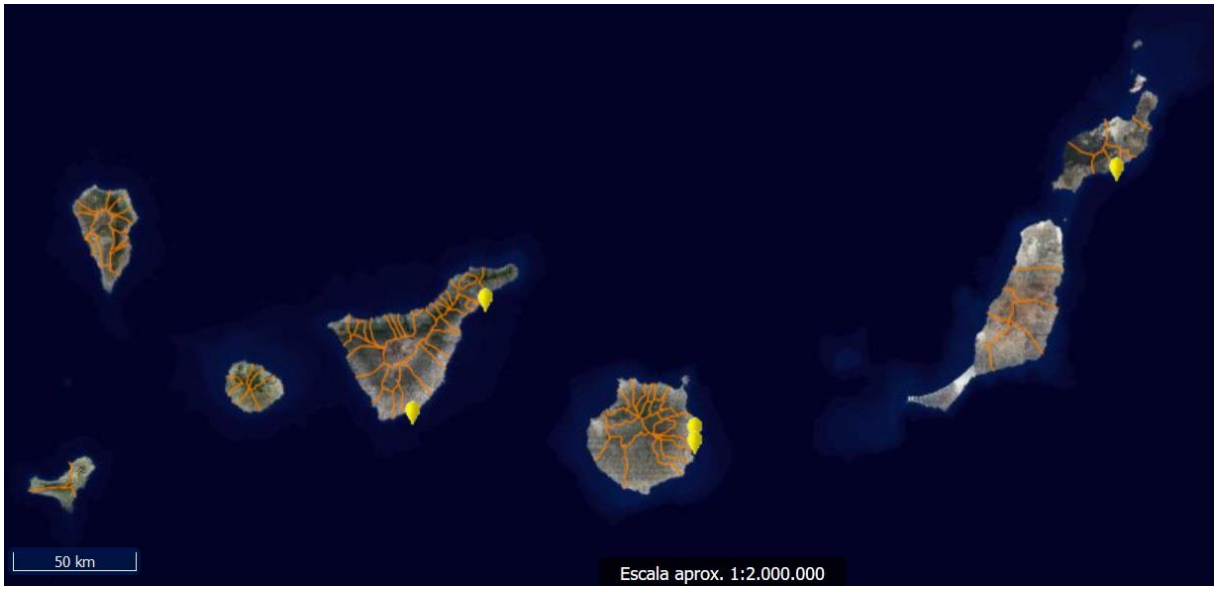


Figure 276. Hydrocarbon transfer buoys (source: viewer HPL, 2019).

PART III

Analysis of interactions

Interaction with other sectors

According to stakeholders, infrastructures present important synergies with sectors such as scientific research, tourism, navigation, ports, energy and defence (high synergy); aquaculture and fisheries (low synergy). The creation of new artificial reefs represents a low synergy with environmental conservation (MarSP, 2019).

Table 122. Degree of synergy of the infrastructure sector with other maritime sectors (source: MarSP, 2019)

Infrastructures			
Aquaculture		Navigation and maritime transportation	
Fisheries		Tourism	
Mineral resources		Scientific research and marine biotechnology	
Energy		Underwater archaeology and cultural heritage	
Defence		Environmental conservation and Marine Protected Areas	
Ports		Scale: No information, Neutral, Low, High	

High conflicts were identified (see table below) with environmental conservation, scientific research, tourism. Medium conflicts are present with fisheries, energy and underwater heritage (MarSP, 2019).

Table 123. Degree of conflicts of the infrastructure sector with other maritime sectors (source: MarSP, 2019)

Infrastructures			
Aquaculture		Navigation and maritime transportation	
Fisheries		Tourism	
Mineral resources		Scientific research and marine biotechnology	
Energy		Underwater archaeology and cultural heritage	
Defence		Environmental conservation and Marine Protected Areas	
Ports		Scale: No information, Neutral, Low, High	

Land-sea interactions

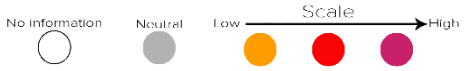
A few high synergies were recognised (see table below) with built-up areas, tourism potential areas and roads. However, most of the land-use sectors have neutral synergy with infrastructures (MarSP, 2019).

Table 124. Degree of synergy of the infrastructure sector with land-use sectors (source: MarSP, 2019)

Infrastructures		
	Scale: No information, Neutral, Low, High	
A	Natural, cultural and landscape areas	
B	Bathing areas	
C	Built-up areas in risk zones	
D	Marine Protected Areas	
E	Terrestrial Protected Areas	
F	Built-up areas	
G	Agriculture, forestry and other uses	
H	Tourism potential areas	
I	Airports	
J	Roads	

On the conflict side, this sector presents high conflicts (see table below) with bathing areas and airports; and medium conflicts with natural and cultural areas, MPAs, and tourism areas (MarSP, 2019).

Table 125. Degree of conflict of the infrastructure sector with land-use sectors (source: MarSP, 2019)

Infrastructures		
		
A	Natural, cultural and landscape areas	
B	Bathing areas	
C	Built-up areas in risk zones	
D	Marine Protected Areas	
E	Terrestrial Protected Areas	
F	Built-up areas	
G	Agriculture, forestry and other uses	
H	Tourism potential areas	
I	Airports	
J	Roads	

TOURISM

PART I

Sector characterization

Tourists- The reason leisure/vacation is the main reason to visit the Canary Islands, reaching the 93.24% of the total of the visits. According to the data of the Frontur survey published by the National Institute of Statistics (INE), the Canary Islands has been placed as the third destination of foreign tourists in 2018, with a total of almost 8 million people visiting the islands in the winter of 2018-2019 (November 2018- April 2019), being Tenerife and Gran Canaria the most visited islands (Table 126) (http://www.grancanaria.com/turismo/es/area-profesional/informes-y-estadisticas/informes/).

Table 126. Total number of tourists in the Canary Islands in the winter period 2018-2019.

Turistas totales. Invierno 18-19	Total	% Var. Anual
Canarias	**7.962.819**	**-1,03%**
Lanzarote	1.579.588	1,10%
Fuerteventura	1.052.749	-8,82%
Gran Canaria	2.430.289	-1,86%
Tenerife	3.133.321	1,43%

So far this year, the number of tourists that arrived to the Canary Islands by plane in the period of January to April reaches the number of 4,829,398, being Tenerife and Gran Canaria the most visited islands, followed by Lanzarote and Fuerteventura.

Table 127. Number of visitors in the period January-April 2019, according to AENA data (www.aena.es)

Enero	Canarias	Lanzarote	Fuerteventura	Gran Canaria	Tenerife	La Palma
TOTAL TURISTAS	1.183.489	193.828	155.337	362.832	451.858	19.634
Febrero						
TOTAL TURISTAS	1.186.433	207.623	161.812	358.628	440.417	17.953
Marzo						
TOTAL TURISTAS	1.346.855	243.949	188.365	398.836	495.771	19.934
Abril						
TOTAL TURISTAS	1.112.621	217.928	172.769	289.766	415.895	16.263
Mayo						
TOTAL TURISTAS	0					
Junio						
TOTAL TURISTAS	0					
Julio						
TOTAL TURISTAS	0					
Agosto						
TOTAL TURISTAS	0					
Septiembre						
TOTAL TURISTAS	0					
Octubre						
TOTAL TURISTAS	0					
Noviembre						
TOTAL TURISTAS	0					
Diciembre						
TOTAL TURISTAS	0					
TOTAL	Canarias	Lanzarote	Fuerteventura	Gran Canaria	Tenerife	La Palma
TOTAL TURISTAS	4.829.398	863.328	678.283	1.410.062	1.803.941	73.784

FUENTE: AENA

By nationalities tourists from United Kingdom represents a 36.8% with almost 19 million people visiting the islands, followed by Germany with 11.4 million people that represent a 20.3% (http://www.gobiernodecanarias.org/istac/jaxi-istac/menu.do?uripub=urn:uuid:ccdf465c-2230-421d-99f6-d6a1669d6032).

As an example, Table 128 shows the number of visitors of Gran Canaria during the period 2001-2018 as a function of their nationality and depending of the season of the year (http://www.grancanaria.com/turismo/es/area-profesional/informes-y-estadisticas/estadisticas/estadisticas-entrada-de-turistas/). As shown, the highest number of visitors during the summer period is always from United Kingdom and Germany, followed by The Netherlands. In the winter period, most visitors are Germans and British followed by Swedish and Norwegians.

Table 128. Number of foreigners visiting Gran Canaria depending on their country of origin during the period 2001-2018. Table also shows the differences between summer ("verano") and winter ("invierno", which goes from november of one year to april of the next year). "Nordic countries" is the sum of Finland, Denmark, Norway and Sweden (http://www.grancanaria.com/turismo/es/area-profesional/informes-y-estadisticas/estadisticas/estadisticas-entrada-de-turistas/).

VERANO	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
ALEMANIA	419.693	360.504	362.431	342.492	332.840	347.535	336.770	330.068	289.418	306.632	342.976	327.496	333.960	349.783	359.038	435.524	461.980	439.985
AUSTRIA	23.265	24.475	23.112	22.158	21.894	23.113	20.000	17.452	12.452	13.646	17.699	17.679	16.141	16.300	9.173	11.462	13.432	14.857
BELGICA	25.412	24.828	27.709	25.895	24.217	32.473	34.736	35.271	29.839	47.833	45.578	46.251	48.679	49.713	56.350	64.499	66.682	59.282
DINAMARCA	37.210	31.890	20.465	24.194	20.812	23.144	26.904	25.816	29.188	27.065	33.519	41.012	45.990	40.866	42.646	44.718	48.205	45.814
FINLANDIA	12.113	11.245	13.567	16.923	16.296	15.219	15.606	16.597	15.326	19.271	17.179	16.216	16.616	14.092	13.866	14.669	13.178	18.151
HOLANDA	108.041	101.918	96.572	90.597	90.094	99.158	93.015	87.891	80.972	75.375	93.833	96.373	88.055	82.341	96.648	130.165	135.084	125.036
IRLANDA	82.198	77.946	75.508	75.227	74.200	61.957	66.491	64.801	45.834	47.957	53.110	51.057	47.057	47.017	40.008	45.200	48.254	49.394
NORUEGA	40.087	39.800	42.105	42.002	45.977	45.807	49.552	61.897	55.786	62.252	69.828	76.668	99.342	87.625	78.828	81.568	96.479	93.480
REINO UNIDO	476.279	464.999	468.099	426.537	370.682	363.626	365.193	305.900	214.692	271.931	292.399	302.133	324.963	345.801	370.749	476.594	552.965	499.314
SUECIA	54.464	47.959	30.824	38.796	33.270	31.347	36.660	34.709	46.904	48.668	51.029	41.466	60.511	58.685	61.193	67.721	75.067	68.891
SUIZA	37.987	31.293	23.780	26.818	18.842	30.306	33.286	46.440	36.658	37.703	49.952	52.281	48.956	51.639	48.457	57.415	58.387	60.707
PORTUGAL	9.299	12.335	18.395	19.286	21.977	18.375	19.103	18.462	12.608	20.857	19.097	18.896	17.589	20.733	24.211	26.121	44.992	40.999
OTROS PAISES	73.816	68.298	70.948	68.705	68.480	80.642	64.665	70.202	54.102	63.574	91.295	78.465	83.816	111.774	135.336	179.974	208.590	201.778
TOTALES	**1.399.864**	**1.297.480**	**1.273.515**	**1.219.630**	**1.139.581**	**1.172.702**	**1.161.981**	**1.115.506**	**923.779**	**1.042.764**	**1.177.493**	**1.165.993**	**1.231.675**	**1.276.369**	**1.336.503**	**1.635.630**	**1.823.295**	**1.717.688**
NÓRDICOS	143.874	130.894	106.961	121.915	116.355	115.517	128.722	139.019	147.204	157.256	171.555	175.362	222.459	201.268	196.533	208.676	232.929	226.336

INVIERNO (*)	2001-2002	2002-2003	2003-2004	2004-2005	2005-2006	2006-2007	2007-2008	2008-2009	2009-2010	2010-2011	2011-2012	2012-2013	2013-2014	2014-2015	2015-2016	2016-2017	2017-2018	2018-2019
ALEMANIA	446.749	440.826	412.993	418.046	428.166	419.895	403.538	425.116	374.624	448.763	477.621	403.032	572.341	570.746	590.746	576.784	577.481	
AUSTRIA	27.124	28.914	29.393	24.342	23.928	16.791	21.953	21.125	17.484	17.741	19.918	16.021	17.578	19.133	15.883	22.155	16.322	
BELGICA	24.880	27.552	26.658	26.157	30.542	31.017	30.835	28.276	36.985	41.751	38.842	41.690	45.635	45.327	55.029	52.189	51.666	
DINAMARCA	86.862	90.967	81.608	103.372	108.029	105.515	109.036	85.569	101.073	113.051	116.197	115.105	125.075	113.818	121.448	134.976	143.629	
FINLANDIA	84.736	79.421	79.850	96.090	102.741	99.682	105.737	108.446	86.148	107.827	121.919	121.474	129.060	113.584	109.530	118.522	116.732	
HOLANDA	110.534	103.747	97.574	99.619	94.619	89.285	83.414	71.880	68.328	81.815	80.789	86.227	87.759	80.475	92.758	104.056	110.140	
IRLANDA	44.638	47.996	45.830	48.003	45.526	41.890	42.758	39.610	31.251	34.991	34.704	33.882	29.687	30.110	33.929	36.589	37.977	
NORUEGA	118.803	130.489	148.675	156.239	171.762	161.229	175.113	190.925	182.638	220.591	223.540	271.804	264.938	238.167	242.386	249.838	251.325	
REINO UNIDO	336.347	366.011	343.963	313.482	301.015	279.630	318.845	244.531	245.861	254.484	225.599	204.421	239.079	245.867	312.818	400.479	375.907	
SUECIA	184.845	179.957	165.008	163.116	158.405	157.530	176.668	156.977	148.881	188.103	214.764	231.397	268.928	256.851	265.743	285.581	292.433	
SUIZA	31.181	28.959	25.806	20.474	18.860	28.503	39.172	33.207	33.454	40.160	42.644	42.266	46.575	49.931	56.948	52.890	59.322	
PORTUGAL	39.899	42.295	5.611	5.415	5.819	6.099	6.194	4.205	13.561	11.197	4.830	5.179	6.031	7.220	9.628	8.932	27.377	
OTROS PAISES	44.662	46.829	79.503	84.827	104.723	87.477	72.267	61.628	62.601	94.741	107.107	56.980	63.375	130.076	163.951	179.901	177.956	
TOTALES	**1.581.260**	**1.613.963**	**1.542.472**	**1.559.182**	**1.594.135**	**1.524.533**	**1.585.530**	**1.471.495**	**1.402.889**	**1.655.215**	**1.708.474**	**1.629.478**	**1.946.290**	**1.901.305**	**2.070.797**	**2.222.892**	**2.237.267**	
NÓRDICOS	475.246	480.834	475.141	518.817	540.937	523.956	566.554	541.917	518.740	629.572	676.420	739.780	788.001	722.420	739.107	788.917	804.119	

During the period 2014-2018 the occupancy rates of the hotel and non-hotel places was between 63.77% in 2014 to 73.15% in 2017 for the whole Canary archipelago (Figure 277 left). If we look these statistics by islands (Figure 277 right), data shows that Lanzarote, Fuerteventura and Tenerife reached the highest rates of occupancy, followed by Gran Canaria and La Palma.

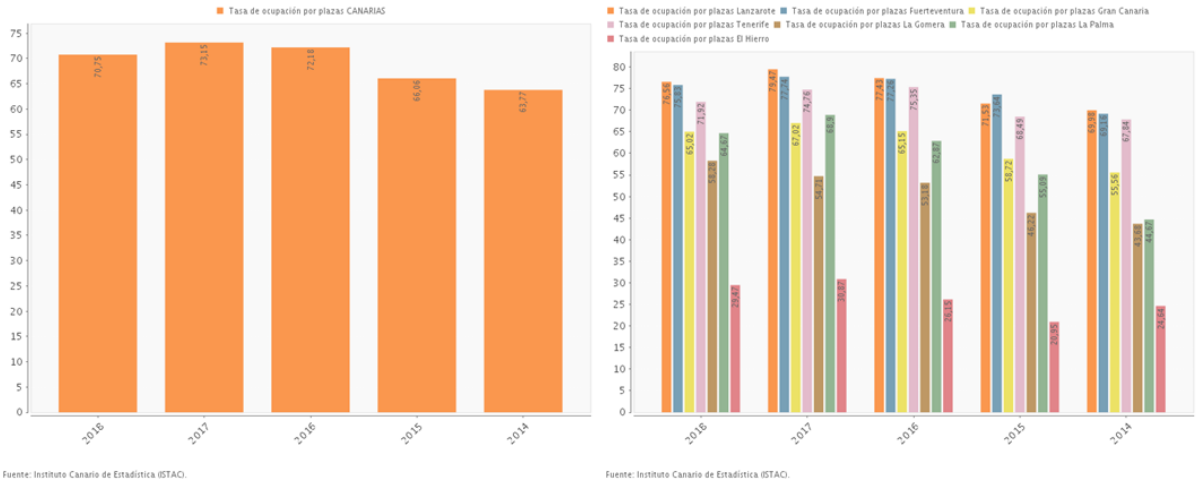


Figure 277. Tourist occupancy rates in the whole archipelago (left) and by islands (right) in the period 2014-2018. Data from Instituto Canario de Estadística (ISTAC, http://www.gobiernodecanarias.org/istac)

Tourism activities/facilities- The activities that tourists preferred to do mostly depend on the attractions of each one of the islands. For instance, going to the beach (71.94%) and walking (68.51%) are the preferred activities chosen by tourists visiting Gran Canaria (Figure 278 left) while hiking (55.1%) and visit places of cultural interest (42.8%) as well as astronomical observation (17%) are chosen for those who visited La Palma (Figure 278 right).

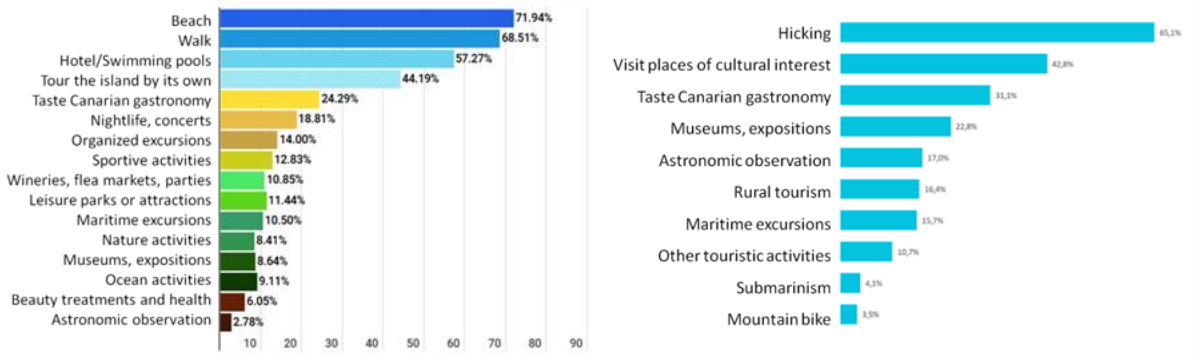


Figure 278. Activities chosen by tourists while visiting Gran Canaria in 2018 (left) or La Palma in 2017 (right). Data adapted from http://www.grancanaria.com/turismo/es/area-profesional/informes-y-estadisticas/nuestros-turistas/ and https://turismodeislascanarias.com/es/investigacion/perfil-del-turista-la-palma-2017-presentacion/

According to the MITECO (Ministerio de Transición Ecológica) and its Beach Guide there are a total of 71 *beaches* in the Canary Islands that are shown in Figure 279 (https://www.miteco.gob.es/es/costas/servicios/guia-playas/default.aspx), being 42 out of them with blue flag (www.pilotajelitoralcanario.es).

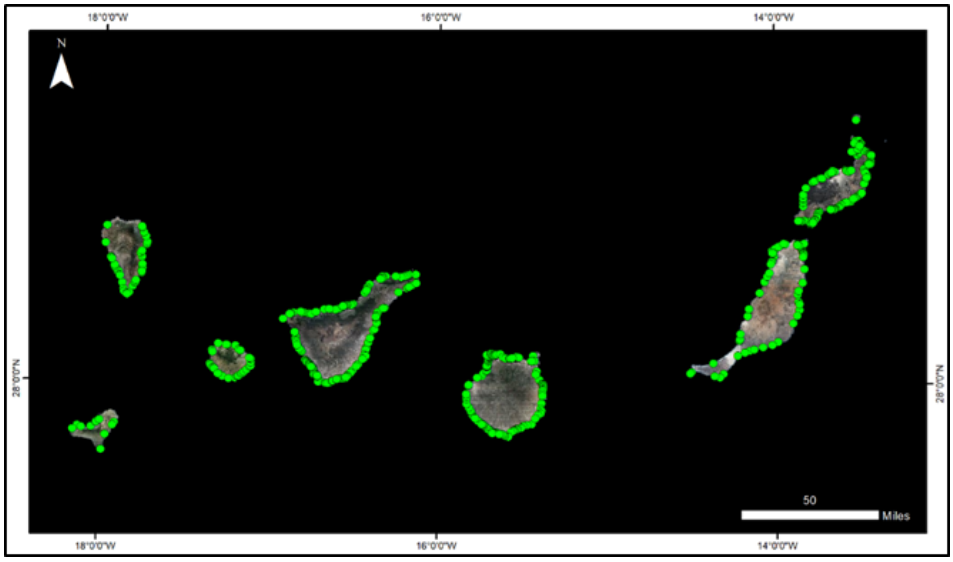


Figure 279. Beaches in the Canary Islands (MITECO Guide of beaches)

The Canary Islands are a real paradise for *diving*. This can be seen in the number of schools and dive sites all over the islands (Figure 280). The Canary waters are known internationally for their quality, their crystal clearness down as far as 30 meters, the temperature of the water (between 18°C in winter and 22°C the rest of the year), sporting facilities and pleasure marina infrastructures providing a habitat for all kinds of species. The sea bed is home to a biodiversity of great value characterized by the volcanic relief full of caves, niches and reefs and of a depth which sometimes reaches a thousand meters. This wealth has awarded different parts of El Hierro, La Palma and Lanzarote the category of Marine Reserve (https://www.wannadive.net/spot/Europe/Canary/).

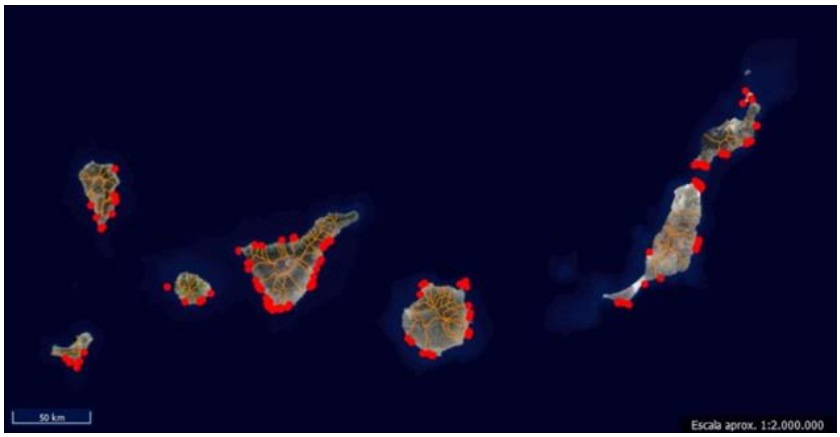


Figure 280. Scuba diving spots (data from 2008, http://www.pilotajelitoralcanario.es/)

Thanks to the volcanic nature of the archipelago, the Canary Islands have innumerous mountainous terrain to enjoy, as well as settings that goes from lush rainforests through to stark lunar landscape and thus, walking or *hiking* is another activity usually chosen by tourists coming to the Canary Islands. There are more than 50 trails that includes mountain bike routes, hiking trails, bicycle rides trails, mountain hikes trails, trail running routes, etc., as well as the so called blue trails, itineraries that link beaches or ports with the Blue Flag beaches. As an example, Figure 281 shows in green some of the trails (not blue trails) present in the islands in 2008 (www.pilotajecanario.es).

Figure 281. Trails in the Canary Islands (http://www.pilotajelitoralcanario.es/)

Cetacean sightseeing and *surfing* and are some other activities preferred by tourists. In the Canary Islands more than 30 different cetacean species can be seen all year round (http://canariasconservacion.org/CetaceosCanarias.htm). You don't need to go too far from the coast to find dolphins, finback whales, pilot whales, sperm whales, etc. This is why the archipelago has become one of the most important places in Europe for the number of people spotting dolphins and whales at large. The Cabildo and the Biosphere Reserve of Fuerteventura have been working for several years on a project to recover the skeletons of several species of cetaceans that have washed up on the insular coast, and thus, the project has been consolidated as *the Path of the Cetaceans of Fuerteventura*, which has so far allowed to recover several bony structures of stranded cetaceans and prepare them for study and public exposure (http://canariasconservacion.org/ESQUELETOS/Senda-de-los-Cetaceos.htm). More than 100 dive centers organize daily excursions to many hundred dive sites. Regarding to surf, innumerous surf spots could be found along the coast of all of the islands (Figure 282).

Figure 282. Dive centers in the Canary Islands ((http://www.pilotajelitoralcanario.es/)

Finally, and not related to the marine sector, the Canary Islands are recognized on an international level for the exceptional conditions in which to *observe the stars*. The quality of the sky is such that it is protected by the Law for the Astronomical Quality of the IAC Observatories and has the privilege of having three Starlight Reserves, a hallmark that confirms the low level of light pollution in the area. The "Observatorio del Roque de los Muchachos" (ORM) on La Palma and the

"Observatorio del Teide" (OT) on Tenerife, combine world class facilities for night and solar time studies (https://www.iac.es/).

Legal framework and constraints

Legislation applicable to the Canary Islands context: summarize the applicable legislation and the developed matters

The tourism activity is the economic instrument of the Autonomous Community of the Canary Islands and, therefore, one of the sectors that contribute the most to our GDP. In fact, the legislator understands it as a basic function that determines, to a large extent, the structure and arrangement of the insular territories (Explanatory memorandum of Law 6/2002, of June 12, on measures of territorial organization of activity tourism in the islands of El Hierro, La Gomera and La Palma).

The organization of this activity, both in general terms, by virtue of Law 7/1995, of April 6, on the Regulation of Tourism of the Canary Islands (hereinafter LOT), as well as individual, through the different regulations that address the Special activities carried out in this area are the exclusive competence of the Autonomous Community of the Canary Islands, depending on the distribution of competencies established in article 148.1. 18th of the EC and specifically assumed by our regional legislator by virtue of the Statute of Autonomy of the Canary Islands (in particular, through articles 129 and as regards the exclusive competence in planning and promotion of economic activity in the Canary Islands, without prejudice to the provisions of articles 149.1.11.ª and 13.ª of the EC).

This competence includes the legislative power that, as we have just pointed out, is based on this sector, the so-called LOT. It regulates the management and promotion of the tourism sector in the Canary Islands as a strategic element of our Autonomous Community. Precisely for this reason it contemplates, among others, the following objectives:

- The regulation of the tourist offers, conceiving the Canary Islands as a unit of tourist destination.

- The conservation, protection and rational use of the tourist resources of the Canary Islands, with special attention to the environment, the landscape and the native culture.

In this line, priority has been given to the management of certain activities that mainly affect the territory and, even less, at sea. Certainly, the Management of tourism activity in general has been developed mainly in those activities that have a direct relationship with the exploitation of the activity of certain companies (for example, Decree 89/2010, of July 22, which regulates the activity of tourist intermediation, with its modifications) and above all, of those others that have an immediate impact on the land (for example, Law 6/2002, of June 12, on measures of territorial organization of tourist activity in the islands of El Hierro, La Gomera and La Palma, Law 19/2003, of April 14, approving the General Management Guidelines and the Canarian Tourism Regulation Guidelines, Law 2/2013 of 29 May, modernization and tourist renewal of the Canary Islands, Decree 142/2010, of October 4, which approves the regulation of tourist accommodation activity, Decree 113/2015, May 22, by which approve to the Regulation of the holiday homes of the Autonomous Community of the Canary Islands, etc.), but, to a lesser extent, those other tourist activities other than recreational sports that have an impact on the sea, well, to be developed exclusively in it,

either by carrying out the activity in terrestrial public domain, or because it is affected by occupying marine space. In particular, we refer to marine excursions and the sighting of cetaceans, on the one hand, and to the exploitation of different tourist activities (such as hydrotherapy establishments, swimming pools and sports areas that use sea water or could affect it).

All of this because the LOT itself not only establishes the general requirements required of any company that intends to develop a tourist activity, but also intends that it be done under conditions that allow them to develop such activity while preserving the environment (including the marine environment), in addition to having very present the legal consequences that these activities may have in relation to the tourist. Precisely for this reason, and at least in those activities at sea or on land that may generate some risk for the user because they are qualified or commonly known as "risk or adventure", it requires a safety bonus imposing the necessary coverage of a liability insurance that covers the damages that may be generated in the enjoyment of such activities. This, together with the previous information that has to be provided to the tourist about the activity and the risks that they entail, and, together with, the exquisite fulfilment of the obligations derived from the contract and the good faith in its fulfilment, will make such activities can be developed in a safe framework.

Certainly, the exercise of any tourist activity is free without any limitations other than those established in the LOT and in the other rules of application (Article 13 LOTC). It is true that it could not be otherwise, because the principle of freedom of enterprise is configured as a basic right recognized to citizens in the EC. Thus, article 38 of the EC establishes that "freedom of enterprise is recognized within the framework of the market economy. The public authorities guarantee and protect their exercise and the defence of productivity, in accordance with the demands of the general economy and, where appropriate, planning. " However, the above, if the autonomic norms will be able to establish certain requirements for the accomplishment of an activity in its territory, provided that such requirements are the least restrictive possible in order to also preserve, the free competition in the market.

In another order of things, we must also value those rules that have directly tried to contribute to planning the territory and preserve the environment, although it is true that most of them affect urbanism and its relationship with the territory, establishing a relationship between the environment and the natural spaces with the soil and the territory.

At this point, we must highlight, among others, Law 3/1985, of July 29, on Urgent Measures in the Field of Urbanism and Protection of Nature; the autonomic norms were projected on the territory in order to the safeguard of the protected natural spaces as they are the Law 12/1987, of June 19, of declaration of Natural Spaces of the Canary Islands, replaced, in turn, by the Law 12 / 1994, of December 19, of Natural Spaces of the Canary Islands; the protection of rustic land and the containment of its occupation, through Law 5/1987, of April 7, on the Urban Land Planning of the Autonomous Community of the Canary Islands; the adaptation of the planning to the insular reality according to the Law 1/1987, of May 13, Regulatory of the Insular Plans of Ordination; control over land uses through Law 7/1990, of May 14, Urban and Territorial Discipline; the environmental evaluation of the works carried out in the territory in accordance with Law 11/1990, of July 13, on the Prevention of Ecological Impact; the environmental evaluation of the plans carried out by Decree 35/1995, of February 24, which approves the Regulation of environmental content of the planning instruments; or the integration of environmental, territorial and urban planning in accordance with Law 9/1999, of May 13, on the Regulation of the Canary Islands. This extensive regulation was subsequently collected in the Revised Text of the Laws of Spatial Planning and Natural Spaces of the Canary Islands, approved by Legislative Decree 1/2000, of May 8, which

collected and systematized a good part of this regulatory experience and mentioned. Subsequently, other rules, in the framework of the moratorium, deepened on the territorial organization of tourism activity. Among them, Law 6/2001, of July 23, on Urgent Measures in matters of Territorial Planning and Tourism in the Canary Islands; the already mentioned Law 6/2002, of June 12, of Measures of Territorial Arrangement of the Tourist Activity in the islands of El Hierro, La Gomera and La Palma; the aforementioned Tourism Ordinance Guidelines approved by Law 19/2003, of April 14; the aforementioned Law 6/2009, of May 6, on Urgent Measures in Matters of Territorial Organization for the Sectorial Revitalization and the Regulation of Tourism; as well as Law 2/2013, of May 29, on renovation and modernization of tourism in the Canary Islands, as amended by Law 9/2015, of April 27. These together with the LOT have tried to achieve a certain balance between tourism and the territory.

The Canary legislator considers that the aforementioned standards "environmental, territorial and urban regulations have contributed decisively to the protection and management of the soil, territory and landscape of the islands, as shock standards that effectively met the objectives of preservation and the containment of urban growth, contributing to create an awareness of environmental protection with wide social acceptance "(Explanatory statement of Law 4/2017, of July 13, on Soil and Protected Natural Spaces of the Canary Islands). Now, the promulgation of so many norms together with the difficulty of harmonious interpretation of some of them, have been revealed, to some extent, as an unnecessary limitation for the pursuit of the ends pursued, generating obstacles that prevented or hindered rational development and sustainable territory.

Precisely for this reason, it has been tried to rationalize and update the regulatory framework through the aforementioned Law 4/2017, of July 13, on Soil and Protected Natural Spaces of the Canary Islands, which becomes the backbone of the management of these spaces trying to simplify the procedures required to carry out activities in them. This simplification is obtained by reducing excessive and unnecessary burdens and procedures, so that the previous license is replaced by communication in all those areas where the first one is not absolutely necessary and demanding, nevertheless, the environmental evaluation in the procedures of preparation and approval of the different planning instruments.

On this last general framework, the different activities that must take place will be developed, also in the marine area, without prejudice to the concrete organization of the activity when it exists.

Eventual administrative derivative acts: explain the required procedure

The observation of cetaceans is recognized as a tourist, economic, scientific, recreational and educational activity of exceptional importance by the Canarian legislator. Recognizes that this activity is positive both for those who develop it and for those who enjoy it, as this contributes to conservation and environmental education. However, it is also recognized that when there is a disproportionate and uncontrolled increase in the number of boats that carry out these activities, problems are generated that fundamentally affect the comfort of these animals.

It should not be forgotten that some of the most frequent species of cetaceans in Canary waters, such as the tropical pilot whale, the "yubarta" and the Canarian population of dolphins, are still threatened by the state of deterioration of the coast, by the incidence of ecotourism of cetaceans and interactions with fisheries, so it is necessary to develop the activity with full respect

for their habitat, trying to influence as little as possible in their development and activity, so that sightings have to be controlled to the extent that they can harm to the fauna that pretends to be seen and protected. And it is that the activity of sighting of cetaceans found almost from its beginnings two important problems of difficult control: a) the unfair competition carried out by stealth vessels; and, b) environmental damage that occurs as a result of the inconvenience caused by these and jointly the "legal" to cetaceans and the marine environment. These two issues, not fully resolved, result in the approval of Decree 178/2000, of September 6, which regulates the activities of observation of cetaceans (hereinafter Decree 178/2000).

The norm will be applied both to individuals or legal entities that, with or without profit motive, organize and carry out maritime or aerial excursions for the observation of cetaceans in the Canary Islands territorial scope, whose sighting has a tourist, scientific purpose, educational, technical, cultural or conservation, as well as people who, also non-profit, and occasionally perform this observation activity for recreational reasons (Article 2. of Decree 178/2000).

Except for the occasional sighting, non-profit and for recreational reasons, the observation of cetaceans will in all cases require the pertinent administrative authorization, which must always be carried on board.

The authorization may be granted for a specific excursion or for a specific period of time (Article 5. of Decree 178/2000). The authorization granted for the realization of a specific excursion will be extinguished once it has been carried out. Those granted for a specific period of time may not exceed one year, being automatically extinguished after the term of validity, unless renewal is requested, and it is granted, once the subsistence of the conditions that determined the granting of the original authorization and previous payment of the corresponding rate when legally established.

The renewal of authorizations must be requested at least two months before the expiration date set by the original authorization or the previous renewals (Article 5.3 of Decree 178/2000).

Authorization for the sighting of cetaceans for tourism purposes must be granted by the Ministry responsible for tourism of the Government of the Canary Islands, following a binding report from the Ministry responsible for environmental matters, in accordance with tourism legislation (Article 7.2 of the Decree 178/2000).

For the granting of such administrative authorization, it will be necessary to submit the activity to carry out a Basic Ecological Impact Study and obtain the relevant Ecological Impact Declaration, in accordance with the provisions of the ecological impact prevention legislation (article 7.3 of the Decree 178/2000). This Ecological Impact Declaration will be issued by the body that authorizes the activity of the Regional Ministry responsible for tourism in the Canary Islands (Article 7.4 of Decree 178/2000). In any case, the companies that are dedicated to the sighting of cetaceans as a tourist activity must constitute a guarantee in accordance with the provisions of article 11. This guarantee, which must be in permanent force, may be executed, totally or partially, in the cases in which a final administrative or judicial resolution is issued declaring responsibility for the commission of an administrative infraction in the development of the tourist activity of observation of cetaceans.

Applications for authorization will be sent to the General Directorate responsible for tourism management and infrastructure, in accordance with the model set forth in Annex I of Decree 178/2000 and will be accompanied by the following documentation (Article 8):

- Document accrediting the personality of the individual or legal entity that owns or leases the vessel or vessels and the organizer of the excursion, as the case may be.
- Authorization issued by the Regional Ministry responsible for tourism of the Government of the Canary Islands for the implementation of discretionary maritime transport.
- Insurance policy that covers the civil responsibility of passengers in case of accident, as well as the last receipt paid to prove its validity.
- Proof of payment of the fee that legally applies.
- Documentation that proves that the guarantee referred to in article 11 of the Decree has been established.
- Documentation proving the personality of the person or persons acting as a sectorial tourism guide, of their professional qualification and mandatory identification card, as well as a report of the tourist-informative activity to be developed during the observation.
- Basic Study of Ecological Impact.

Legislation applicable to the Canary Islands context: summarize the applicable legislation and the developed matters (Recreational-sport and active tourism)

In accordance with the provisions of the new Statute of Autonomy of the Canary Islands, the Autonomous Community regulates and manages exclusively recreational and sports activities under two competences, sports (138) and tourism (129). Obviously there are many tourist, sports and recreational activities that take place in the maritime field, which is why it is necessary to include them in the Maritime Spatial Planning. In fact, Article 10 of Royal Decree 363/2017, of April 8, which establishes a framework for the management of maritime space that takes as a heading "Content of maritime spatial planning" indicates in its section second, letter k) tourism, recreational, cultural and sports activities as an integral part of said plans.

Therefore, the capacity of the Canary Islands in terms of the regulation of this type of activities in the maritime space is very broad, and more taking into account the special maritime territorial scope of the Canary Islands described in art. 4 of the new Statute of Autonomy in which the maritime space is regulated. In this sense we have to underline new developments with respect to other autonomous systems such as the consideration in Law 1/2019, of January 30, of physical activity and sports in the Canary Islands of sports facilities in certain marine areas. In this sense, areas of activity are defined as non-strictly sporting spaces, such as infrastructures or natural spaces, including maritime spaces, on which sports activities are developed because they have been adapted or are usually used for their development. There are areas of activity, among others, bays, trails, beaches and airspace.

Eventual administrative derivative acts: explain the required procedure (Recreational-sport and active tourism)

It would be too extensive to explain at this point the multitude of administrative acts that can be derived from the application of the regulations on tourism, recreational and sports activities. The important thing is to point out that, if we have concluded that the Autonomous Community of the Canary Islands holds important competences in the field of tourism and sports at the regulation level, it is evident that the Autonomous Community of the Canary Islands (or, where appropriate, the lower territorial entities, especially “Los Cabildos”) develops the competences regarding the management of these titles.

In this point we must point out as one of the great novelties of the new Statute of Autonomy of the Canary Islands the extension of the competences on the littoral and the terrestrial maritime public domain in the art. 157, especially:

- The establishment and regulation of territorial plans for the management and use of the coast and beaches, as well as the regulation of the procedure for processing and approving these instruments and plans.
- The management of titles of occupation and use of the maritime-terrestrial public domain, especially the granting of authorizations and concessions and, in any case, the concessions of fixed works at sea, respecting the exceptions that may be established for environmental reasons in Inland and transitional coastal waters.

In this sense it seems that, according to the new Statute of Autonomy, in the entire maritime-terrestrial public domain, the management of occupancy titles and use is autonomous competence.

Constraints

A general constraint for this sector (see table below) seems to be the tourism model of the Canary Islands. Environmental concerns related to this model are exceeding the carrying capacity, reducing impacts or becoming a sustainable activity. Administrative procedures for permitting tourism activities such as diving is also an important constraint. Mistrust among tourism operators such as divers, bathing and recreational fisheries also hampers the development of this sector (MarSP, 2019).

Table 129. Constraints to the development of the tourism sector (source: MarSP, 2019)

	Tourism
Legal	✓ Permitting procedures for diving are complex and time-consuming. Lack of follow-up of illegal centres ✓ Tourism model of Canarias ✓ There is no governance plan but management plan, which is not applied later on
Administrative	✓ Long and complex procedures. Lack of information and professional support to undertake procedures ✓ Lack of will from local, island and regional administrations to reach consensus and execute the plans ✓ Tourism model of Canarias
Economic	✓ Reach the balance between economic profit and carrying capacity to reduce impacts ✓ Tourism model of Canarias
Technological	✓ Tourism model of Canarias
Social	✓ Tourism activities such as diving are not well seen by users such as bathers and recreational fishers. Even not supported by local administrations despite the important economic revenues ✓ Tourism model of Canarias ✓ Disproportionate tourism growth affects society and the environment
Environmental	✓ Supporting a sustainable model that respects the resources

- ✓ Environmental tourism is becoming a harmful activity for the environment
- ✓ Carrying capacity of ecosystems
- ✓ Tourism model of Canarias
- ✓ Excessive tourism growth affects society and the environment

PART II

Current spatial distribution

The most detailed information about the beaches is obtained from the **Beach Guide of the Ministry for the Ecological Transition (MITECO)**. It is a service that aims to make citizens aware of the Spanish heritage of beaches through cartographic tools. For each beach a complete file is provided, including physical and environmental aspects, geographic extension data, meteorological information, data related to hospitals and nearest marinas, accesses, security, transportation and a variety of services associated with the beach, such as toilets, footbaths, showers, telephones, litter bin, cleaning services, umbrella rental services and hammock, establishments, children's areas, etc.

In the tool named as ***Herramienta de Pilotaje del Litoral Canario*** **(HPL)**, developed by the Coastal Management Service of the Vice-Ministry of Territorial Policy of the Canary Islands Government, the following information regarding the tourism sector is presented.

- **Bathing water areas and Environmental analysis sampling points.** Information prepared by the General Directorate of Public Health of the Ministry of Heath of the Government of the Canary Islands (data 2017). Bathing water is defined as the geographically delimited area of a municipal area composed of a beach and its bathing water and sampling points as the places designated by the health authority to carry out the sampling for the control of the quality of the waters of bathroom. These points return information on the annual quality of the water based on the evaluation of the series of analytical results of *Escherichia coli* and intestinal *Enterococci*, collected during the last four years, as established in the R.D. 1341/2007, of October 11, on the management of the quality of bathing water.
- **Beaches with Blue Flag and Q for tourist quality.** Information provided and published by the General Directorate of Public Health of the Canary Islands Health Service.
- **Delimitation of beaches**. Digitized data from Orthophoto, Topographic and oblique photos and territory in 3D. This proposal aims to define the occupation of the spaces in the DPMT area of the Canary Islands. It includes: physical area, management, useful, sheet of water and those elements that are part of the functioning of the beach (promenade, parking, jetties).
- **Blue trails.** They are itineraries that link beaches or ports with the Blue Flag and contribute, positively, to the sustainable use of the coast. For the award-winning municipalities it is a recognition of their work in the improvement and restoration of their natural and ethnological coastal heritage. In addition, the Blue Paths play an important social role, as they constitute excellent places for the enjoyment of nature and, also, as backbone elements for the development, health and well-being of society as whole.

- **Surf practice areas and wave catalog.** Point layer digitized from the information provided by public and private websites in different formats (geographic coordinates, plans, interactive maps):

  https://www.holaislascanarias.com

  https://es.magicseaweed.com/Canarias-Surf-Forecast/5/

  https://www.wannasurf.com/spot/Europe/Canary/

- **Areas for scuba diving.** Digitized from the information provided by the private web https://www.wannadive.net/spot/Europe/Canary/ in different formats (geographic coordinates, interactive maps).

In addition, from **IU-ECOAQUA (ULPGC)** was obtained information on the areas where whale watching and kitesurfing activities are carried out.

Table 130. Cartographic information available for tourism.

Name	Source	Organization	Date	Definition
Beach Guide of Spain	MITECO Metadata Catalog	MITECO	2018	List of the beaches of the Spanish Coast. Each beach is represented geographically on the map and has a series of attributes that describe it.
Link: https://www.miteco.gob.es/es/cartografia-y-sig/ide/descargas/costas-medio-marino/guia-playas-descargas.aspx				
Areas of bathing waters and Sampling Points	IDECanarias	GRAFCAN	2017	Information developed by *Dirección General de Salud Pública, de la Consejería de Sanidad del Gobierno de Canarias.*
Link: https://www.idecanarias.es/listado_servicios/zonas-de-aguas-de-ba%C3%B1o-y-puntos-de-muestreo **WMS:** https://idecan2.grafcan.es/ServicioWMS/ZB_PM?				
Blue Flag and Q	HPL	Government of the Canary Islands	2008	Identification of the beaches from Canary Islands with Blue Flag and Q for touristic quality.
Delimitation of beaches	HPL	Government of the Canary Islands	2008	Includes: physical surface, management, useful sheet of water and those elements that are part of the operation of the beach (Promenade, parking, jetties).
Blue trails	HPL	Government of the Canary Islands	2008	
Surf Areas and Catalog of waves	HPL	Government of the Canary Islands	2018	Surf areas and places that identify the waves present in the Canary Islands, giving information about their denomination, location and characteristics (size, direction, etc.).
Scuba diving	HPL	Government of the Canary Islands	2018	Scuba diving areas in the Canary Islands.
Link HPL: http://www.pilotajelitoralcanario.es/				
Whale watching areas	IU-ECOAQUA	IU-ECOAQUA		Areas where whale watching activities are carried out.
Kite surf areas	IU-ECOAQUA	IU-ECOAQUA		Areas where kitesurfing activities are carried out.

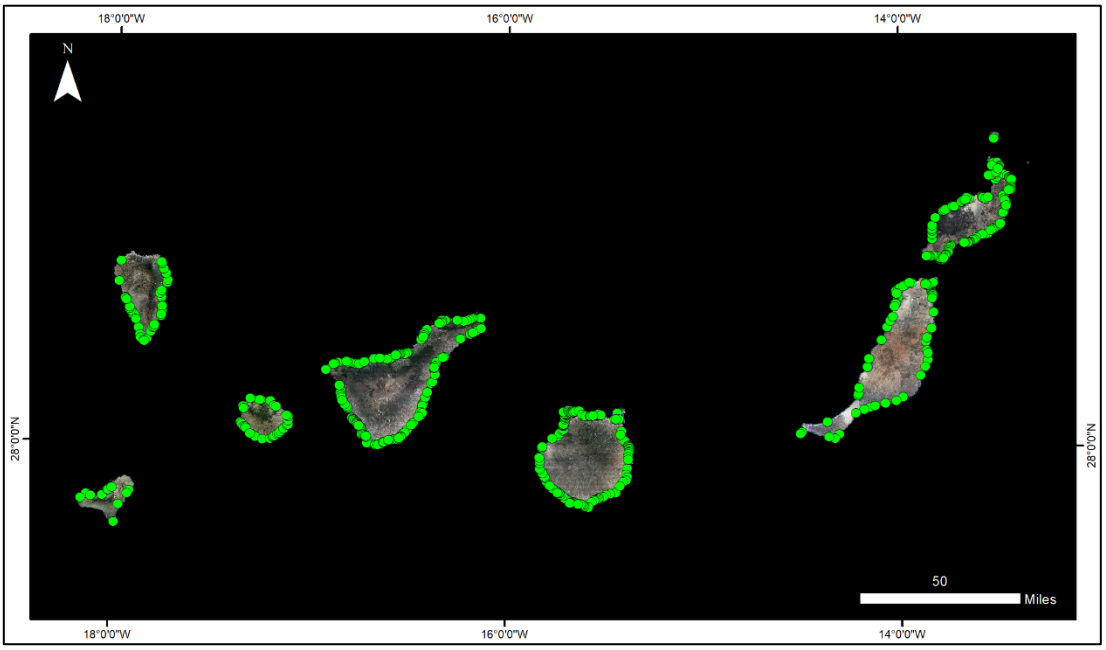


Figure 283. Beach guide (source: IDE MITECO, 2019).

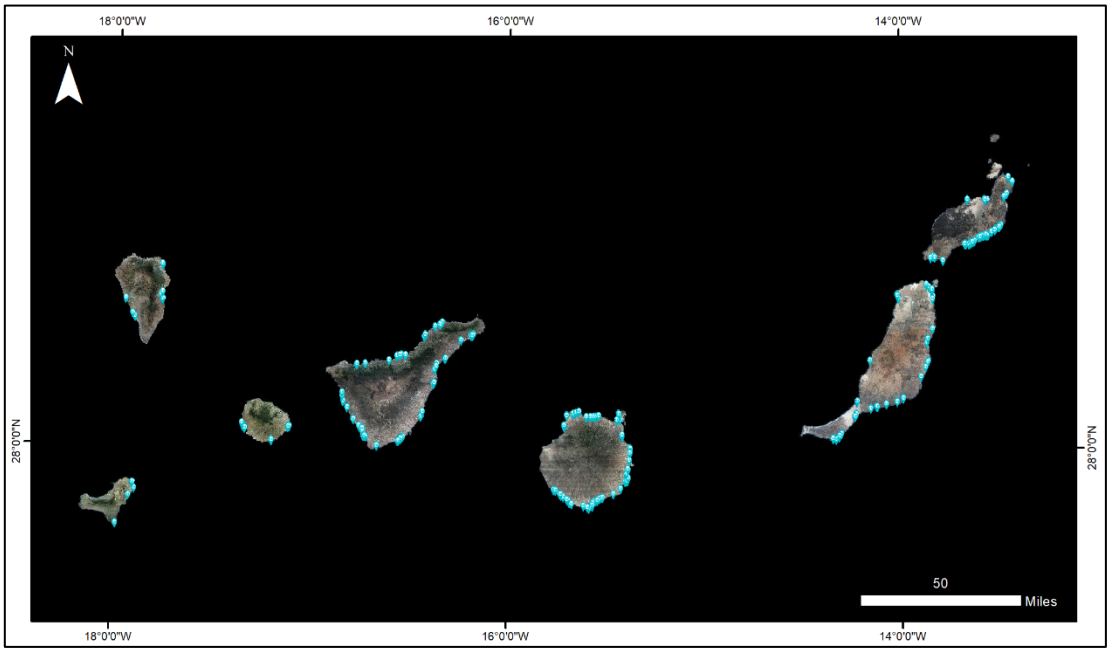


Figure 284. Areas of bathing waters and sampling points (source: IDE Canarias, 2019).

Figure 285. Areas of bathing waters and sampling points. Sample: Teresitas beach (source: IDE Canarias, 2019).

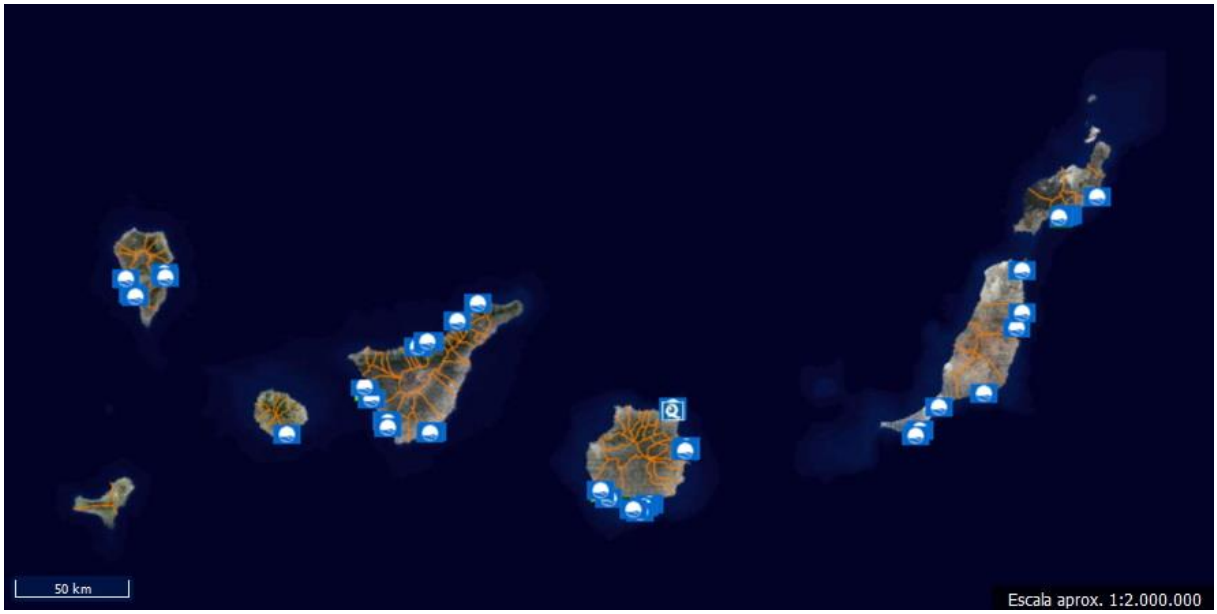


Figure 286. Beaches with Blue Flag and Q (source: viewer HPL, 2019).

Figure 287. Delimitation of beaches. Sample: Fuerteventura North (source: viewer HPL, 2019).

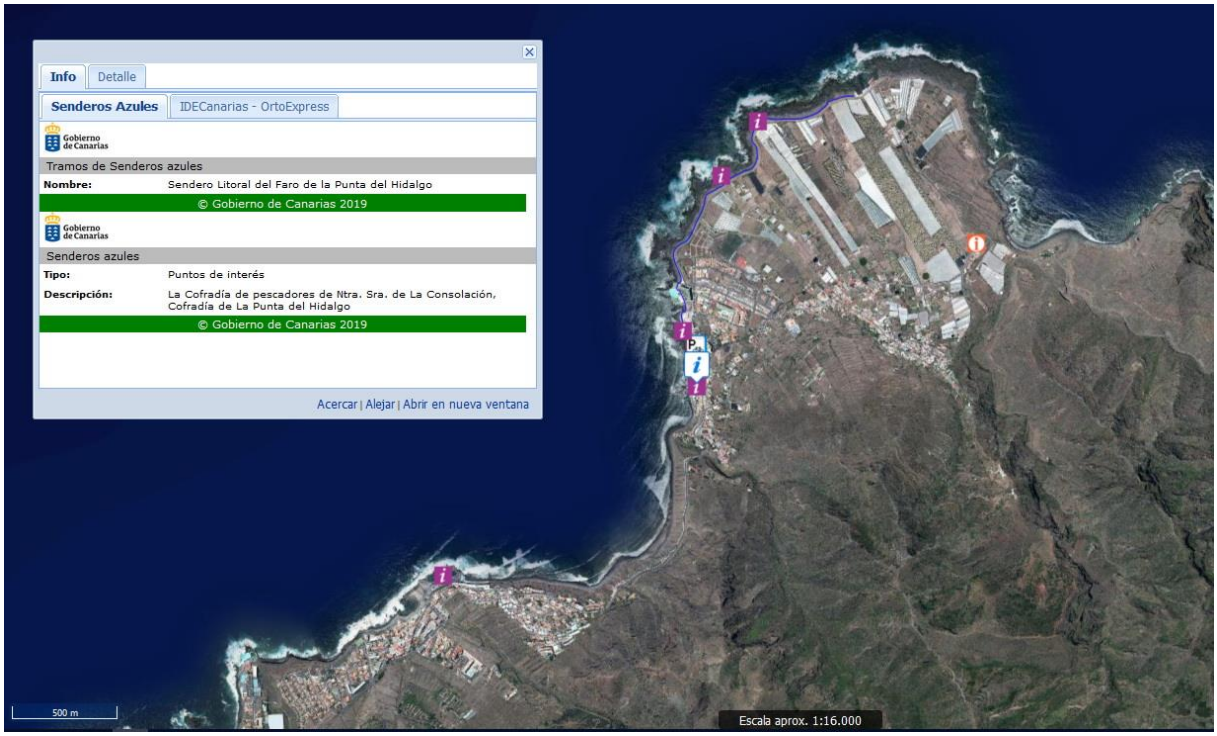


Figure 288. Blue trails. Sample: Sendero Litoral del Faro de la Punta del Hidalgo (source: viewer HPL, 2019).

Figure 289. Surf areas (source: viewer HPL, 2019).

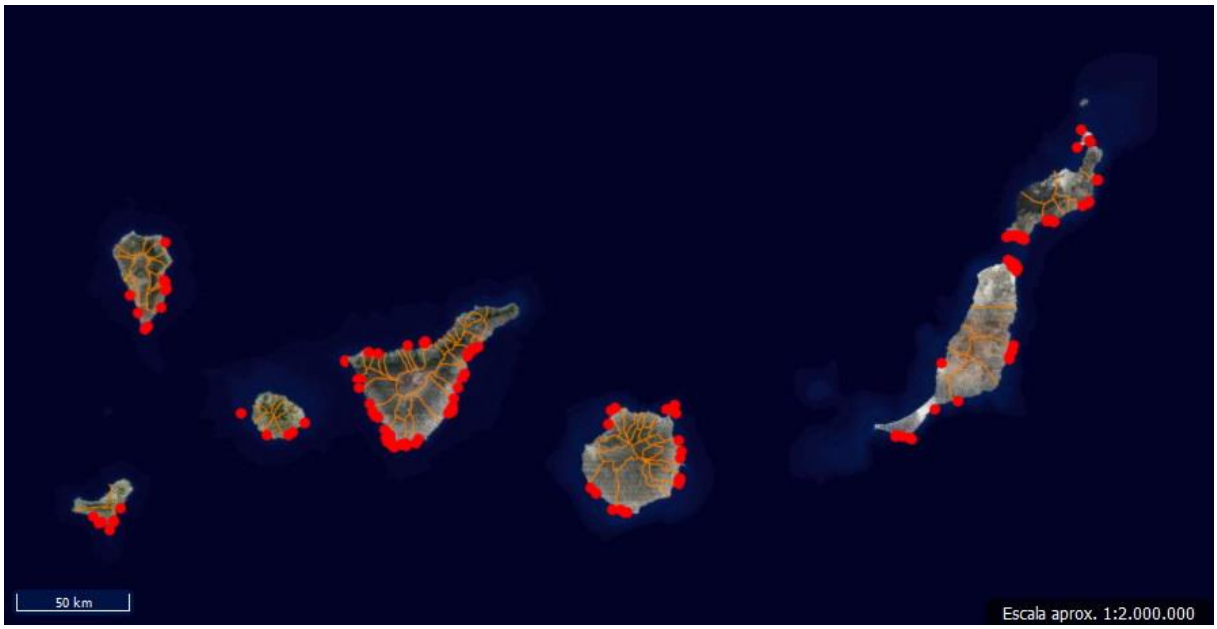


Figure 290. Scuba diving areas (source: viewer HPL, 2019).

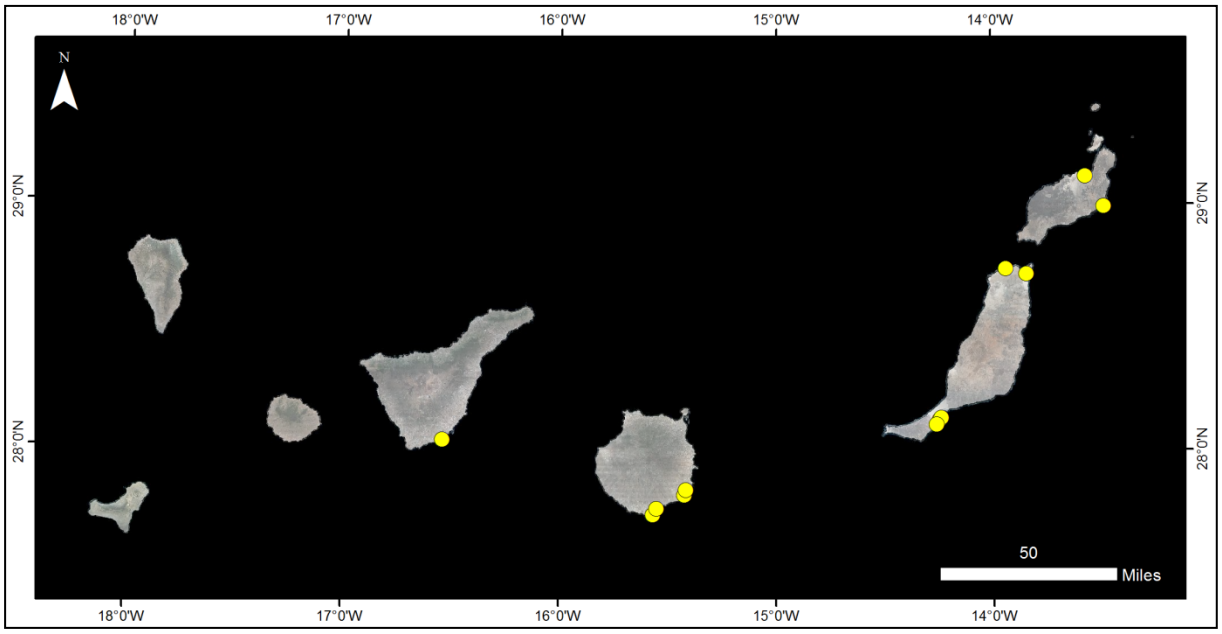


Figure 291. Kitesurfing areas (source: IU-ECOAQUA).

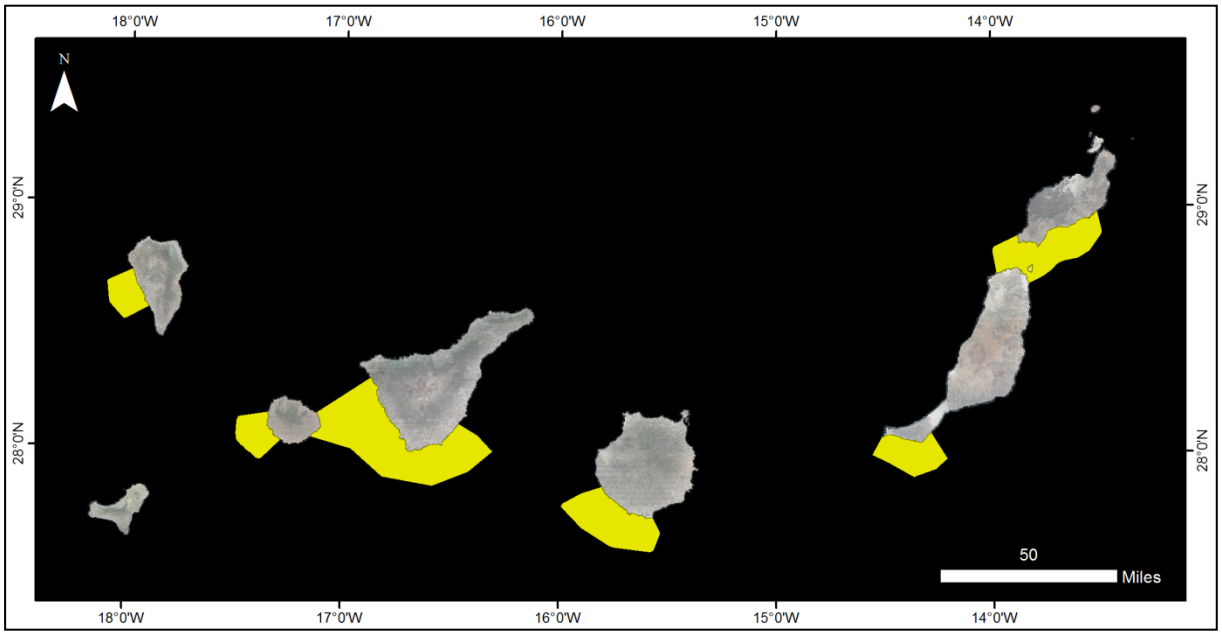


Figure 292. Whale watching areas (source: IU-ECOAQUA).

PART III

Analysis of interactions

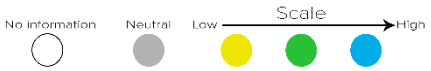
Interaction with other sectors

According to participants of the 2nd MarSP stakeholder workshop of the Canary Islands, tourism have synergies with most of the maritime sectors (see table below). High synergies are with energy, ports, navigation, infrastructures, scientific research and underwater heritage.

Fisheries, aquaculture and environmental protection have medium synergies. Many of the activities at sea may become a tourism attraction such as artisanal fisheries, aquaculture ponds or wind turbines. Scientific tourism and 'green'/responsible tourism in protected areas may also be sources of revenues (MarSP, 2019).

Table 131. Degree of synergy of the tourism sector with other maritime sectors (source: MarSP, 2019)

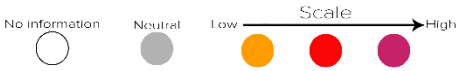
Tourism			
Aquaculture		Navigation and maritime transportation	
Fisheries		Infrastructures	
Mineral resources		Scientific research and marine biotechnology	
Energy		Underwater archaeology and cultural heritage	
Defence		Environmental conservation and Marine Protected Areas	
Ports			



According to participants in the 2nd MarSP stakeholder workshop of the Canary Islands (see table below), tourism has important conflicts with infrastructures, scientific research, environmental conservation, and mineral resources (high conflict); and aquaculture, fisheries, energy, defence and navigation. Environmental conservation is one of the sectors that may be adversely affected by mass tourism (e.g. endangered species) (MarSP, 2019).

Table 132. Degree of conflicts of the tourism sector with other maritime sectors (source: MarSP, 2019)

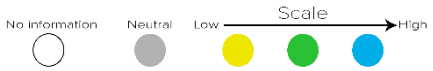
Tourism			
Aquaculture		Navigation and maritime transportation	
Fisheries		Infrastructures	
Mineral resources		Scientific research and marine biotechnology	
Energy		Underwater archaeology and cultural heritage	
Defence		Environmental conservation and Marine Protected Areas	
Ports			



Land-sea interactions

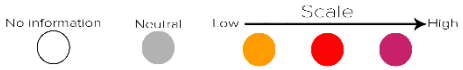
Tourism presents important synergies with all land uses according to the opinions of stakeholders (see table below). These synergies are particularly high for bathing areas, terrestrial protected areas, tourism areas, airports and roads. In the case of airports and roads, these allow to increase the tourism capacity (MarSP, 2019).

Table 133. Degree of synergy of the tourism sector with land-use sectors (source: MarSP, 2019)

Tourism		
		
A	Natural, cultural and landscape areas	
B	Bathing areas	
C	Built-up areas in risk zones	
D	Marine Protected Areas	
E	Terrestrial Protected Areas	
F	Built-up areas	
G	Agriculture, forestry and other uses	
H	Tourism potential areas	
I	Airports	
J	Roads	

Tourism also presents many conflicts with land uses (see table below). These conflicts mainly have medium intensity, except for airports that have a high conflict. An intensive tourism without the appropriate impact assessment may be negative in the case of natural and cultural areas and protected areas (MarSP, 2019).

Table 134. Degree of conflict of the tourism sector with land-use sectors (source: MarSP, 2019)

Tourism		
		
A	Natural, cultural and landscape areas	
B	Bathing areas	
C	Built-up areas in risk zones	
D	Marine Protected Areas	
E	Terrestrial Protected Areas	
F	Built-up areas	
G	Agriculture, forestry and other uses	
H	Tourism potential areas	
I	Airports	
J	Roads	

SCIENTIFIC RESEARCH AND MARINE BIOTECHNOLOGY

PART I

Sector characterization

The geographical location of the Canary Islands in the Central North Atlantic and its environmental conditions make the Canary Islands an excellent natural research laboratory for observing the ocean processes of global interest and in particular for Europe. There are several infrastructures and research centers centered in marine biotechnology:

- PLOCAN, The Oceanic Platform of the Canary Islands (https://www.plocan.eu/index.php/es/) is a floating laboratory for development of advanced marine technologies with the objective of building, equipping and operating a set of marine infrastructures for research in the field of marine sciences and technologies. It is the hub of numerous research projects ranging from marine biology to vehicle design (Figure 293). PLOCAN has an offshore platform infrastructure, built over a caisson which rests on the seabed, located in the NE of Gran Canaria, at 30.5 m depth and with a Surface of 5000 m^2. It also has a marine smart grid whose main function is to provide support for experimenting and testing new technologies that use marine energy resources to generate electricity and for connecting technologies for observation and increasing depths. Finally, the so called the VIMAS base (Vehicles, Instruments and Submarine Machines) has as main goal to provide a permanent service of Operational Support through a multidisciplinary fleet of cutting-edge autonomous ocean platforms and instruments, to all those activities with needs related to ocean monitoring from the perspective of technological development, marine sciences, training and cooperation with institutions and technology-based companies.

Figure 293. PLOCAN offshore platform

- The Technological Institute of the Canary Islands (ITC, http://www.itccanarias.org/) is a public enterprise established by the Government of the Canary Islands in 1992, and attached to the Department of Employment, Industry and Trade of the regional government. It has several centers in the islands of Tenerife and Gran Canaria. Most of their research projects were and actually are orientated to marine biotechnology and/or marine sciences. Some examples are the creation of a marine genetic bank of the Macaronesia, the improvement

of the quality of the recreational and coastal waters of Macaronesia or the production of algae on a semi-industrial scale or the desalination of seawater by reverse osmosis using photovoltaic solar energy. Nowadays, the ITC has a Platform named BIOASIS - Platform of Excellence in Blue Biotechnology with the main purpose of the implementation in Gran Canaria of marine bio-industry based on the area of marine animal cultures and marine plant biotechnology.

- EMODnet (The European Marine Observation and Data Network) and in particular the EMODnet Human Activities Portal that aims to facilitate access to existing marine data on activities carried out in EU waters by building a single entry point for geographic information on 14 different themes, has four projects running in the Canary Islands with the objective of obtain data from waves and ocean energy (Figure 294) (http://www.emodnet-humanactivities.eu/view-data.php).

Figure 294. Location of the four wave stations in the Canary Islands within EMODNET

- The Spanish Bank of Algae (BEA- Banco Español de Algas, http://marinebiotechnology.org/es/) located in Telde, is a service of the Marine Biotechnology Center (CBM-Centro de Biotecnología Marina) of the University of Las Palmas de Gran Canaria (ULPGC), whose objectives are the isolation, identification, characterization, conservation and provisioning of microalgae and Cyanobacteria. It has a collection of over 1,600 strains from the macaronesic region. The main research lines are the development of a new agro-industrial activity for the Canary Islands, the cultivation and industrial use of marine micro- and macroalgae as non-polluting biotechnology, the development of a high-value metabolite-producing algae bioindustry for biomedicine, the development and assessment of an algae bio-industry for Thalassotherapy, Dermocosmetics and Dietetics and the development of an organic bio-industry of algae producers of Agricultural Biostimulants, suitable for Ecological Agriculture.

- The Ecoaqua University Institute (http://ecoaqua.ulpgc.es/en) is a Universitary Institute aiming at promoting of research, innovation and postgraduate training in the conservation and sustainable use of coastal resources and in the development of aquaculture in the ULPGC (University of Las Palmas de Gran Canaria). They have an Aquaculture research group (GIA), a Group in Biodiversity and Conservation (BIOCON), a group that study the Marine Organisms Ecophysiology (EOMAR) and a Group of Tourism, Territorial Planning and the Environment (TOTMA), all of them working on several lines of research on marine resources.

- The Canarias Oceanographic Center located in Tenerife, (http://www.ieo.es/es/web/canarias) is one of the nine Oceanographic Centres of the IEO (www.ieo.es). Some of their research lines are the study of the dynamics of fish, cephalopod and crustacean populations of commercial interest, monitoring of artisanal and/or industrial fishing activity, impact of fishing on the ecosystem, biology and ecology of the main species of commercial and/or ecological interest, the study of the biodiversity and ecological processes in coastal and deep-water ecosystems, monitoring of vulnerable marine ecosystems, habitats and sensitive species, incidence of environmental conditions, specific interrelation and anthropogenic action on marine living resources and the ecosystem, study of marine reserves as a figure of Marine Protected Areas, etc. It also has a experimental plant of marine cultures.

- The POSEIDON PROGRAM is developed by the Canary Science and Technology Park Foundation of the ULPGC with the support of the Biodiversity Foundation it is a citizen science program that has scientific validation, aimed at the sighting of marine species in the coastal and marine environment of the Canary Islands (http://www.geoportal.ulpgc.es/programaposeidon/index.html).

Legal framework and constraints

Constraints

Scientific research is particularly hampered by economic constraints such as insufficient and non-stable funding (see table below). As a consequence of this, there are some social (instability of research teams) and technological (lack of renewal and maintenance of equipment and tools) implications too (MarSP, 2019).

Table 135. Constraints to the development of the scientific research and marine biotechnology sectors (source: MarSP, 2019)

Scientific research and marine biotechnology	
Legal	✓ There is no governance plan but management plan, which is not applied later on
Administrative	✓ Lack of will from local, island and regional administrations to reach consensus and execute the plans
Economic	✓ Need for a stable funding over time ✓ Private and public funding for research need to be increased ✓ Need for further resources in research for a better planning ✓ Lack of stable funding for research projects and personnel
Technological	✓ More investment in scientific infrastructure. Lack of maintenance and renewal of the existing infrastructure
Social	✓ Difficulties to maintain stable research teams due to instability and projects' funding timelines

PART II

Current spatial distribution

Among the areas for scientific research we have the concession of **Oceanic Platform of the Canary Islands (PLOCAN)** available in the HPL viewer and in the EMODnet Human Activities test site. The test bench is constituted by an area of maritime-terrestrial public domain located off the north-east coast of Gran Canaria whose management aims to promote marine R&D&I. It is a surface area of approximately 23Km^2, with maximum depths of 600 meters, for the testing and monitoring of marine energy devices equipped with the observation capacity of meteo-oceanographic parameters and which will have an electrical and communication infrastructure for the evacuation to ground of energy and data of the device under test in the test beach.

On the other hand, it presents the buoy and tide gauge stations that will contribute to the monitoring of the marine strategies of Spain, provided by the Ministry for the Ecological Transition.

Third, ocean energy facilities (project locations), provided by EMODnet Human Activities, are shown. Geodatabase on Ocean Energy projects in the EU was created in 2014 by AZTI-Tecnalia for EMODnet. It is the result of the aggregation and Geodatabase on Ocean Energy projects in the EU was created in 2014 by AZTI-Tecnalia for EMODnet. It is the result of the aggregation and harmonization of datasets provided by several sources from all across the EU. The database contains points representing Ocean Energy project sites. In the Canary Islands there are four wave projects, some already completed.

Table 136. Cartographic information available for scientific research and marine biotechnology.

Name	Source	Organization	Date	Definition
Concession of the PLOCAN	HPL EMODnet	Government of the Canary Islands	2008	Delimitations of the concessions granted in the DPMT to the PLOCAN (Plataforma Oceánica de Canarias).
Link: http://www.pilotajelitoralcanario.es/ **Link:** http://www.emodnet-humanactivities.eu/search-results.php?dataname=Test+Sites				
Stations y transects Marine Strategy Framework Directive (MSFD)	IDE MITECO	MITECO	2018	Buoys stations, tide gauges and transects that will contribute to the monitoring of the Marine Strategy of Spain.
Link: https://www.miteco.gob.es/es/cartografia-y-sig/ide/descargas/costas-medio-marino/estaciones-transectos-estrategias-marinas-espana.aspx				
Ocean Energy Facilities (Project Locations)	EMODnet Human Activities	EMODnet		The database contains points representing Ocean Energy project sites.
Link: http://www.emodnet-humanactivities.eu/search-results.php?dataname=Project+Locations				

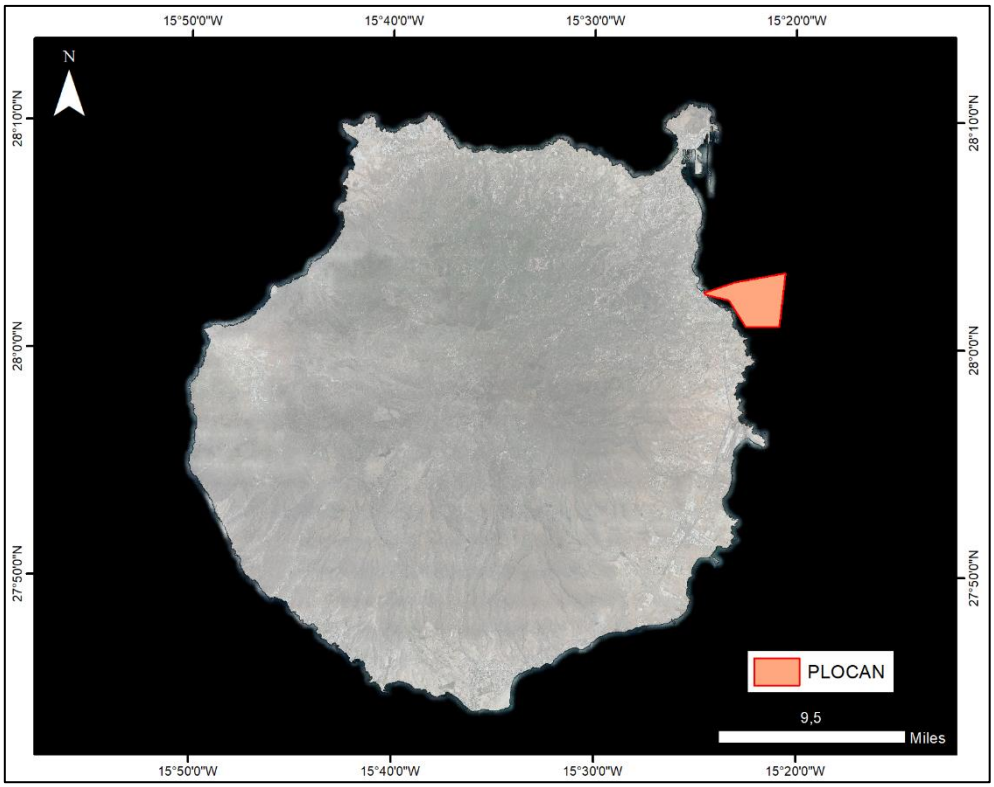


Figure 295. PLOCAN (source: EMODnet Human Activities, 2019).

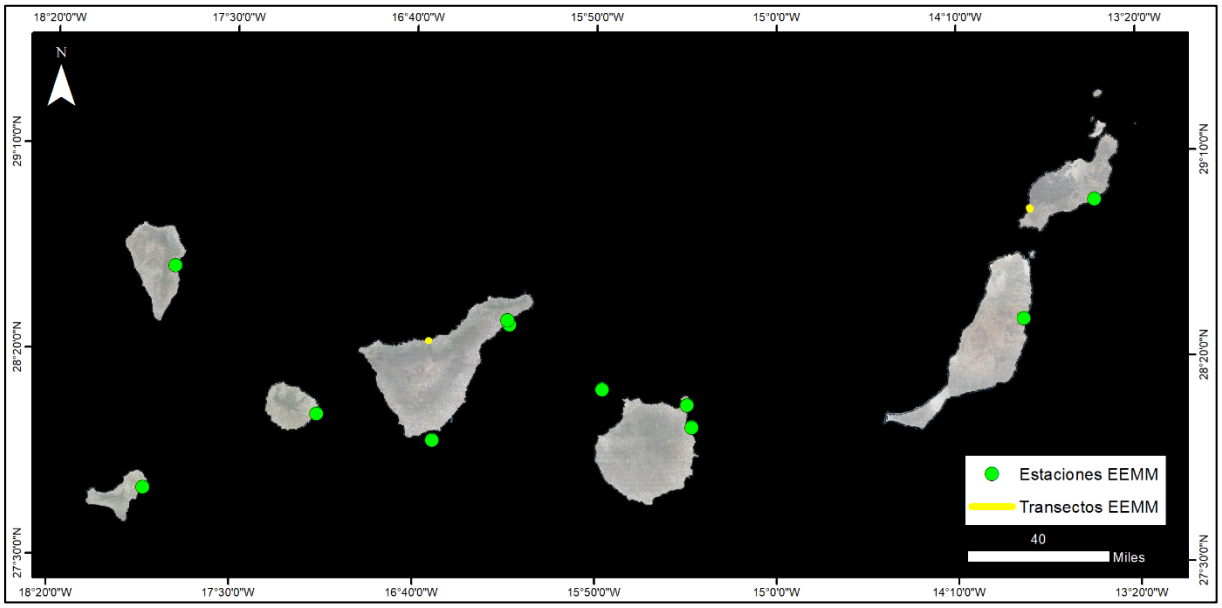


Figure 296. Sampling stations of Marine Strategy Framework Directive (source: IEO).

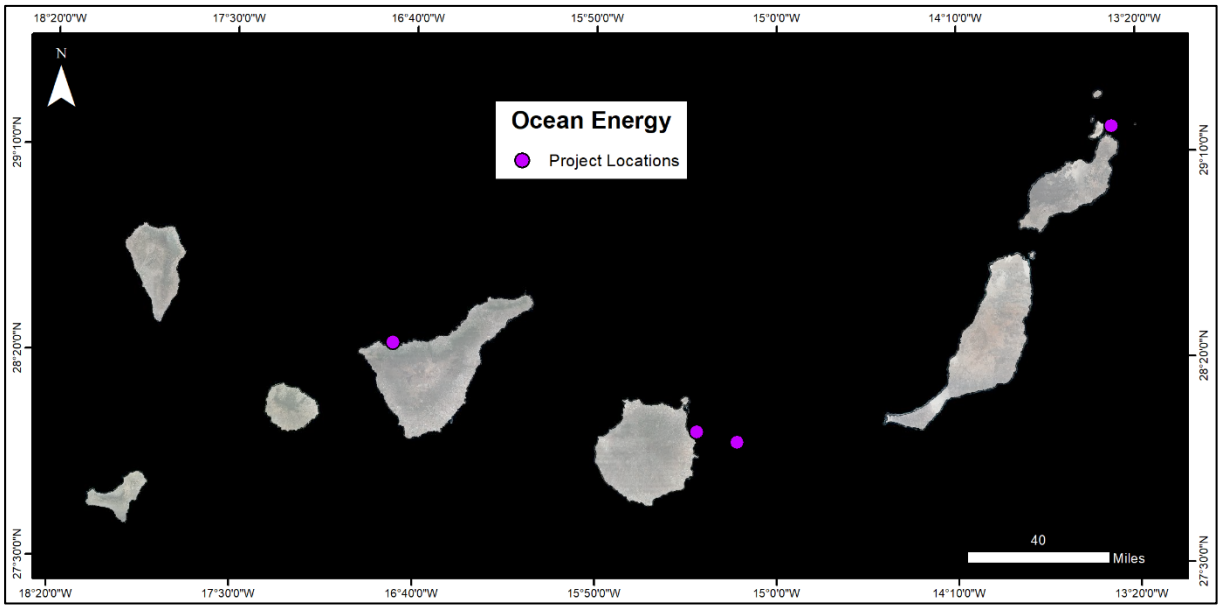


Figure 297. Project locations of ocean energy (source: EMODnet Human Activities, 2019).

PART III

Analysis of interactions

Interaction with other sectors

This sector presents many synergies with all maritime sectors except for defence and ports (see table below). These synergies are particularly high for aquaculture, fisheries, infrastructures, tourism, underwater heritage, and environmental conservation. Scientific research benefits most of the maritime sectors by advancing technology that allows a more efficient use and sustainability generally. In the case of energy this may contribute developing biofuels using marine resources. For fisheries and aquaculture this sector helps controlling and monitoring poison in both recreational and commercial species (MarSP, 2019).

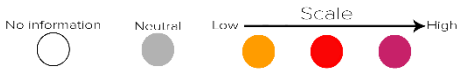
Table 137. Degree of synergy of the scientific research and marine biotechnology sectors with other maritime sectors (source: MarSP, 2019)

Scientific research and marine biotechnology			
Aquaculture		Navigation and maritime transportation	
Fisheries		Infrastructures	
Mineral resources		Tourism	
Energy		Underwater archaeology and cultural heritage	
Defence		Environmental conservation and Marine Protected Areas	
Ports		Scale: No information, Neutral, Low, High	

Scientific research also presents conflicts with most of the maritime sectors (see table below). These are high conflicts in the case of ports, navigation, infrastructures and tourism (MarSP, 2019).

Table 138. Degree of conflicts of the scientific research and marine biotechnology sectors with other maritime sectors (source: MarSP, 2019)

Scientific research and marine biotechnology			
Aquaculture		Navigation and maritime transportation	
Fisheries		Infrastructures	
Mineral resources		Tourism	
Energy		Underwater archaeology and cultural heritage	
Defence		Environmental conservation and Marine Protected Areas	
Ports			



Land-sea interactions

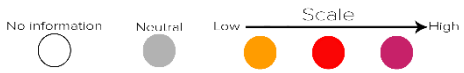
This sector has synergies with most of land-uses (see table below), particularly with protected areas, natural and cultural areas, and built-up areas in risk zones. The increased sustainability that this sector may provide to conservation areas explains these high synergies. Agriculture was recognised as a medium synergy because of the contribution that scientific research can give to the sector with marine-based compounds (MarSP, 2019).

Table 139. Degree of synergy of the scientific research and marine biotechnology sectors with land-use sectors (source: MarSP, 2019)

Scientific research and marine biotechnology		
A	Natural, cultural and landscape areas	
B	Bathing areas	
C	Built-up areas in risk zones	
D	Marine Protected Areas	
E	Terrestrial Protected Areas	
F	Built-up areas	
G	Agriculture, forestry and other uses	
H	Tourism potential areas	
I	Airports	
J	Roads	

Scientific research mainly presents medium and low conflicts with land uses (see table below). The most important conflicts are identified with all built-up areas, tourism potential areas and airports (MarSP, 2019).

Table 140. Degree of conflict of the scientific research and marine biotechnology sector with land-use sectors (source: MarSP, 2019)

Scientific research and marine biotechnology		
		
A	Natural, cultural and landscape areas	
B	Bathing areas	
C	Built-up areas in risk zones	
D	Marine Protected Areas	
E	Terrestrial Protected Areas	
F	Built-up areas	
G	Agriculture, forestry and other uses	
H	Tourism potential areas	
I	Airports	
J	Roads	

UNDERWATER ARCHAEOLOGY AND CULTURAL HERITAGE

PART I

Sector characterization

Salt Pans (salinas)- 85% of the salt consumed in the Canary Islands is of mineral origin, not marine. Salt is always natural, whatever the extraction process. It is known that the aborigines in the Canary Islands already collected the salt from the ponds, cultivating it and using it with meat and fish. In the middle of the 16th century, the first salt pans were built on rocks. The process was very similar to the one used by the aborigines, they took advantage of the highest tides and the water deposited in the puddles was transported by the "salineros" in cubes, on shoulders to a higher area ("cocederos"). After a few days (app 20) under the sun salt was left alone. In the mid-seventeenth century the exploitation of salt becomes essential in the Canary Islands, and thus "salinas" are built on the southwest coast of Gran Canaria, north and south of Lanzarote and Fuerteventura.

Nowadays only a few survive, fortunately and rightly they are protected, either because of their architectural interest being declared of Cultural Interest (BIC) or because of their natural interest as a Natural Area because they are areas of great relevance for birdlife. The salinas that currently survive in the Canary Islands are: the Salinas de Fuencaliente in La Palma (Figure 298); Salinas de Bufadero in Bañaderos, Arucas, Gran Canaria; Salinas de Bocacangrejo, Salinas de la Florida and Salinas de Arinaga in Agüimes, Gran Canaria; Salinas de Tenefé in Pozo Izquierdo, Santa Lucía, Gran Canaria; Salinas del Carmen in Antigua, Fuerteventura; Salinas de los Agujeros in Teguise, Lanzarote and Salinas de Janubio in Yaiza, Lanzarote (Figure 299).

Figure 298. Salinas in Fuencaliente (La Palma)

Figure 299. Localization of the salinas (salt pans) in the Canary Islands (http://www.pilotajelitoralcanario.es/)

Wells to dry lupines ("secaderos de chochos" in local language)- The" chocho" is a bitter fruit with a white color that is obtained from *Lupinus Albus*, a legume plant of the *Fabaceae* family. It is also used to feed cattle, although it is also edible for humans if it is extracted bitterness and neurotoxic alkaloids, after macerating it for more than twelve hours in salt water, modifying both its properties and its color, which becomes more yellowish. In most of Spain it is also known as "altramuces". Their use in the Canary Islands came from the nineteenth century, as it was a food that served both for people and animals. They took advantage of both the plant (as fertilizer and fodder) and the fruit. This legume is sown between November and January to be harvested in summer. Traditionally, chochos were prepared to consume directly or turn them into "gofio" (corn or wheat flour. They were placed into wells close to the sea that were usually natural holes through which sea water is filtered. After a while they were extracted from the wells extended to the sun in the dryers. In the Island of La Palma there are some wells and dryers still in use. Thus the Porís de Tigalate is the best conserved of the Island (Figure 300).

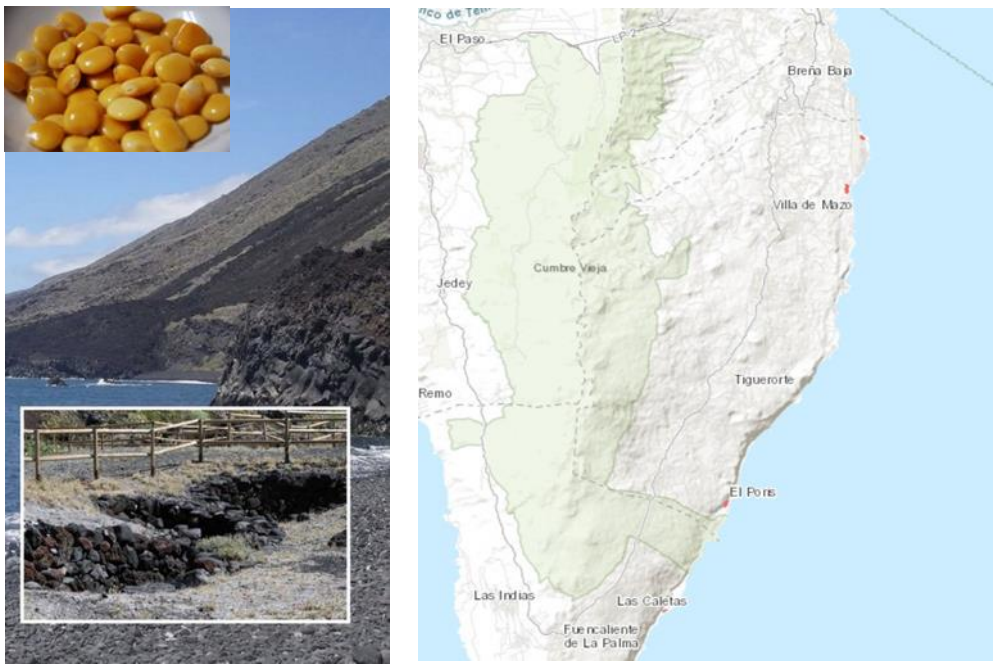


Figure 300. Traditional wells and dryers of chochos (upper corner) (left) and Wells and dryers of La Palma (right) (https://www.arcgis.com/home/webmap/print.html)

Lighthouses- According to data from the Government of the Canary Islands there a total of 29 lighthouses, as seen in Figure 301. The province of Santa Cruz de Tenerife has 13 lighthouses while the province of Las Palmas de Gran Canaria has 16 (http://www.pilotajelitoralcanario.es/). Apart from them there are multiple maritime signals along their coasts.

Figure 301. Localization of the 29 lighthouses in the Canary Islands (http://www.pilotajelitoralcanario.es/)

Underwater cultural resources- Law 4/99 of March 15 of the Historical Heritage of the Canary Islands is adapted to the peculiarities of the Archipelago and assumes as an objective the compatibility of the preservation of the historical heritage with its enjoyment as a cultural object, without prejudice to its use as an economic resource.

The first references of findings located in Canarian waters date from the beginning of the sixties of the previous century and are centered in Gran Canaria, Tenerife and in the easternmost islands of the archipelago, La Graciosa and Lanzarote. However the findings were casual and made by fishermen and sportive divers. Based on these discoveries, new findings will take place through the other islands, mostly related to the recovery of ceramic amphoras of difficult chronological affiliation, such as those that occurred in the Islet of Fermina (Arrecife, Lanzarote), on the coast of San Andrés and Punta de Guadamojete (Tenerife), and in the Port of Las Palmas and on the coast of Gáldar (Gran Canaria). Since the beginning of the nineties, a series of work had begun aimed at cataloging and inventing the underwater archaeological sites of the different islands, mostly commissioned by the General Directorate of Historical Heritage of the Government of the Canary Islands.

Figure 302 shows the sites where wrecks or other historical underwater founds were discovered along the island. Some examples of the richness of this underwater heritage are the wrecks found in the Playa del Agujero (Gáldar), the Playa del Burrero (Ingenio) and the Old San Telmo Pier (Las Palmas de Gran Canaria); other underwater areas that exhibit a high archaeological value are the Port of Sardina del Norte (Gáldar), the littoral of the Castle of Romeral (San Bartolomé de Tirajana) and the Bay of Gando (Telde). In this last place two wrecks were found, the wrecks of "Alfonso XII" and "Ville de Pará" (Olmo, 2010).

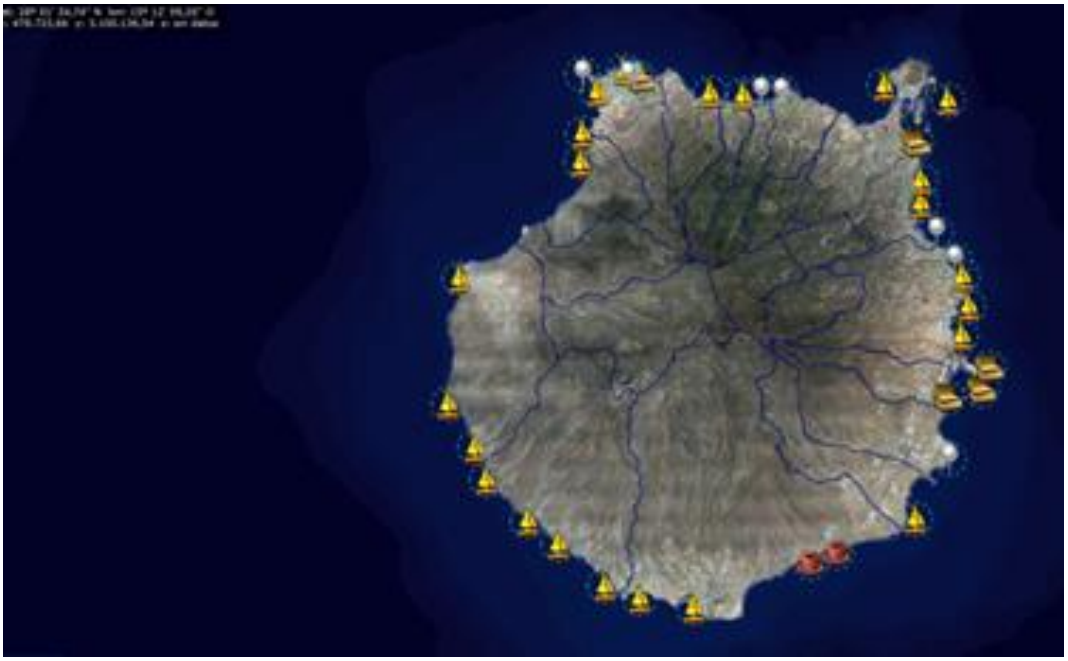


Figure 302. Sites of Gran Canaria Island were wrecks and other underwater deposits are discovered (www.pilotajelitoralcanario.es/)

Regarding Tenerife Island several submarine wrecks were found along its coast. Some of them were found in Punta de Guadamojete, Anaga, Güímar, Muelle de Santa Cruz, Garachico, Punta de Teno, El Pris, Puerto de La Cruz and in Los Cristianos and are shown in Figure **303** (Plan insular de Ordenación de Tenerife (https://www.tenerife.es/planes/PIOT/adjuntos/ADef_E-Base_Puertos_Feb2011_13.pdf).

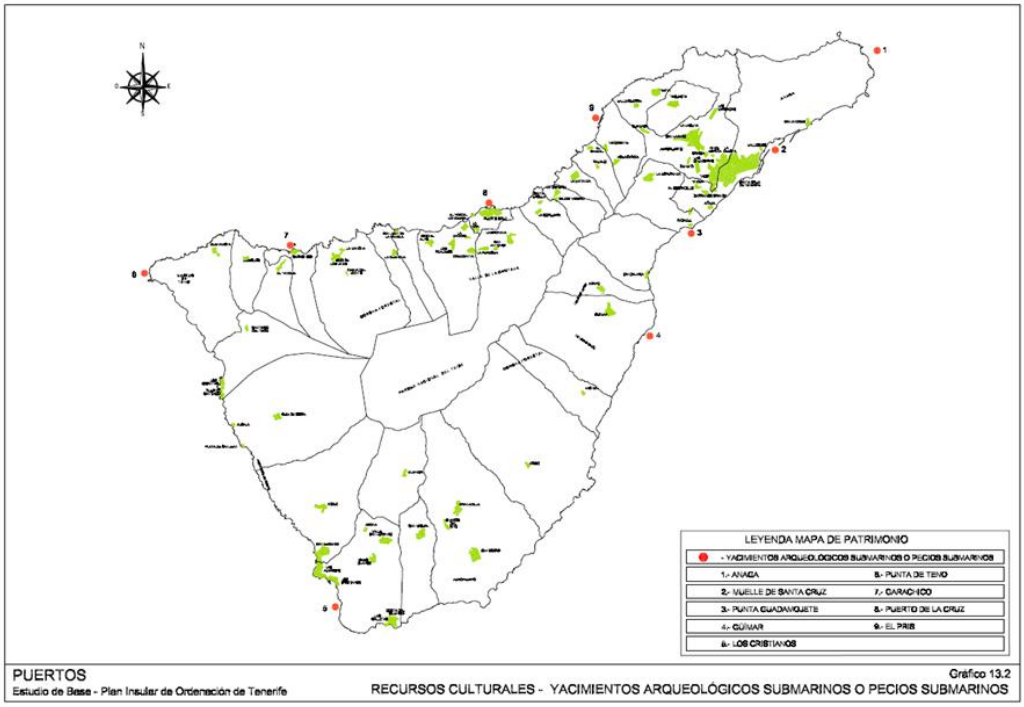


Figure 303**. Underwater archaeological sites or wrecks found in Tenerife** (https://www.tenerife.es/planes/PIOT/adjuntos/ADef_E-Base_Puertos_Feb2011_13.pdf).

In Fuerteventura, the most famous wreck corresponds to the sinking of the ship "El Griego" in Pájara, which has given rise to the name of Arrecifes del Griego, at the most prominent point of Punta de Jandía (Escribano and Medero, 2000).

Legal framework and constraints

Legislation applicable to the Canary Islands context: summarize the applicable legislation and the developed matters

Preamble of Law 4/1999, of March 15, of Historical Heritage of the Canary Islands:

- The Canarian historical heritage constitutes not only the deposit but the support of that Atlantic and island identity, in which the cosmopolitan condition and the universal vocation of the Canarian nationality are consolidated. A legacy that demonstrates the wisdom and art of the Canarian people that preceded us and offers the keys to understand the path that led us, through the times, to our current reality, to what we are today.

- The protection of the underwater cultural heritage in the context of the management of the Canary marinate spatial in the Canary Islands plays an important role. In fact, in accordance with current international and local legislation, the protection of underwater cultural heritage has priority over any other commercial need, in order to block any initiative that is not in accordance with the protection and conservation of the heritage itself.

- According to the experts Gabriel Escribano Cobo and Alfredo Mederos Martin, the Canary Islands, in fact, are one of the sites of greatest risk of destruction of underwater heritage at the level of the Spanish State, due to the continuous remodelling of ports and the even more intensive process of regeneration of beaches.

- The legislation, as it will be analysed, is quite developed because at the international level the UNESCO Convention has been ratified, specifically dedicated to this topic. On a practical level, it seems that there are strong complaints about real surveillance with respect to heritage. Historically, the need to protect underwater cultural heritage arose from the increasing accessibility to the ocean floor by human beings. At the end of the 1940s, in fact, it was already possible to access the bottom and reach the trails protected by water. The main problems that have been registered since then have been:

    - Destruction, although unconscious, by visitors or scientists who brought to the surface objects that deteriorated;
    - Looting of ancient remains by thieves;
    - Insufficient legal protection due to ignorance.

It is easy to understand to what extent these circumstances set in motion a rapid process of protection, considering the invaluable source of information that underwater cultural heritage has on ancient civilizations. The initial impulse was given by the United Nations Convention on the Law of the Sea, (Montego Bay, December 10, 1982), according to which, to articles 149 and 303: a first indicative definition of those objects of the underwater cultural heritage that should be considered protected is provided:

- **Article 149** Archaeological and historical objects. All objects of an archaeological and historical nature found in the Area shall be conserved or disposed of for the benefit of all mankind, particularly taking into account the preferential rights 89 of the State or country of origin, the State of cultural origin or the State of historical and archaeological origin; States are forced to protect their underwater cultural heritage:

- **Article 303** Archaeological and historical objects found in the sea. 1) States have the obligation to protect archaeological and historical objects found in the sea and will cooperate to that end. 2) In order to control the traffic of such objects, the coastal State, in applying article 33, may presume that the removal of those from the seabed in the area referred to in that article without its authorization constitutes an infraction, committed in its territory or in its territorial sea, of the laws and regulations mentioned in said article. 3) Nothing in this article shall affect the rights of the identifiable owners, the rules on salvage or other rules of maritime law or the laws and practices regarding cultural exchanges. 4) This article shall be without prejudice to other international agreements and other norms of international law relating to the protection of archaeological and historical objects.

In any event, since no detailed indications on such protection are provided, paragraph 4 of the second of these articles provides for the possibility of a more specific international agreement in this regard. On January 2, 2009, in fact, in Spain came into force the UNESCO Convention on the Protection of the Underwater Cultural Heritage (2001), so that from the time of its publication has become part of the Spanish legal system and with a higher rank than the existing legislation to date. The Convention is an international agreement, independent of any other treaty, and is especially dedicated to the protection of underwater cultural heritage, which recognizes being an integral part of the cultural heritage of humanity. Specifically, the Convention introduces more detailed measures in both the defining and sanctioning areas:

- It establishes basic principles for the protection of the underwater cultural heritage;
- It foresees an international coordination system and
- Provide practical rules for the investigation of underwater cultural heritage.

The definition contained in Article 1, for example, is strongly inspired and exhaustive: *"Underwater cultural heritage"* means all traces of human existence that have a cultural, historical or archaeological character, that have been under water, partially or totally, periodically or continuously, for at least 100 years, such as:

- the sites, structures, buildings, objects and human remains, together with their archaeological and natural context;
- ships, aircraft, other means of transport or any part of them, their cargo or other content, together with their archaeological and natural context; and (iii) objects of a prehistoric nature.

According to Article 5, in addition, each State shall use the most viable means available to it to avoid or mitigate any possible negative repercussions of activities under its jurisdiction that may affect fortuitously the underwater cultural heritage. The theme of "culture", in general, is a shared theme. The State has authority over it, especially in the field of protection, due to its importance, but, from a regulatory point of view, the Autonomous Community may choose to regulate this issue especially. According to Article 46 of the Spanish Constitution, in fact, "the public authorities shall guarantee conservation and promote the enrichment of the historical, cultural and artistic heritage of the peoples of Spain and of the assets that comprise it, whatever their legal

status and its ownership. The criminal law shall punish any offenses against this heritage". In any case, "without prejudice to the powers that may be assumed by the Autonomous Communities, the State will consider the service of culture as a duty and essential attribution and will facilitate cultural communication between the Autonomous Communities, in accordance with them." (Article 149, paragraph 2).

The Canarian Autonomous Community has decided to address cultural issues as a regular issue, as confirmed in the new Autonomous Statute of 2018 to Articles 27 and 137, according to which the Canary public authorities will ensure the protection and defence of the identity, historical heritage and the values and interests of the Canary Islands. In fact, the Autonomous Community of the Canary Islands has exclusive competence over cultural heritage, without prejudice to article 149.2 of the Constitution.

Always respecting the premise related to international standards, the national and regional legislation applicable to the Canarian context is well developed. The State Law 16/1985 of the Spanish historical heritage, says that the autonomous communities are the executive powers to apply the law in matters of archaeological heritage. The autonomous administrations have, therefore, a leading role in the protection of archaeological heritage, both terrestrial and underwater. However, in accordance with article 6 b) of Law 16/1985, the general administration of the State also has important competences in the matter such as those related to defence against: illicit export and the plundering of the assets that make up the Spanish Historical Heritage.

The coordination between Administrations was quite complicated and, from the need to identify, for coordination purposes, the basic lines of action that must be developed to carry out an effective policy of protection of underwater archaeological heritage, a National Plan was adopted. of protection of the underwater archaeological heritage, based on a shared reflection between the General State Administration and the Autonomous Administrations within the Historical Heritage Council. Thanks to this Plan, the joint action of the State and the Autonomous Communities is coordinated in this delicate issue.

As far as the Canary Islands are concerned, the last **Law 4/1999, of 15 March, on the Historical Heritage of the Canary Islands** assumed the objective of making the **preservation of the historical heritage** compatible with its enjoyment as a cultural object, without prejudice to its use as an economic resource.

The instruments of protection regulated in the Law of 1999 have not been approved by most of the Canary Islands municipalities, leaving unprotected a considerable number of assets that hold heritage values worthy of being preserved, so they have proved ineffective and insufficient to meet the objective of the protection of cultural heritage.

In the specific case of the underwater cultural heritage, in addition, the Law of 1999 regulated its protection only at the indirect level, with a reference to the archaeological heritage located in the "territorial sea" and the corresponding Archaeological Letters: articles 60 and 64. This decision can be explained in the light of the historical and scientific discoveries that did not consider the underwater cultural heritage as delicate as important at historical and cultural level. Things have changed since the UNESCO Convention. In any way, consistent with what the Law requires (Article 64) and to try to improve as much as possible the ongoing process of destruction of the underwater archaeological heritage, the **Underwater Archaeological Charts** of the **Canary Archipelago** were also programmed, which were **approved** by the Government of the Canary

Islands in **1995**, under the direction of A. Tejera, to try to exercise a policy of protection of underwater heritage.

However, the charts are not accessible to the general public, while the last very important and useful initiative has already been published on the Internet. The Ministry of Culture and Historical and Cultural Heritage of the Cabildo de Gran Canaria, in fact, through the Historical Heritage Unit, presented in 2011 the first phase of an exhaustive and systematic inventory of submerged archaeological heritage found in nearby waters to the Gran Canaria coast. Through this inventory, the known wrecks are documented in advance and an exhaustive exploration, documentation and prospecting of the coast of the municipality of San Bartolomé de Tirajana was done. In successive extensions, the entire island coast will be catalogued. The new Law 11/2019 on Cultural Heritage of the Canary Islands, approved on April 25, 2019, aims to solve some of the deficiencies of the Law of 1999 and innovate with respect to the past. The Act of 2019, in fact, replaces the above-mentioned Law 4/1999, of March 15, on the Historical Heritage of the Canary Islands, because it has become obsolete after the time elapsed since its entry into force, due to the evolution that the regulated matter. Similarly, it tries to solve some interpretative doubts that the Law 4/1999 proposed, improving the systematics and the agreement of the previous text.

The new norm also aims to solve the problem of the inactivity of certain public administrations when approving instruments for the protection of cultural heritage, thereby generating the most absolute lack of protection of the assets that comprise it. In general, it can say that the level of protection and surveillance with the new Law of 2019 increases for all the goods belonging to the Canary underwater cultural heritage.

Eventual administrative derivative acts: explain the required procedure

The protection of the underwater cultural heritage is regulated in a preventive manner by the standards of the UNESCO Convention and, also, by the national and regional ones, if they are developed. Regard to the basic principles of the UNESCO Convention, it is necessary to emphasize the obligation, by the States, to preserve the heritage; "in situ" preservation as a priority protection; the prohibition of commercial exploitation and the exchange of information at an international level. According to the Annex of the UNESCO Convention, in addition, detailed practical rules are set out for the activities directed to the underwater cultural heritage.

These are commonly recognized and applied standards, which include:

- rules on how a project should be prepared;
- guidelines on the competences and qualifications required of people who carry out activities;
- methods of conservation and site management.

Canary legislation, articles 90 and 95 of the new Law of 2019, regulate the discipline of protection of the Canary underwater cultural heritage, introducing more specific rules with respect to the Law of 1999. The new law, in fact, divides susceptible assets in several categories, and for each one provides a specific form of protection. Most of these protections will be decided with regulations issued after the law comes into force. The underwater cultural heritage, in any form and without prejudice to its declaration as a cultural interest, is included in the insular catalogues of cultural heritage assets (Article 95).

Constraints

Underwater archaeology and heritage is hampered by general aspects such as the non-execution of plans or data gaps but also because of a lack of investment and awareness about the importance of this 'hidden' cultural heritage (see table below) (MarSP, 2019).

Table 141. Constraints to the development of the underwater archaeology and cultural heritage sectors (source: MarSP, 2019)

Underwater archaeology and cultural heritage	
Legal	✓ There is no governance plan but management plan, which are not applied later on
Administrative	✓ Lack of will from local, island and regional administrations to reach consensus and execute the plans
Economic	✓ Lack of investments
Technological	✓ Lack of data. Out-of-date data
Social	✓ Lack of awareness about the importance of conservation
Environmental	✓ Inhabitants do not realise the importance of underwater cultural heritage

PART II

Current spatial distribution

The information regarding to the submarine patrimony was taken from the Insular Territorial Plans (PIO, of its initials in Spanish) of the "Cabildos insulares", except the information of the salt pans, present in the tool named as *Herramienta de Pilotaje del Litoral Canario* (HPL).

Table 142. Cartographic information available for Underwater cultural heritage.

Name	Source	Organization	Date	Definition
Salt Pan	HPL	Government of the Canary Islands		Sal Pan in the Canary Islands.
Link HPL: http://www.pilotajelitoralcanario.es/				
Underwater cultural sites (Gran Canaria)	IDEGran Canaria	Cabildo de Gran Canaria	2010	Data of wrecks and natural anchorages.
Link: http://catalogo.idegrancanaria.es/gn/srv/es/main.home?uuid=98260e8c-6815-4ef6-844e-0a47cfae9b94 **WMS:** https://ide2.idegrancanaria.es/wms/ ARQ_YacSubacuaticos?				
Porises (La Palma)	La Palma Open Data	Cabildo de La Palma	2018	Porises (pier). Other assets of patrimonial interest.
Link: http://www.opendatalapalma.es/datasets/e87b023da8c64edd9875d76d0fc743b3_8?geometry=-18.082%2C28.603%2C-17.648%2C28.708				
Wells to dry lupins (La Palma)	La Palma Open Data	Cabildo de La Palma	2018	Wells to dry lupins ("secaderos").
Link: http://www.opendatalapalma.es/datasets/e87b023da8c64edd9875d76d0fc743b3_6				
Underwater cultural sites of Tenerife	Tenerife Insular Territorial Plan (PIOT)	Cabildo de Tenerife	2011	Map with the archaeological sites or wrecks of Tenerife. Found in Información Ambiental de la Ordenación de Puertos.
Link: http://www.tenerife.es/planes/PIOT/PIOTindex.htm				

Coastal Heritage of El Hierro	El Hierro Insular Territorial Plan (PIOH)	Cabildo de El Hierro	2011	Map of the uses of the coast with information on coastal uses and goods. Document pending final approval.
Link: http://tac.elhierro.es:8082/pioh/				

Figure 304. Localization of the salt pans in the Canary Islands (source: viewer HPL, 2019).

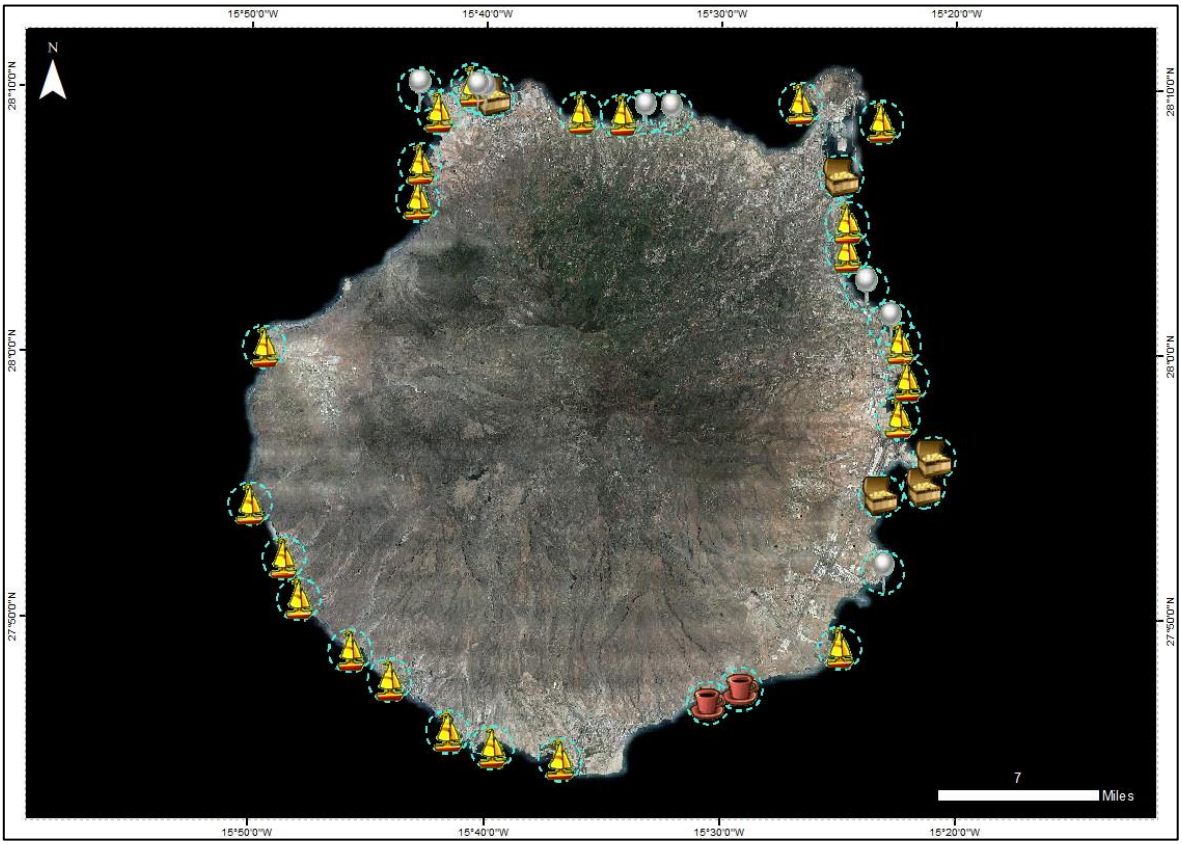


Figure 305. Underwater cultural site in Gran Canaria (source: IDE Gran Canaria, 2019).

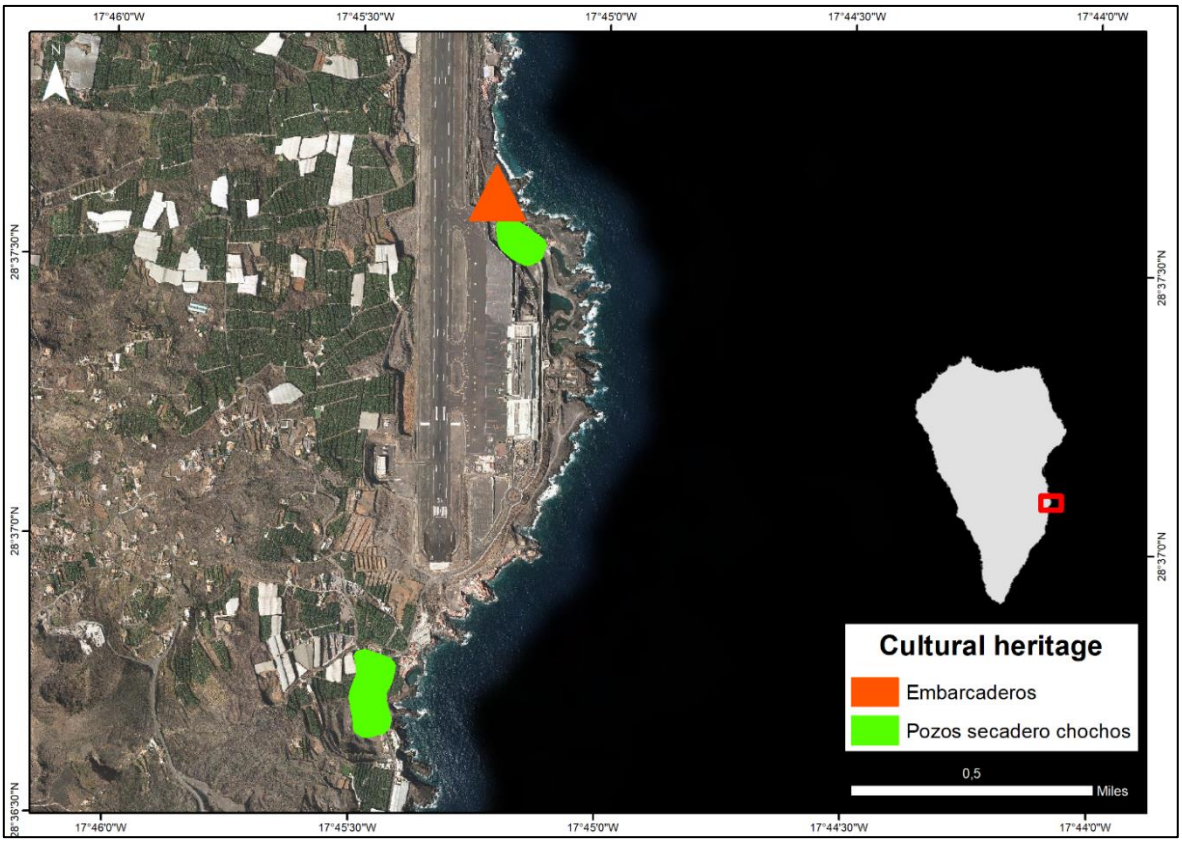


Figure 306. Cultural heritage (source: Open Data La Palma, 2019).

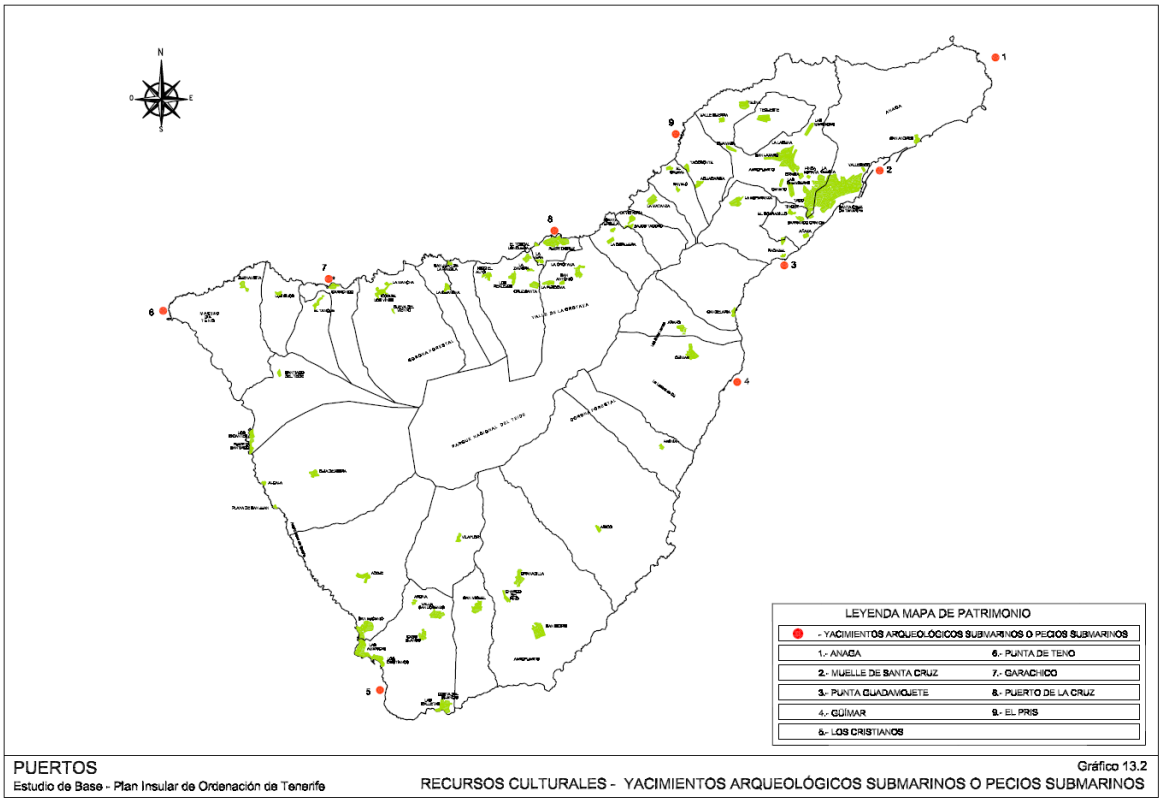


Figure 307. Underwater cultural site in Tenerife. (source: PIOT, 2011).

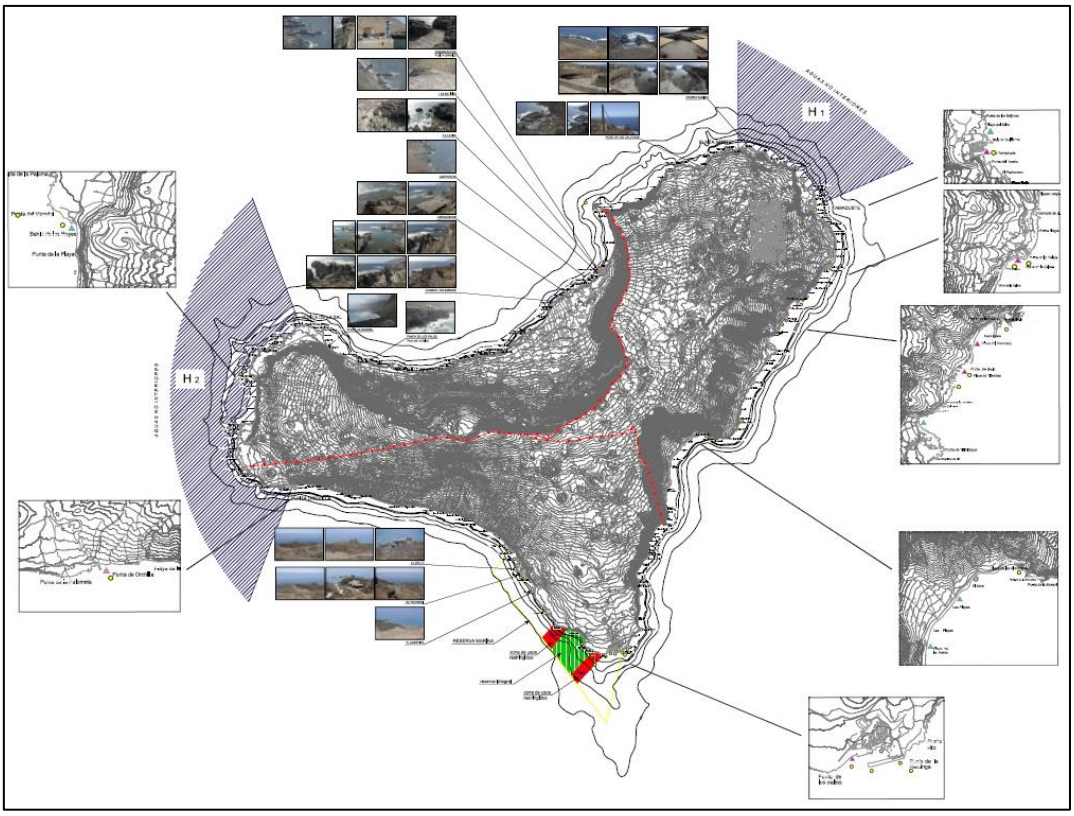


Figure 308. Map of uses of the coast with information on coastal uses and goods (source: PIOH, 2011).

PART III

Analysis of interactions

Interaction with other sectors

Not many synergies were identified between this sector and the rest of the maritime uses (see table below). High synergies were identified though for tourism, scientific research and environmental conservation. In the case of tourism, this sector benefits from the presence of cultural heritage such as wrecks (e.g. diving activities) (MarSP, 2019).

Table 143. Degree of synergy of the underwater archaeology and cultural heritage sectors with other maritime sectors (source: MarSP, 2019)

Underwater archaeology and cultural heritage			
Aquaculture		Navigation and maritime transportation	
Fisheries		Infrastructures	
Mineral resources		Tourism	
Energy		Scientific research and marine biotechnology	
Defence		Environmental conservation and Marine Protected Areas	

This sector has low and medium conflicts with most maritime sectors (see table below) such as mineral resources, ports, navigation, infrastructure and scientific research (medium conflicts). Ports for instance can be affected by underwater archaeology when an emergency dredging is needed (MarSP, 2019).

Table 144. Degree of conflicts of the underwater archaeology and cultural heritage sectors with other maritime sectors (source: MarSP, 2019)

Underwater archaeology and cultural heritage			
Aquaculture		Navigation and maritime transportation	
Fisheries		Infrastructures	
Mineral resources		Tourism	
Energy		Scientific research and marine biotechnology	
Defence		Environmental conservation and Marine Protected Areas	
Ports			

Land-sea interactions

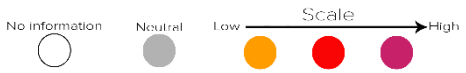
Synergies between this sector and land uses are many (see table below) but particularly important (high synergy) with all built-up areas, protected areas, and potential tourism areas (underwater heritage as a tourism attraction) (MarSP, 2019).

Table 145. Degree of synergy of the underwater archaeology and cultural heritage sectors with land-use sectors (source: MarSP, 2019)

Underwater archaeology and cultural heritage		
A	Natural, cultural and landscape areas	
B	Bathing areas	
C	Built-up areas in risk zones	
D	Marine Protected Areas	
E	Terrestrial Protected Areas	
F	Built-up areas	
G	Agriculture, forestry and other uses	
H	Tourism potential areas	
I	Airports	
J	Roads	

Conflicts with land uses were only identified for bathing and potential tourism areas (see table below) (MarSP, 2019).

Table 146. Degree of conflict of the underwater archaeology and cultural heritage sectors with land-use sectors (source: MarSP, 2019)

Underwater archaeology and cultural heritage		
		
A	Natural, cultural and landscape areas	
B	Bathing areas	
C	Built-up areas in risk zones	
D	Marine Protected Areas	
E	Terrestrial Protected Areas	
F	Built-up areas	
G	Agriculture, forestry and other uses	
H	Tourism potential areas	
I	Airports	
J	Roads	

ENVIRONMENTAL CONSERVATION AND MARINE PROTECTED AREAS

PART I

Sector characterization

In Spain, the environmental conservation has become a priority in the last 10 years. Proof of this is its great involvement in the implementation of the Marine Strategy Framework Directive (2008/56/EC). One of the main measures taken both in the whole Spanish territory as well as in the Canary Islands, in relation to the environmental conservation is the declaration of marine protected areas (MPAs). MPAs exist in multiple forms; they have been created for different purposes and legal frameworks, generally with varying levels of protection and subject to different management approaches and conservation measures.

In addition, it is often observed that the range of activities allowed or restricted in an MPA also varies considerably. However, it is generally explicit that the establishment of an MPA stems from the need for better conservation and knowledge of coastal and marine biodiversity and implies the adoption of protection measures for communities and sensitive marine habitats, in such a way that ensures the maintenance of marine biodiversity. MPAs are, therefore, emerging marine conservation and management strategies, as tools to halt or reverse the loss of biodiversity and associated ecosystem services, and a useful tool to support the management and sustained use of their resources, through the harmonious integration of human activities.

In Spain, the figure of AMP in Spain was created in Law 42/2007, of December 13, on Natural Heritage and Biodiversity, as one of the classification categories of protected natural areas (articles 29 and 32). According to this law, the MPAs, and other protected areas in the Spanish marine area, may be part of the Network of Marine Protected Areas of Spain ("RAMPE").

Subsequently, Law 41/2010, of December 29, on the protection of the marine environment formally creates "RAMPE", regulates it and establishes its objectives, the natural spaces that comprise it and the mechanisms for its designation and management. It also specifies the functions that the Ministry of Agriculture and Fisheries, Food and Environment (MAPAMA) will carry out in relation to "RAMPE".

Article 26.1 of Law 41/2010, lists the marine protected areas of state competence that may be part of the RAMPE:

a) Marine Protected Areas (MPA).
b) The Special Areas of Conservation (SAC)
c) s) and Special Protection Areas for Birds (SPAs), which make up the Natura 2000 Network.
d) Other categories of protected natural areas, as established in article 29 of Law 42/2007, of December 13.
e) Areas protected by international instruments, notwithstanding that their declaration and management will be in accordance with the provisions of their corresponding international regulations.
f) The Marine Reserves regulated in Law 3/2001, of March 26, on Maritime Fishing of the State.

Likewise, protected areas and protected areas in the fishing sector may be part of the "RAMPE", whose declaration and management are autonomous competence in the case established in article 36.1 of Law 42/2007, upon proposal of the affected Autonomous Community, after agreement of the Sectoral Conference on the Environment.

In Spain, including the Canary Islands, through the adoption of Royal Decree 1599/2011, of November 4, have been established the criteria for the integration of marine protected areas in the Network of Marine Protected Areas of Spain. This Royal Decree has laid the foundations for the establishment of an ecologically coherent, well-managed network that represents the natural heritage and Spanish marine biodiversity. These integration criteria are constituted as the essential tool to build the network; the foundations on which the "RAMPE" will grow and that guarantee that the Network will be constituted by spaces that make up an ecologically coherent and well-managed whole, composed of representative spaces of the natural heritage and of the Spanish marine biodiversity.

In this way, the RAMPE will be the contribution of our country to the Global Network of Marine Protected Areas within the framework of the United Nations and the Convention on Biological Diversity, and will serve to fulfill, in part, the obligations and commitments acquired by Spain as a Contracting Party to numerous agreements, conventions and protocols in the international framework and as a Member State of the European Union.

The marine protected areas of the Canary Islands include:

- Forty-two areas of the Natura 2000 Network:
    - 26 SAC
    - 2 SCI
    - 11 SPA
    - 2 SAC of maritime-terrestrial area
    - 1 SPA of maritime-terrestrial area
- Three marine reserves and a natural park. The Marine Reserves in the Canary Islands are three, located in the islands of El Hierro, La Palma and north of Lanzarote.

The Network of all Protected Natural Spaces of the Canary Islands of maritime-terrestrial scope are listed in the table below.

Table 147. Lists of marine protected areas (MPA) in Canary Islands

Designation	Clasification
Cueva de Lobos	SAC ES7010014
Área marina de La Isleta	SAC ES7010016
Franja marina de Mogán	SAC ES7010017
Sebadales de La Graciosa	SAC ES7010020
Sebadales de Guasimeta	SAC ES7010021
Sebadales de Corralejo	SAC ES7010022
Playa de Sotavento de Jandía	SAC ES7010035
Bahía del Confital	SAC ES7010037
Bahía de Gando	SAC ES7010048
Playa del Cabrón	SAC ES7010053
Los Jameos	SAC ES7010054
Sebadales de la Playa del Inglés	SAC ES7010056
Costa de Sardina del Norte	SAC ES7010066
Cagafrecho	SAC ES7011002
Sebadales de Güigüí	SAC ES7011005
Franja marina de Teno-Rasca	SAC ES7020017
Mar de las Calmas	SAC ES7020057
Sebadales del Sur de Tenerife	SAC ES7020116
Cueva marina de San Juan	SAC ES7020117
Sebadal de San Andrés	SAC ES7020120
Franja marina de Fuencaliente	SAC ES7020122
Franja marina Santiago-Valle del Gran Rey	SAC ES7020123
Costa de Garafía	SAC ES7020124
Costa de los Órganos	SAC ES7020125
Costa de San Juan de la Rambla	SAC ES7020126
Sebadales de Antequera	SAC ES7020128
Banco de la Concepción	SCI ESZZ15001
Espacio marino del oriente y sur de Lanzarote-Fuerteventura	SCI ESZZ15002
Espacio marino de Mogán - La Aldea	SPA ES0000530
Espacio marino de los Islotes de Lanzarote	SPA ES0000532
Islotes del norte de Lanzarote y Famara	SPA ES0000040
Espacio marino del norte de La Palma	SPA ES0000525
Espacio marino de Anaga	SPA ES0000529
Espacio marino del Roque de la Playa	SPA ES0000528
Espacio marino de los acantilados de Santo Domingo y Roque de Garachico	SPA ES0000527
Espacio marino de La Gomera - Teno	SPA ES0000526
Espacio marino de los Roques de Salmor	SPA ES0000524
Espacio marino de la zona occidental de El Hierro	SPA ES0000523
Espacio marino de La Bocayna	SPA ES0000531
Banco de la Concepción	SPA ES0000535
Reserva marina del entorno de la isla de La Graciosa y de los islotes del norte de Lanzarote	
Reserva marina de la isla de La Palma	
Reserva marina en el entorno de la Punta de La Restinga, Mar de las Calmas	
Parque Natural Archipiélago de Chinijo	L-2

Among the other marine conservation areas are the seven Biosphere Reserves, two Geoparks, a Natural Park of the Canary Islands Protected Areas Network and a wetland of international importance (RAMSAR) with a marine environment. The maps of the marine protected areas are shown in the current spatial distribution section.

Legal framework and constraints

Legislation applicable to the Canary Islands context: summarize the applicable legislation and the developed matters

It is necessary to take into account that both concurs together, despite that the state legislation has a basic character and Autonomous Community is a development regulation. In addition, it is pertinent to mention the recent reform of the Statute of Autonomy of the Canary Islands, especially in relation to territorial extension. According to Article 4.2 "*Without prejudice to the delimitation of existing baselines, between the most salient extreme points of the islands and islets that make up, according to the previous section, the Canary Islands, a perimeter contour will be drawn that follows the general configuration of the archipelago, as established in the annex to this Statute*. The waters that are integrated within this perimeter contour will receive the name of Canary waters and constitute the special maritime area of the Autonomous Community of the Canary Islands".

The state and autonomic norms on the subject are exposed:

SPATIAL CONSERVATION

State Legislation

- Law 42/2007, of December 13, on Natural Heritage and Biodiversity.

The main norm related to the protection of biodiversity is Law 42/2007, of December 13, on Natural Heritage and Biodiversity. In development of this norm, the following regulations have been issued:

- Royal Decree 556/2011, of April 20, for the development of the Spanish Inventory of Natural Heritage and Biodiversity

- Royal Decree 1997/1995, of December 7, which establishes measures to help guarantee biodiversity through the conservation of natural habitats and wild fauna and flora.

- Royal Decree 630/2013, of August 2, which regulates the Spanish Catalogue of invasive alien species

- Royal Decree 139/2011, of February 4, for the development of the List of Wild Species in Special Protection Regime and the Spanish Catalogue of Endangered Species.

- Royal Decree 435/2004, of March 12, which regulates the national inventory of wetlands.

In order to protect the Natura 2000 marine network in the Canary Islands, the following norm is essential, since it not only declares said spaces, but also proceeds to its planning:

- Order ARM / 2417/2011, of August 30, by which special marine conservation sites of the Macaronesian biogeographic region of the Natura 2000 Network are declared special conservation zones and their corresponding conservation measures are approved.

In another order of considerations, the strategic planning contained in the Strategic Plan for the Natural Heritage and Biodiversity must be taken into account:

- Royal Decree 1274/2011, of September 16, which approves the Strategic Plan of the natural heritage and biodiversity 2011-2017, in application of Law 42/2007, of December 13, of the Natural Heritage and the Biodiversity

In the marine area, the Law for the protection of the marine environment is essential, a rule from which the Marine Strategies and maritime space planning derive:

- Law 41/2010, of December 29, on the protection of the marine environment. Which has been developed by the following standards:

- Royal Decree 1365/2018, of November 2, which approves marine strategies.

- Royal Decree 363/2017, of April 8, establishing a framework for the management of maritime space

- Royal Decree 79/2019, of February 22, which regulates the compatibility report and establishes the criteria for compatibility with marine strategies.

Another regulation that deserves mention, although it does not have a direct impact on the marine field is the following:

- Law 30/2014, of December 3, of National Parks

- Royal Decree 416/2014, of June 6, approving the Sector Plan for Nature and Biodiversity Tourism 2014-2020.

- Royal Decree 1739/1997, of November 20, on measures of application of the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES), made in Washington on March 3, 1973 and of Regulation (EC) 338/97, of the Council, of December 9, 1996, relative to the protection of species of wild fauna and flora by controlling their trade.

The state has the basic competence in the protection of the environment, which is why the Autonomous Community of the Canary Islands has the legislative development and execution.

Canarian Autonomous Legislation.

In relation to the protection of biodiversity, in addition to the state legislation must take into account the regional regulations of the Canary Islands that is development regulations. In this sense, the following norms must be taken into account: Law 4/2017, of July 13, on Soil and Protected Natural Spaces of the Canary Islands. In addition, this Act has left in effect the annex of Legislative Decree 1/2000, of May 8, which approves the Revised Text of the Laws of Ordination of the Canary Islands Territory and of Natural Spaces of the Canary Islands, in which find the description of the

Protected Natural Spaces. In addition, we must take into account Decree 181/2018, December 26, which approves the Planning Regulation of the Canary Islands, which develops the planning aspects of Protected Natural Spaces.

Of less importance for the purpose that brings us other norms related to biodiversity in the Canary Islands: Decree 70/2011, of March 11, by which the Canarian Network of National Parks is created; Decree 103/2010, of July 29, which regulates certain aspects of the management and administration of the Biosphere Reserves in the Canary Islands; Decree 327/1995, of November 24, of the Regulation of Organization and Functioning of the Council of Natural Protected Spaces of the Canary Islands; Order of August 6, 2001, of the Ministry of Territorial Policy and Environment, which establishes general and urgent measures, on a provisional basis, for the treatment of sands from the African continent, intended for the use of construction, asphalted or any other, with the exception of that used for the generation of beaches.

Of greater importance is Law 4/2010, of June 4, of the Canary Islands Catalog of Protected Species. This Law comes to develop the law of Biodiversity. Regarding the Natura 2000 network, the declaration of ZEC zones made by the Autonomous Community must be taken into account:

- Decree 174/2009, of December 29, declaring Special Conservation Zones as part of the Natura 2000 Network in the Canary Islands and measures for maintaining a favorable conservation status of these natural areas.

In addition, for the terrestrial ZECs, the Government of the Canary Islands has approved the corresponding plans that can be consulted in the following link:

http://www.gobiernodecanarias.org/medioambiente/piac/temas/biodiversidad/medidas-y-factores/espacios-protegidos/medidas-de-conservacion/red-natura-2000/red-natura-2000-canarias/planes-gestion-zec

Eventual administrative derivative acts: explain the required procedure

In this matter, the state legislation, of basic character and autonomic legislation, of development concur. More specifically in the marine field most of the legislation is state. The main norm is Law 42/2007, of December 13, of the Natural Heritage and of Biodiversity, which has been developed by Royal Decree 556/2011, of April 20, for the development of the Spanish Inventory of Natural Heritage and Biodiversity; and Royal Decree 1997/1995, of December 7, which establishes measures to help guarantee biodiversity by conserving natural habitats and wild fauna and flora. The objective of Law 42/2007, Article 1, is to establish "the basic legal regime of conservation, sustainable use, improvement and restoration of natural heritage and biodiversity, as part of the duty to conserve and the right to enjoy of an adequate environment for the development of the person, established in article 45.2 of the Constitution ". As regards the authorities competent to act in the marine environment, article 6 must be taken into account, which establishes the following:

State competences:

- The exercise of the functions referred to in this law, with respect to all species, spaces, habitats or critical areas located in the marine environment, without prejudice to the competences of the coastal autonomous communities.

- Similarly, it corresponds to the General State Administration the exercise of these functions in the exclusive economic zone, continental shelf, and spaces located in the straits subject to international law or on the open sea.
- The establishment of any limitation or prohibition of maritime navigation and its related activities, as well as the prevention and fight against pollution in marine waters object of this provision.
- The exercise of the functions object of the previous points of this article in the marine spaces located in the straits subject to International Law or on the open sea.

Competences of the Autonomous Communities:

- The exercise of the functions referred to in this law with respect to species (except highly migratory) and spaces, habitats or critical areas located in the marine environment, when there is ecological continuity of the marine ecosystem with the terrestrial natural space object of protection, supported by the best existing scientific evidence.

- The exercise of the functions mentioned in this article shall be exercised by the competent Administration in accordance with the principles of cooperation and inter-administrative collaboration.

Natural Protected Areas

Article 28 establishes the definition of protected natural spaces:

- The spaces of the national territory, including inland waters, and the marine environment, together with the exclusive economic zone and the continental shelf, which meet at least one of the following requirements and are declared as such, shall be considered protected natural spaces:

    - Contain natural or representative systems, singular, fragile, threatened or of special ecological, scientific, landscape, geological or educational interest.

    - Be specially dedicated to the protection and maintenance of biological diversity, geodiversity and the associated natural and cultural resources.

- Protected natural areas may cover, in their perimeter, exclusively terrestrial areas, simultaneously terrestrial and marine, or exclusively marine. As you can see, these spaces can be terrestrial, maritime or simultaneously terrestrial and marine. For its part, Article 29 establishes the content of the regulatory rules of protected areas:

    - The regulatory standards of the protected areas, as well as their management planning mechanisms, will determine the legal, financial and material instruments that are considered necessary to effectively fulfil the purposes pursued with their declaration.

    - If different figures of protected spaces overlap in the same place, the regulations governing them, as well as the planning mechanisms, must be coordinated to unify into a single integrated document, in order that the different applicable regimes in function of each category make up a coherent whole. An exception to the above are the assumptions in which the different figures of protected areas correspond

to different public administrations, without prejudice to the relevant inter-administrative collaboration.

Other forms of protection
In the marine environment there are other forms of protection, such as marine reserves.

Conservation of marine areas.

1.- Special Marine Conservation Areas.
Regarding the Natura 2000 Network and the Special Conservation Zones, it must be taken into account that in addition to the appropriate conservation norms (in the case of the Marine Special Conservation Zones in the Canary Islands, Order ARM / 2417 must be taken into account). / 2011, of August 30, whereby special marine conservation sites of the Macaronésica biogeographic region of the Natura 2000 Network are declared special conservation zones and their corresponding conservation measures are approved.

This Order contains the management plans that include the measures to be adopted for the conservation of the habitats and the species included in the Special Conservation Zones.

2.- Marine strategies.
Law 41/2010, of December 29, on the protection of the marine environment, regulates marine strategies, and as a consequence of this, the Marine Strategy of the Canary Islands Demarcation is in force.

The strategies contain an evaluation of the environmental state, a definition of good environmental status, understanding this:

The good environmental state of the marine environment is one in which it gives rise to oceans and seas that are ecologically diverse and dynamic, clean, healthy and productive in the context of their intrinsic conditions, and in which the use of the marine environment is sustainable, leaving thus protecting its potential uses, activities and resources by current and future generations.

Each Strategy is made up of 5 parts:
I. General Framework
II. Analysis of Pressures and Impacts
III. Economic and Social Analysis
IV. Evaluation of the State of the Marine Environment and Definition of Good Environmental Status
V. Environmental Objectives

The marine strategies of the Canary demarcation can be found in the following link:

https://www.miteco.gob.es/es/costas/temas/proteccion-medio-marino/estrategias-marinas/demarcacion-canaria/default.aspx

The importance of marine strategies for the actions to be carried out in the marine environment is that Article 3.3 of the Law establishes that "The authorization of any activity that requires, either the execution of works or installations in marine waters, its bed or its subsoil, or the placement or deposit of materials on the seabed, as well as the discharges regulated in title IV

of this law, *must have a favourable report from the Ministry of Environment, and Rural and Marine Affairs regarding the compatibility of the activity or dumping with the corresponding marine strategy in accordance with the criteria established by regulation".*

This precept has been developed through Royal Decree 79/2019, of February 22, which regulates the compatibility report and establishes the criteria for compatibility with marine strategies.

The importance of this report is given by what is provided in Article 4.1: "The authorization or approval of the actions included in the scope of application of this royal decree must have the favourable report of the Ministry for the Ecological Transition regarding the compatibility of the activity or dumping with the corresponding marine strategy. The General Directorate of Sustainability of the Coast and the Sea corresponds to the issuance of the reports of compatibility with the marine strategies, except in the case of article 6.3, in which the compatibility report will be issued by the Peripheral Services of Coasts ".

At present, the second cycle of the Marine Strategies of Spain is being drafted: update of the Initial Assessment of the marine environment, Definition of Good Environmental Status and establishment of Environmental Objectives. They can be consulted at the following link:

https://www.miteco.gob.es/es/costas/participacion-publica/000-EEMM-segundo-ciclo.aspx

3.- Management of maritime site.

Of the same Law 41/2010, of December 29, of protection of the marine environment, and in development of this, Royal Decree 363/2017, of April 8, has been approved, by which a framework for the ordination is established of the maritime space. For the purposes now of interest, article 4, in sections 2 and 3, regulates the relationship of maritime planning plans with other plans and strategies. Thus, in the first place, it is provided that "In the elaboration of maritime spatial planning plans, the interactions between land and sea will be taken into account. In order to take into account, the interactions between land and sea, it will be possible to resort to other instruments to define this interaction. The result will be reflected in the maritime spatial planning plans ".

Paragraph 3 shows that "Without prejudice to the provisions of Article 2, paragraph 2, letter b), through the management of maritime space, the coherence of the resulting maritime spatial planning plan or plans shall be promoted. with other relevant processes, which will be coordinated through the Monitoring Committees of the marine strategies, the Interministerial Commission of Marine Strategies or other existing inter-administrative coordinating bodies."

Canary Legislation

In the Canary Islands there is a natural park that covers both land and sea. It is the Natural Park of the archipelago. Its ordinance instrument has been approved by means of the Resolution of September 11, 2006, whereby the Agreement of the Canary Islands Commission for Territory and Environment of July 10, 2006, regarding the Master Plan for Use is made public and Management of the Chinijo Archipelago Natural Park (L-2), in the municipalities of Teguise and Haría. Island of Lanzarote. Exp. No. 131/00.

Species conservation

In this section, the following legislation must be taken into account State. Law 42/2007, of December 13, on Natural Heritage and Biodiversity.

- Royal Decree 630/2013, of August 2, which regulates the Spanish Catalogue of invasive alien species One of the inspiring principles of Law 42/2007, of December 13, of Natural Heritage and Biodiversity, and without a doubt one of the most transcendental, is the preservation of biological and genetic diversity, of populations and species. On this principle one of the most important purposes of said law is to stop the current rate of loss of biological diversity, and in this context indicates in article 52.1 that to guarantee the conservation of biodiversity that lives in the wild, the autonomous communities and Cities with autonomous status must establish specific protection regimes for those wild species whose situation requires it. However, in addition to the conservation actions carried out by the aforementioned public administrations, in order to achieve said purpose, Law 42/2007, of December 13, in its articles 53, and 55 creates, with basic character, the List of Wild Species under a special protection regime and, within it, the Spanish Catalogue of Endangered Species. Likewise

- Royal Decree 139/2011, of 4 February, for the development of the List of Wild Species in Special Protection Regime and the Spanish Catalogue of Endangered Species. This regulation regulates:

    - The characteristics, content and procedures of inclusion, change of category and exclusion of species in the List of Wild Species in Special Protection Regime and in the Spanish Catalogue of Endangered Species.

    - The guidelines for the periodic evaluation of the conservation status of the species included in the List and in the Catalogue.

    - The characteristics and content of the species conservation strategies of the Catalogue and the fight against the main threats to biodiversity.

    - The technical conditions necessary for the reintroduction of extinct species and the reinforcement of populations.

    - The natural conditions required for the survival or recovery of endangered wild species.

    - The aspects related to cooperation for the conservation of threatened species.

For the conservation of these species, the conservation strategies of threatened species and the fight against the main threats to biodiversity are established, which constitute guiding criteria or guidelines for the recovery plans, in the case of endangered species, and conservation plans, in the case of vulnerable species, which must develop and develop the autonomous communities and cities with autonomous status, or the MARM within the scope of their competencies in the marine environment, in accordance with article 6 of Law 42/2007, of December 13.

Strategies to combat threats to biodiversity are established as guiding criteria or guidelines for action plans or other similar measures to combat threats to biodiversity adopted by the autonomous communities and cities with autonomy status.

The recovery or conservation plans for the species or populations that live exclusively or in a high proportion in natural protected areas, Natura 2000 Network or in areas protected by international instruments, may be articulated through the corresponding figures of planning and management of said spaces, being able to adopt a similar content to that outlined in the following section.

Canary Legislation

In the Canary Islands, Law 4/2010, of June 4, of the Canary Islands Catalogue of Protected Species, is also applicable, as Article 1:

1. Under the terms of section 3 of Article 55 of Law 42/2007, of December 13, Natural Heritage and Biodiversity, the Canary Islands Catalogue of Protected Species is created as a public record of an administrative nature that will include, when there is technical information that so advises, species, subspecies or populations of threatened biodiversity or of interest to the Canarian ecosystems, including them in any of the categories that are determined in article 3 of this law. For such purposes, the Catalogue will be ordered in four sections, one for each of the categories regulated in said precept.

2. The taxa susceptible to be included in this Catalogue will be, in any case, those previously registered in the Biodiversity Data Bank of the Canary Islands and that have the consideration of being wild and native. Exotic species, those that have not been scientifically described and hybrid populations are excluded from the cataloguing.

These species can be included in any of the following categories:

1) Endangered Species.

a) Species "in danger of extinction",
b) "Vulnerable" species,

The legal regime of special protection for both categories of threatened species will be that established in the basic state legislation for these, without prejudice to the additional protection measures provided for in the Canary Islands' recovery and conservation plans for the different catalogued species.

2) Species of "interest for Canarian ecosystems".

The Canary Islands Catalogue of Protected Species will also include species "of interest to Canarian ecosystems", which are those that, without being in either of the two threat situations in the previous section, deserve particular attention because of their ecological importance in spaces of the Canary Network of Protected Natural Spaces or of the Natura 2000 Network. The species listed as "of interest to the Canarian ecosystems" will be those listed in annex III of this law and those that are designated according to the criteria established in the Article 6 of this law.

3) Species of "special protection".

Wild species of "special protection" are those wild species that are not in either of the two threat situations in the first section of this article, nor deserve particular attention because of their ecological importance in spaces of the Canary Network of Protected Natural Spaces or of the

Natura 2000 Network, they deserve special attention in any part of the territory of the Autonomous Community according to their scientific, ecological or cultural value or because of their singularity or rarity. The species listed as "special protection" shall be considered as those listed in Annex IV and those designated according to the criteria established in Article 7 of this Law.

- Effects of the inclusion of a species in the catalogue
- Effects of the inclusion in the Canary Islands Catalogue of Protected Species.

    - The inclusion of a taxon in the categories in danger of extinction or vulnerable will determine the application of the provisions for those categories in article 56, sections a) and b), respectively, of Law 42/2007, of December 13, of the Natural Heritage and Biodiversity.

    - The legal regime for the protection of species of "interest for Canarian ecosystems" will be exclusively applicable in the territorial scope of the spaces of the Canary Network of Natural Protected Areas and of the Natura 2000 Network. For this purpose, the applicable measures they will be those foreseen in the management plans of the protected natural spaces and the habitats of the Natura 2000 Network in which they are located. Said plans shall include the determinations, control and follow-up to guarantee the effectiveness of the protection, or, where appropriate, the justification for their unnecessariness. In any case, with general character in relation to these species, the prohibitions foreseen in article 54.1 of Law 42/2007, of December 13, of the Natural Heritage and of Biodiversity will be applicable. In the cases of actions promoted by reason of public interest and priority that affect "species of interest for Canarian ecosystems", it will be possible to act as long as they do not significantly affect the ecosystem, in the terms established in paragraphs 4 to 7 of the article 45 of Law 42/2007, of December 13, of Natural Heritage and Biodiversity.

    - The inclusion of a species, subspecies or population in the category of "special protection" will entail the periodic evaluation of its conservation status and the prohibitions foreseen in article 54.1 of Law 42/2007, of December 13, of the Patrimony Natural and Biodiversity, notwithstanding that in the cases of actions promoted for reasons of public interest and priority, in the environmental assessment procedure, the environmental body determines the suitability of the translocation or any other corrective or compensatory measure based on the timely technical reports.

Monk seal, *Monhachus monhachus*: Actions aimed at the reintroduction of the monk seal in the Canary Islands were initiated in 1995, in development of the Life Action Viability Project for the Stabilization of the Atlantic Population of the Monk seal (*Monhachus monhachus*) approved by the European Commission in 1994. This plan was developed in collaboration with the Ministry of Environment, executing different organizations through agreements, such as the University of Las Palmas de Gran Canaria, the University of Barcelona and the Association for the Study and Conservation of the Monk Seal (ISIFER). Its main objective was to assess the technical viability of the reintroduction of the species, to improve the survival problems caused by the fragmentation of the population. Creating a monk seal colony in the Canary Archipelago, acting as a bridge between the populations of Madeira (10 to 20 individuals) and Cabo Blanco (between 200 or 300 individuals), currently its only areas. The first phase/cycle consisted of studying the biology of the Saharan population: number of births per year and survival in the first 6 months, the causes of

youth mortality, the size and area of distribution of the colony and the causes that prevent the species recolonize other areas originally inhabited by it. The second phase/cycle of the program is developed through the Life Actions project for the recovery of the monk seal (*Monachus monachus*) in the Atlantic, approved in 1996.

The results obtained in the Life started in 1994, have given rise to this new project, which has 220 million pesetas (Peseta (Pts): was the currency of Spain between 1868 and 2002) for its execution in two years. The European Community contributes 75% (165 million Pts), the Ministry of Environment 12.5% (27,500,000 Pts) and the Canary Islands Government the rest (27,500,000 Pts).

General objectives of the program:

- To encourage the creation of new populations in a way that interconnects the existing colonies of Madeira and Cabo Blanco, by conserving and improving the potential available habitats and reintroducing individuals.
- To ensure the conservation of the colonies and encourage their demographic recovery to serve as donor populations or propagating sources of individuals.
- To deepen studies on the status and biology of the donor colony.

More information about the monk seal (*Monhachus monhachus*) as well as maps of the current distribution areas in the following link:
http://www.gobiernodecanarias.org/cptss/sostenibilidad/temas/biodiversidad/conservacion_de_especies/medidas-de-conservacion/otros_planes_y_actuaciones/pc-foca-monje/

Lapa majorera, *Patella candei*: About Lapa Majorera, it is necessary to take into account Decree 161/2015, of July 3, which approves the Lapa Majorera Recovery Plan (*Patella candei*).

Constraints

Constraints for environmental conservation are many and diverse (see table below). From the administrative side, lack of surveillance and coordination between competent authorities are the main constraints identified. This, together with the lack of financial resources and investments and limited knowledge and awareness about conservation, represent the major constraints for the development of this activity (MarSP, 2019).

Table 148. Constraints to the development of the environmental conservation and Marine Protected Areas sectors (source: MarSP, 2019)

Environmental conservation and Marine Protected Areas	
Legal	✓ Lack of surveillance, minor and non-executed penalties to malpractices and prohibited activities within protected areas ✓ There is no governance plan but management plan, which is not applied later on
Administrative	✓ Lack of will from local, island and regional administrations to reach consensus and execute the plans ✓ Competence and surveillance problems ✓ Lack of surveillance and transparency in the penalty procedures ✓ Lack of coordination between administrations ✓ Lack of surveillance in marine areas, sea farms, etc. Because of administrative/political problems or financial allocation. This hampers the effective implementation of conservation policies
Economic	✓ Lack of economic and investment means for surveillance ✓ Lack of surveillance in marine areas, sea farms, etc. Because of administrative/political problems or financial allocation. This hampers the effective implementation of conservation policies
Social	✓ Limited knowledge of society about conservation values, measures and legislation in general terms
Environmental	✓ Lack of knowledge

PART II

Current spatial distribution

In this sector the information of the **Marine Protected Areas (MPA)** is shown, compound by the Natura 2000 Network spaces and the Marina Reserves of Fishing Interest. In addition, other protected or important areas for conservation and protected species are included. The Natura 2000 Network is composed of Special Protection Areas (SPA), Proposed Sites for Community Importance (pSCI), Sites of Community Importance (SCI) and for Special Areas of Conservation (SAC). In the Canary Islands there are 26 marine SAC, 2 maritime-terrestrial SAC, 11 SPA and 1 maritime-terrestrial SPA. In addition, there is two SCI. The Marine Reserves in the Canary Islands are three, located in the islands of El Hierro, La Palma and north of Lanzarote.

Among the other marine conservation areas are the seven Biosphere Reserves, two Geoparks, a Natural Park of the Canary Islands Protected Areas Network and a wetland of international import0061nce (RAMSAR) with a marine environment.

For the protected species, data from the Biodiversity Data Bank of the Canary Islands (BDBC) have been analyzed, showing the specific richness of threatened species by 500 x 500 meter squares. EMODnet Biology shows sightings of species of **IUCN Red List of Threatened Species** in the last decade. Using the Data Download Toolbox, the information is generated with the following criteria:

- **Threatened Species. Vulnerable (VU), endangered (EN) and critically endangered (CR)**. Spatial: EEZ Canary Islands; Temporal: 2009-01 / 2019-01; Traits IUCN: vulnerable, endangered, critically endangered. The source of each record is in the "datasetid" field. E.g.: "CETUS: Cetacean monitoring surveys in the Eastern North Atlantic" or "Coyne, M. S., and B. J. Godley. 2005. Satellite Tracking and Analysis Tool (STAT): an integrated system for archiving, analyzing and mapping animal tracking data. Marine Ecology Progress Series. Vol. 301:1-7." "Diveboard - Scuba diving citizen science observations".

- **Least Concern (LC) and Data Deficient (DD) Species**. Spatial: EEZ Canary Islands; Temporal: 2009-01 / 2019-01; Traits IUCN: least concern, data deficient. The source of each registry is in the field "datasetid". "Correia, A.M., Gandra, M., Liberal, M., Valente, R., Gil, A., Rosso, M., Pierce, G.J. & Sousa-Pinto, I, CIIMAR - UP. (2019). CETUS: Cetacean monitoring surveys in the Eastern North Atlantic." and "Diveboard - Scuba diving citizen science observations".

Finally, following the same methodology as for the IUCN Red List of Threatened Species, the **species of the Habitats Directive** are shown. The information is originated through the Data Download Toolbox with the following criteria: Spatial: EEZ Canary Islands; Traits Habitats Directive Annex: II y IV. The source of each registry is in the field "datasetid". E.g.: "CETUS: Cetacean monitoring surveys in the Eastern North Atlantic"; "Incidental sightings of marine mammals"; "Islas Canarias (Proyecto Aegina): juvenile loggerheads".

Table 149. Cartographic information available for environmental conservation and Marine Protected Areas.

Name	Source	Organization	Date	Definition
SCI/SAC	BDN	MITECO	2018	Proposed Sites for Community Importance, Sites of Community Importance and for Special Areas of Conservation in marine waters of the Canary Islands. Banco de Datos de la Naturaleza (BDN).
Link: https://www.miteco.gob.es/es/biodiversidad/servicios/banco-datos-naturaleza/informacion-disponible/red_natura_2000_inf_disp.aspx				
SPA	BDN	MITECO	2014	Special Protection Areas in marine waters of the Canary Islands. Banco de Datos de la Naturaleza (BDN).
Link: https://www.miteco.gob.es/es/costas/temas/proteccion-medio-marino/biodiversidad-marina/espacios-marinos-protegidos/red-natura-2000-ambito-marino/red-natura-2000-declaracion-lugares-ZEPA.aspx				
Marine Reserves	IEO	IEO	2019	The three Marine Reserves of Canary Islands of Fishing Interest.
Natural Park Archipiélago de Chinijo	SITCAN	Government of the Canary Islands	2018	Natural Park belonging to the Network of Protected Natural Spaces of the Canary Islands.
Link: https://opendata.sitcan.es/dataset/espacios-naturales-protegidos-de-canarias				
Biosphere Reserves (MaB)	BDN	MITECO	2018	Canary Biosphere Reserves belonging to the Man and the Biosphere Programme (MaB) de la UNESCO. Banco de Datos de la Naturaleza (BDN).
Link: https://www.miteco.gob.es/es/biodiversidad/servicios/banco-datos-naturaleza/informacion-disponible/mab.aspx				
Geoparks	SITCAN	Government of the Canary Islands	2018	Geoparks declared by UNESCO in the Canary Islands. Sistema de Información Territorial de Canarias (SITCAN).
Link: https://opendata.sitcan.es/dataset/geoparques-de-canarias				
RAMSAR	BDN	MITECO	2017	Wetlands of Spanish international importance inscribed in the RAMSAR Convention List. Saladar de Jandía wetland with marine area. Banco de Datos de la Naturaleza (BDN).
Link: https://www.miteco.gob.es/es/biodiversidad/servicios/banco-datos-naturaleza/informacion-disponible/ramsar.aspx				
Protected species	SITCAN	Government of the Canary Islands	2017	Cells of specific richness of species included in the List of Wild Species under the Special Protection Regime and the Spanish Catalog of Threatened Species, generated from the Biodiversity Data Bank of the Canary Islands. Sistema de Información Territorial de Canarias (SITCAN).
Link: https://opendata.sitcan.es/dataset/especies-protegidas				
Threatened Species (IUCN)	EMODnet Biology	EMODnet	2019	Data Download Toolbox criteria: Spatial: EEZ Canary Islands; Temporal: 2009-01 / 2019-01; Traits IUCN: vulnerable, endangered, critically endangered.
Link: http://www.emodnet-biology.eu/toolbox/en/download/selection/15cb5dee8dd90f				
LC y DD Species (IUCN)	EMODnet Biology	EMODnet	2019	Data Download Toolbox criteria: Spatial: EEZ Canary Islands; Temporal: 2009-01 / 2019-01; Traits IUCN: least concern, data deficient.
Link: http://www.emodnet-biology.eu/toolbox/en/download/selection/15cb6da596e61b				
Species Habitat Directive	EMODnet Biology	EMODnet	2019	Data Download Toolbox criteria: Spatial: EEZ Canary Islands; Traits Habitats Directive Annex: II y IV. The source of each record is in the field "datasetid". E.g.: "CETUS: Cetacean monitoring surveys in the Eastern North Atlantic"; "Incidental sightings of marine mammals"; "Islas Canarias (Proyecto Aegina): juvenile loggerheads".
Link: http://www.emodnet-biology.eu/toolbox/en/download/selection/15cb5bc8262313				

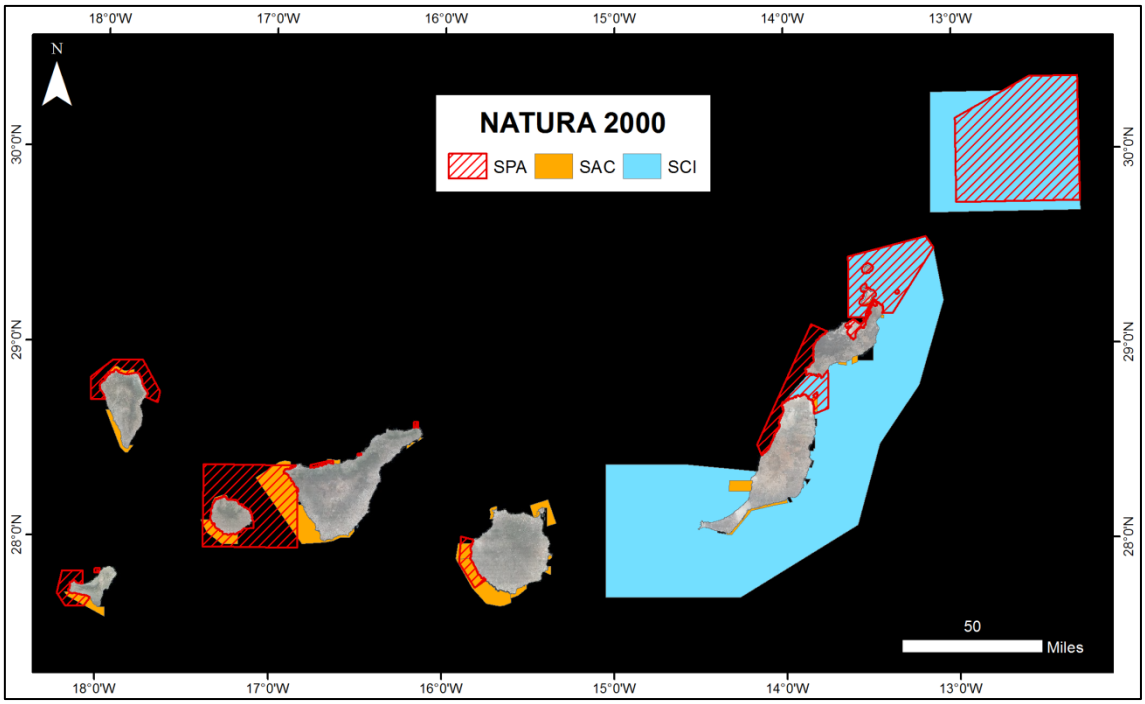


Figure 309. Red Natura 2000 Protected Areas (source: IDE MITECO, 2019).

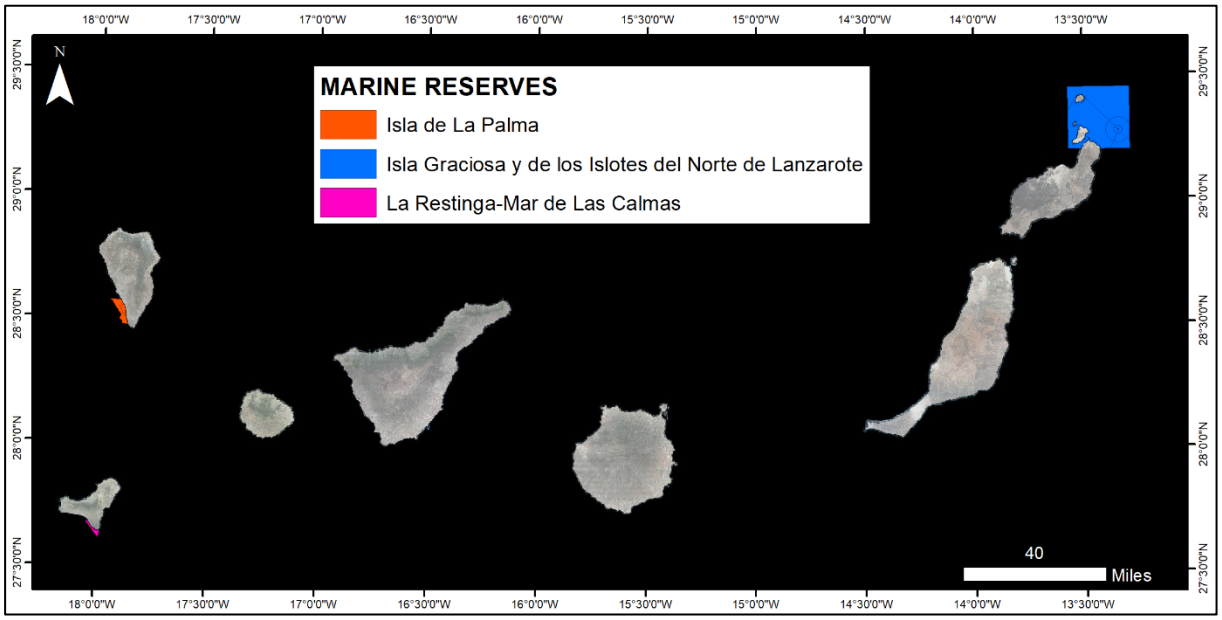


Figure 310. Marine Reserves (source: IEO).

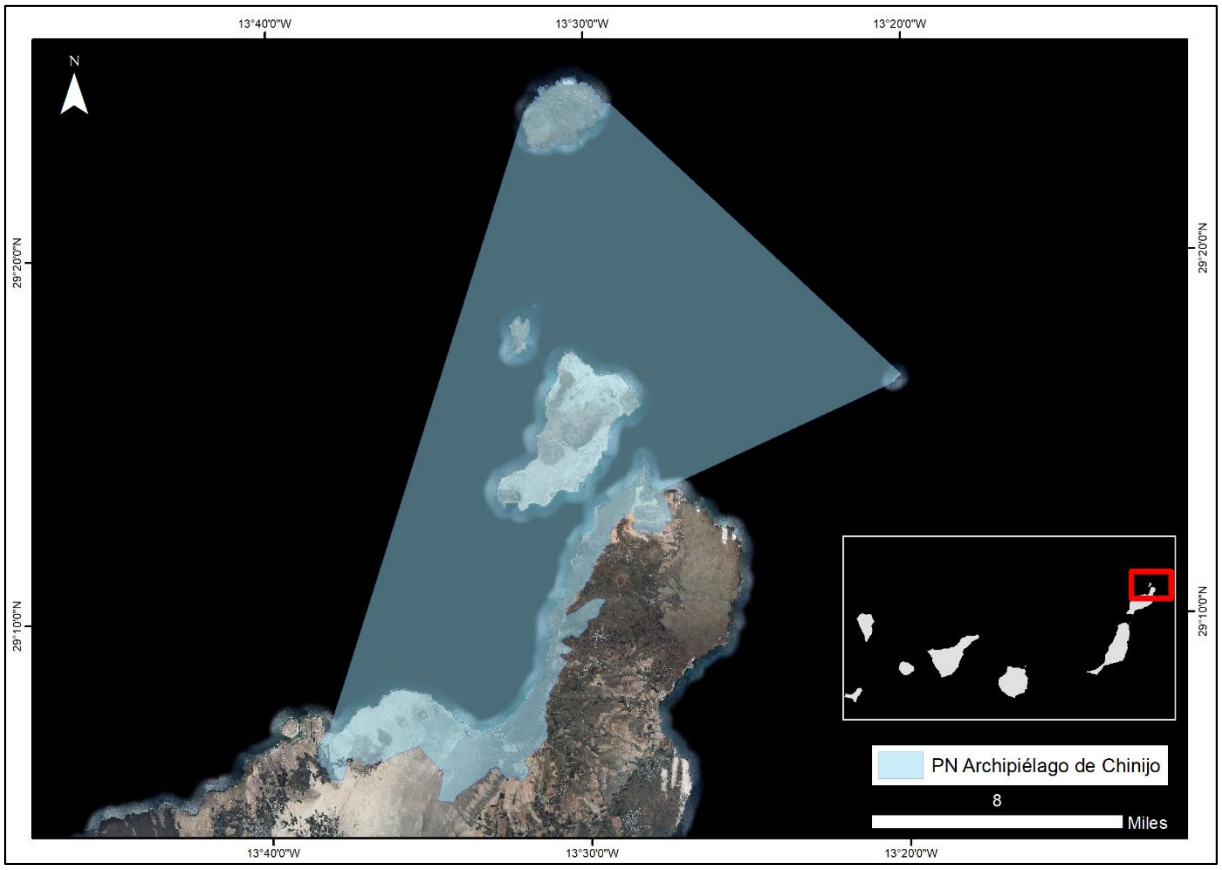


Figure 311. Archipiélago de Chinijo Natural Park (source: SITCAN, 2019).

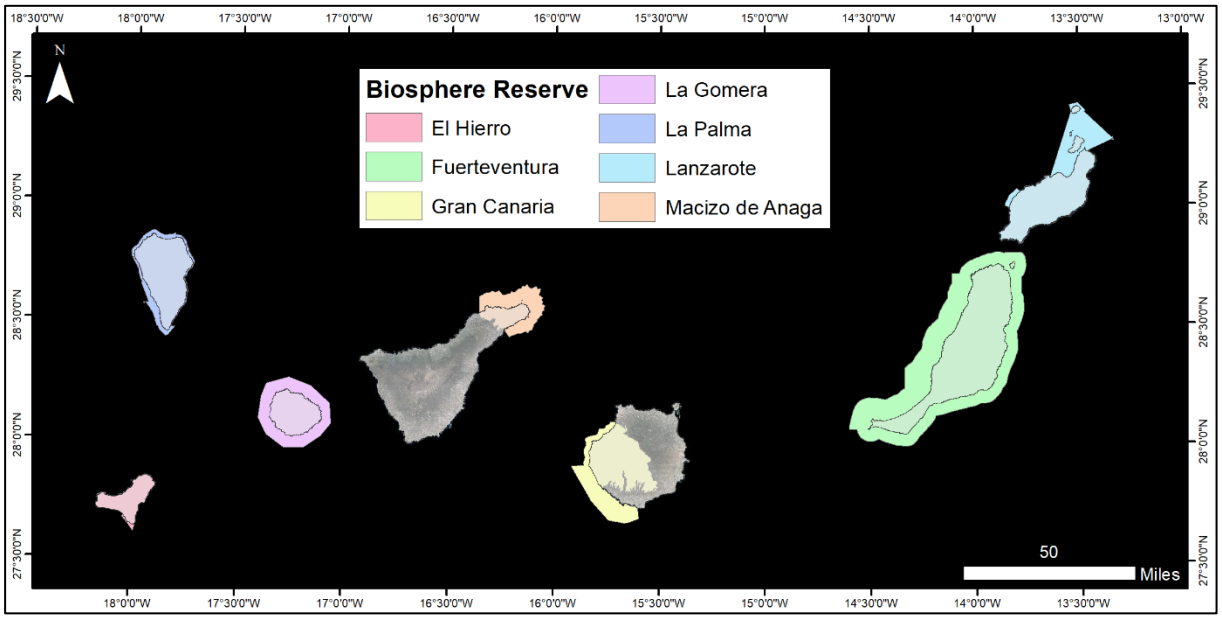


Figure 312. Biosphere Reserve (MaB) (source: IDE MITECO, 2019).

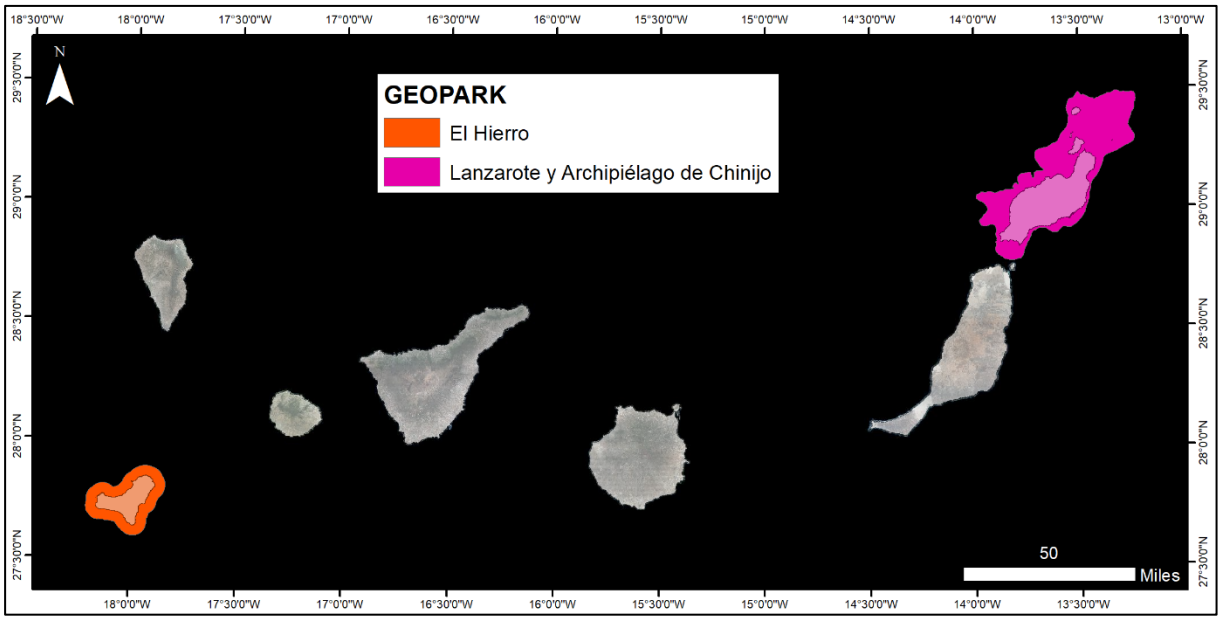


Figure 313. Geoparks (source: SITCAN, 2019).

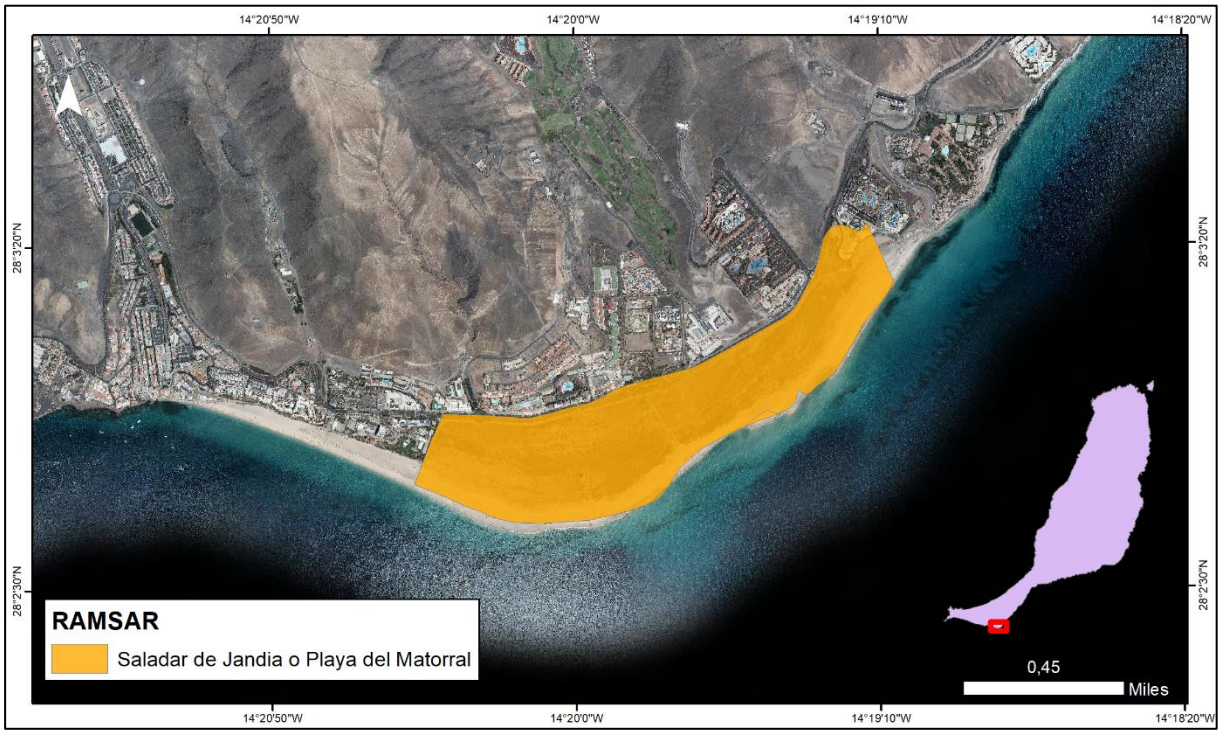


Figure 314. Wetland Saladar de Jandía (Ramsar Convention) (source: IDE MITECO, 2019).

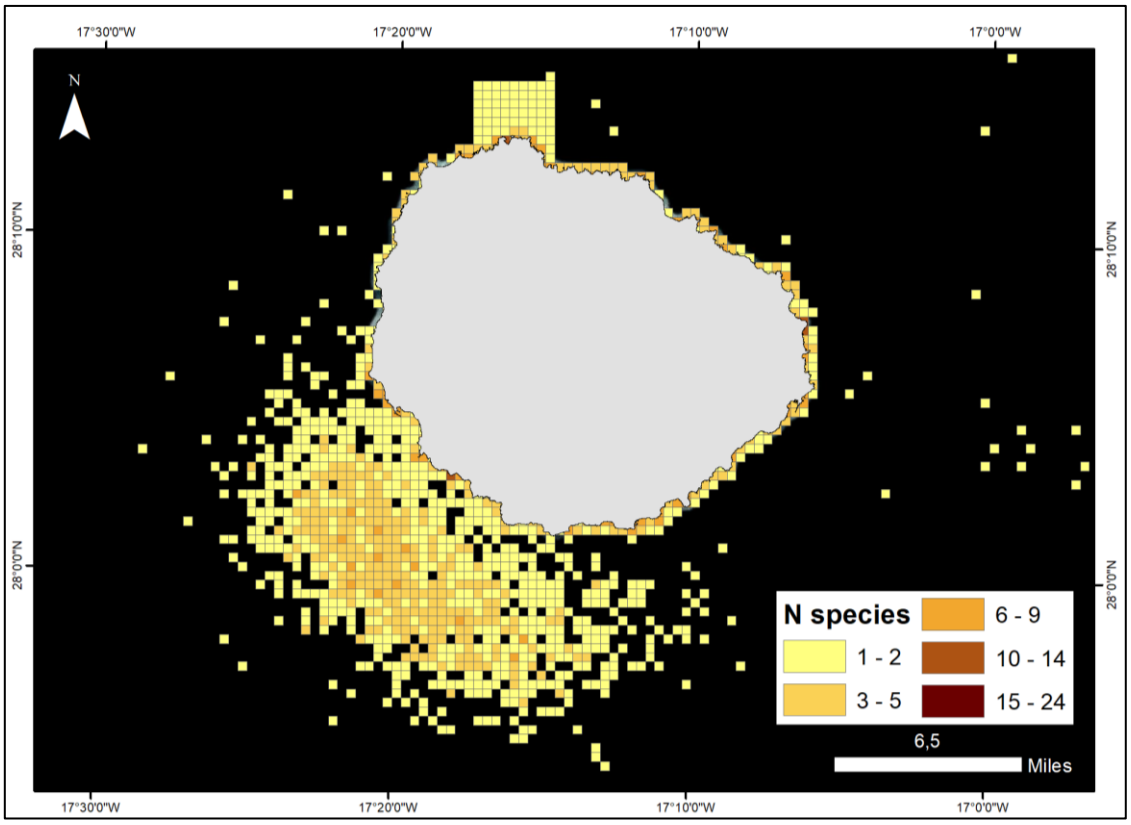


Figure 315. Map sample showing cells that indicate the specific richness of protected species in La Gomera island (source: SITCAN, 2019).

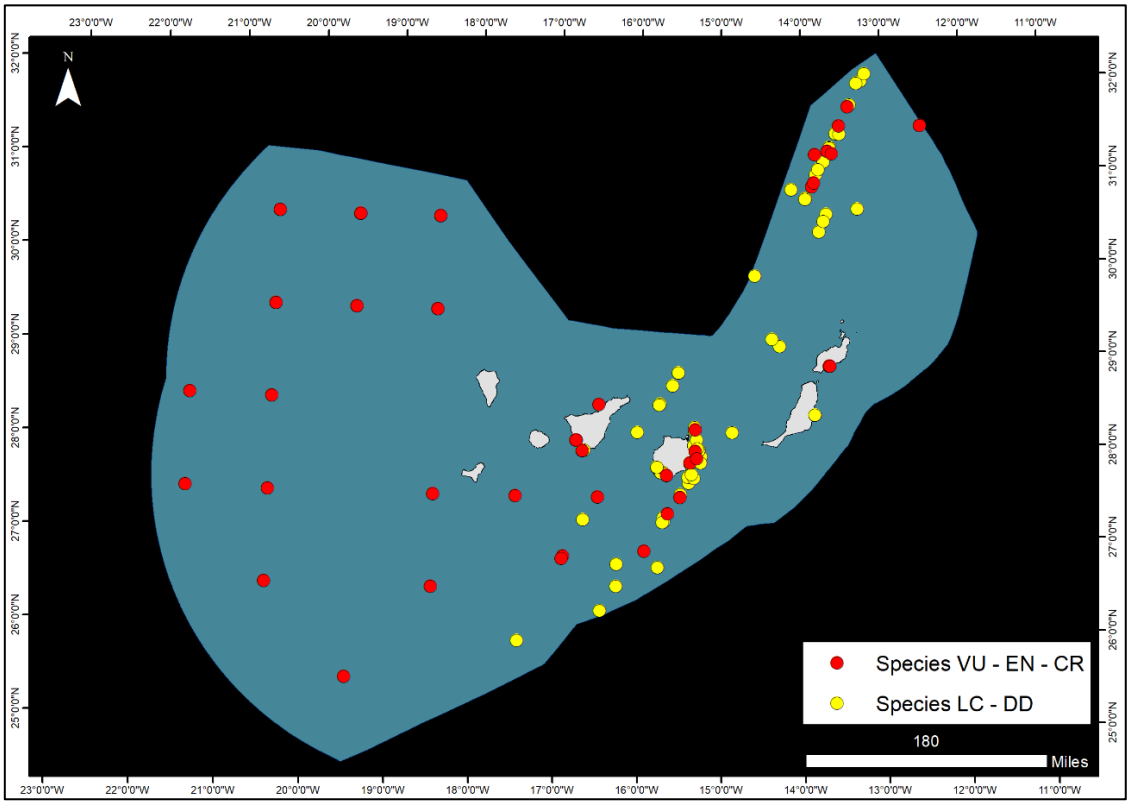


Figure 316. Threatened Species (IUCN): DD= Data Deficient, LC= Least Concern, VU= Vulnerable, EN= Endangered, CR= Critically Endangered (source: EMODnet Biology, 2019).

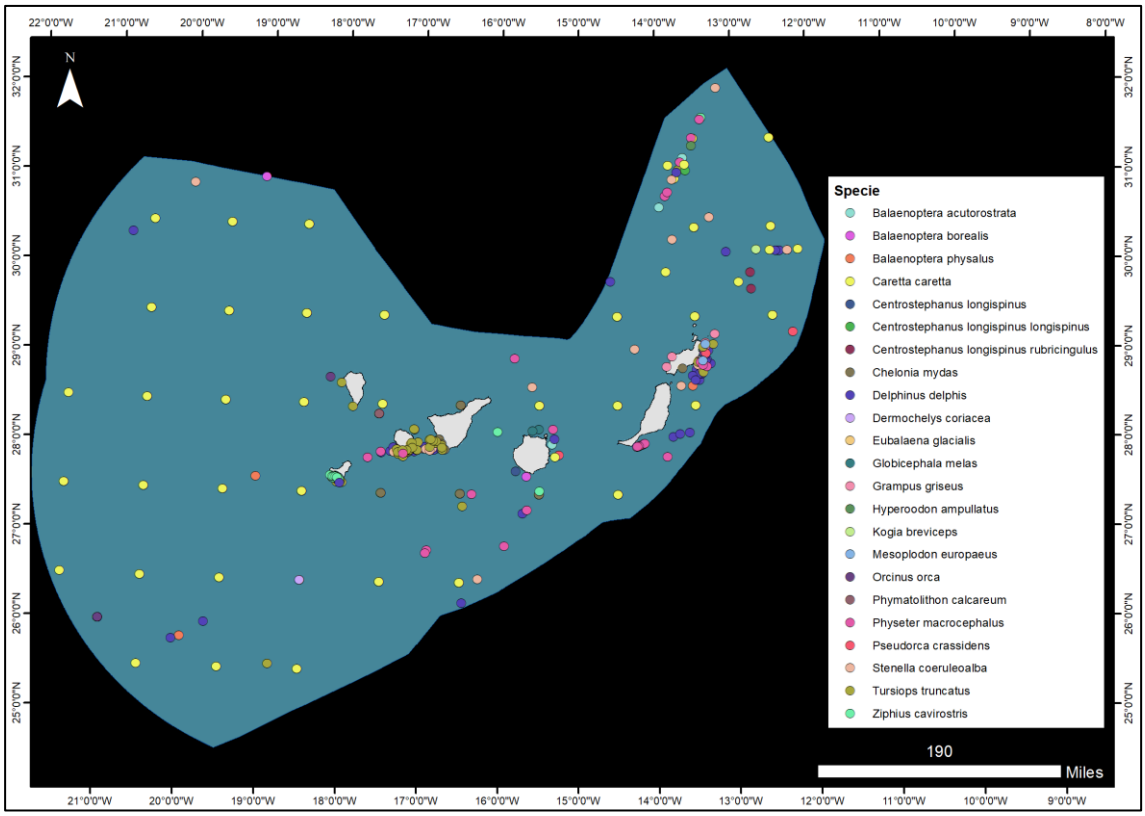


Figure 317. Species included in attachments II and IV of the Habitats Directive (source: EMODnet Biology, 2019).

PART III

Analysis of interactions

Interaction with other sectors

Various synergies were found with the rest of the maritime sectors (see table below). The most important ones with fisheries, energy, scientific research and underwater archaeology (high synergy); and aquaculture and tourism (medium synergy) (MarSP, 2019).

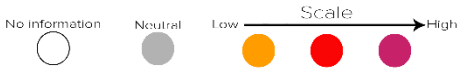
Table 150. Degree of synergy of the environmental conservation and Marine Protected Areas sectors with other maritime sectors (source: MarSP, 2019)

Environmental conservation and Marine Protected Areas			
Aquaculture		Navigation and maritime transportation	
Fisheries		Infrastructures	
Mineral resources		Tourism	
Energy		Scientific research and marine biotechnology	
Defence		Underwater archaeology and cultural heritage	
Ports		Scale: No information, Neutral, Low, High	

Environmental conservation presents very important conflicts with the rest of the maritime sector (see table below). High conflicts were found with energy, defence, mineral resources, ports, navigation, infrastructures and tourism. The environmental impacts of these uses generally affect marine conservation, especially for those having a large and more intense use of the maritime space and hard uses. Impacts on cetaceans, endangered species, seabed were mentioned by participants. On the other side, scientific research and underwater archaeology were recognised to have a neutral conflict (MarSP, 2019).

Table 151. Degree of conflicts of the environmental conservation and Marine Protected Areas sectors with other maritime sectors (source: MarSP, 2019)

Environmental conservation and Marine Protected Areas			
Aquaculture		Navigation and maritime transportation	
Fisheries		Infrastructures	
Mineral resources		Tourism	
Energy		Scientific research and marine biotechnology	
Defence		Underwater archaeology and cultural heritage	
Ports			

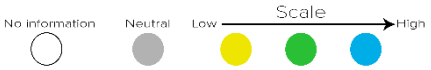


Land-sea interactions

This sector has various synergies with land-use sectors (see table below), particularly high for natural and cultural areas, protected areas and agriculture (MarSP, 2019).

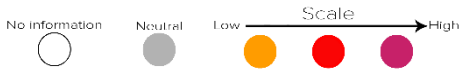
Table 152. Degree of synergy of the environmental conservation and Marine Protected Areas sectors with land-use sectors (source: MarSP, 2019)

Environmental conservation and Marine Protected Areas		
A	Natural, cultural and landscape areas	
B	Bathing areas	
C	Built-up areas in risk zones	
D	Marine Protected Areas	
E	Terrestrial Protected Areas	
F	Built-up areas	
G	Agriculture, forestry and other uses	
H	Tourism potential areas	
I	Airports	
J	Roads	



Important conflicts were also identified (see table below) with roads, airports, tourism potential areas, and built-up areas (medium conflict) and especially for agriculture (high conflict) (MarSP, 2019).

Table 153. Degree of conflict of the environmental and Marine Protected Areas sectors with land-use sectors (source: MarSP, 2019)

Environmental conservation and Marine Protected Areas		
		
A	Natural, cultural and landscape areas	
B	Bathing areas	
C	Built-up areas in risk zones	
D	Marine Protected Areas	
E	Terrestrial Protected Areas	
F	Built-up areas	
G	Agriculture, forestry and other uses	
H	Tourism potential areas	
I	Airports	
J	Roads	

CONTAMINATION

PART I

Sector characterization

The coast in the Canary Islands is one of the most punished areas in recent decades. The high rate of human occupation, high maritime traffic, intensive agriculture and industrialization in some areas are the most important sources of hazardous chemical substances. Due to its amount and incidence, the main discharges to the sea are of urban and industrial origin, being the industry, oil refining and agriculture those that contribute with a greater polluting load. Other sectors of production that contribute with a lower polluting load are those of the chemical industry, generation of electrical energy, aquaculture, cement and naval. Hazardous chemicals also reach the sea through runoff from ravines. Once at sea, the transport and final destination of these substances is highly conditioned by the high hydrodynamics existing in the Islands. In the coastal strip, the high population density generates a volume of wastewater that sometimes exceeds the existing treatment capacity, so they are discharged into the sea with their loads of heavy metals, surfactants, aromatic hydrocarbons, polycyclics, pesticides and other less studied compounds such as household chemicals (personal hygiene, drugs, cleaning, etc.). The treatment of these waters does not eliminate a significant part of these compounds.

The high maritime traffic and port activities contribute significantly to the entry of hydrocarbons, oils, organo-stannic compounds and copper, especially in the areas near the ports. Routine navigation operations, such as tank cleaning and bilge water removal, also produce pollution in the areas. In major ports, oil spills are frequent due to leaks or accidents during loading and unloading maneuvers. The presence in surface sediments of organo-stannic compounds (tributyl and triphenyl) and their degradation products as well as non-ionic surfactants has been detected in port waters.

Furthermore, in certain coastal areas, intensive agricultural activities are carried out with a high consumption of phytosanitary products, thus the contribution to the sea of organophosphorus, organo-nitrogen pesticides, etc. is relevant. Aquaculture, in full development, is a possible route of entry of undesirable chemical substances, especially pesticides and drugs for the control of diseases and parasites, as well as antifouling paints or artificial colors, so some monitoring system should be applied for these substances as they are not included in the EU Directive on the quality required of mollusc farming waters (2006/113 / EC).

Surveillance and quality control of coastal waters is carried out by applying different strategies to comply with the European Directives (Water Framework, water quality for mollusc farming, or pollution caused by certain dangerous substances).

According to the Servicio de Ordenación del Litoral Oriental y Occidental (http://www.pilotajelitoralcanario.es/) from Gobierno de Canarias the risk of pollutant spills in the islands is high and very high, especially in Tenerife and Gran Canaria due to their higher population. On the contrary, the islands of La Palma, El Hierro, La Graciosa and the west coast of Fuerteventura have the lower risk of pollution.

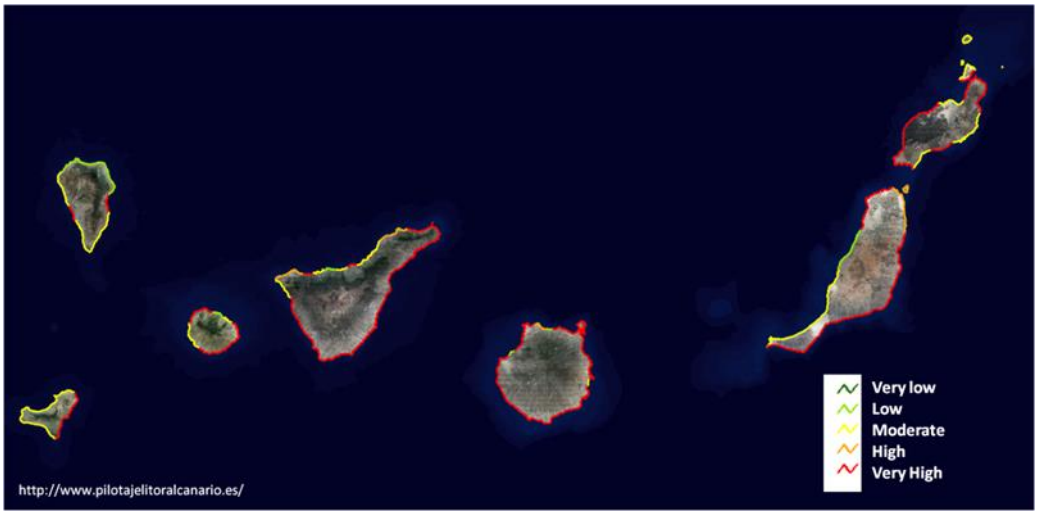


Figure 318. Risk of pollutant spills in the Canary Islands. Data from the Government of Canarias (https://visor.grafcan.es/visorweb/)

In fact, the map of spills in the year 2017 in the archipelago is shown in Figure 319, where the allowed discharges are represented in green dots and the non allowed in red.

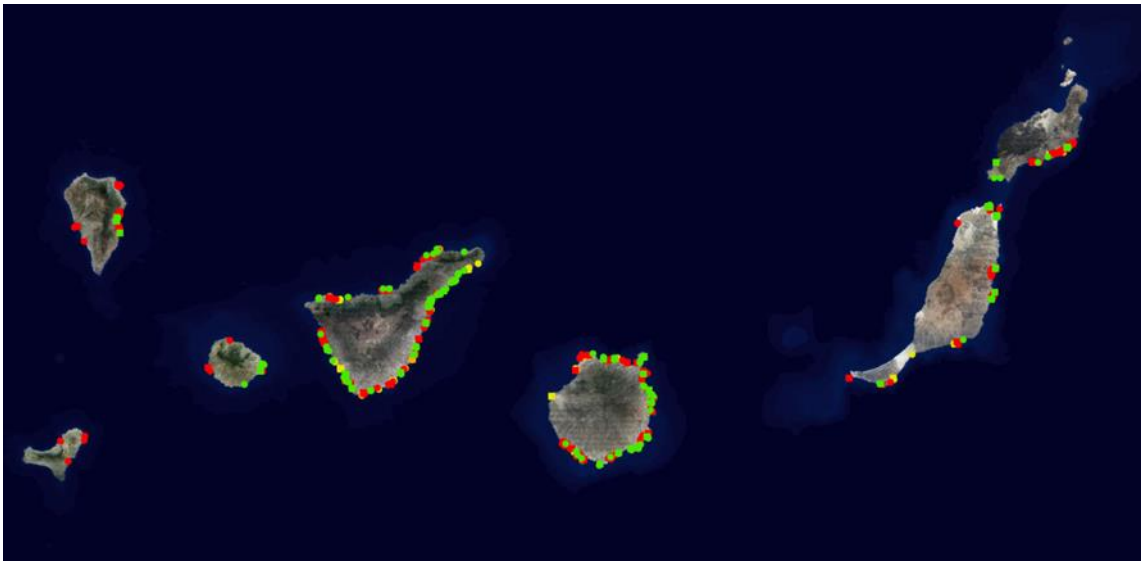


Figure 319. Census of discharges in the year 2017 from land to sea. Green dots represent allowed discharges while red dots represent non allowed discharges. Data from the Government of Canarias (https://visor.grafcan.es/visorweb/default.php?svc=svcVertidos)

According to the Government of the Canary Islands, in the whole of the Canary archipelago, a total of 394 points of discharge have been found, of which 49 are underwater outfalls, 306 are drainage pipes and 30 are installations in DPMT. In addition, 2 spill points have been recorded that have not been categorized due to the absence of data (www.datosdelanzarote.com/Uploads/doc/Actualizaci%C3%B3n-de-censo-de-vertidos-desde-tierra-al-mar-en-Canarias-(2017)-20181205120438901NFORME-FINAL.pdf) and (https://opendata.sitcan.es/dataset/actualizacion-del-censo-de-vertidos-desde-tierra-al-mar-ano-2017).

As seen in Figure 320 adapted from the mentioned documents, the most common discharge is urban waste water, representing 57%, followed by discharges of salt water and brine, which account for 15% and 13% respectively.

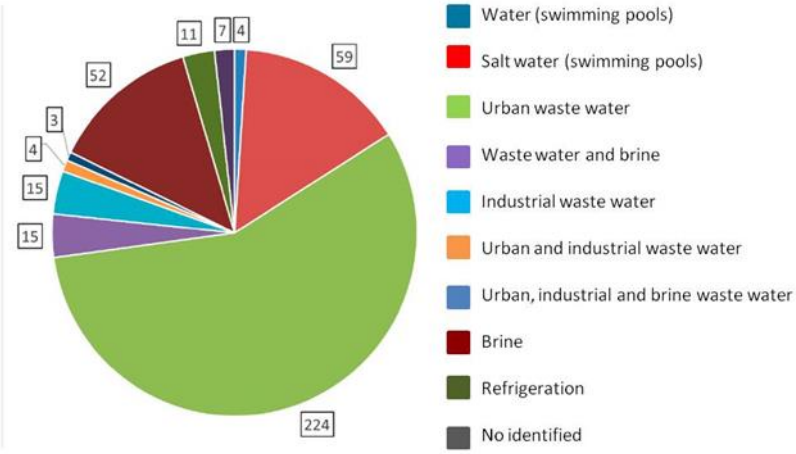


Figure 320. Different types of discharges in 2017 for the whole archipelago. Data adapted from (www.datosdelanzarote.com/Uploads/doc/Actualizaci%C3%B3n-de-censo-de-vertidos-desde-tierra-al-mar-en-Canarias-(2017)-20181205120438901NFORME-FINAL.pdf)

The Province of Santa Cruz de Tenerife has 204 points of discharge, while in the province of Las Palmas de Gran Canaria are registered 190, which represent a 52% and 48% respectively. By islands, the islands of Tenerife and Gran Canaria with 172 and 113 points each represent 72% of the total.

Marine debris and plastics- Another type of contamination is plastic and microplastics, plastic particles smaller than 5 millimeters, have been found widely distributed throughout the planet, in oceans, coasts, lakes and rivers, even from the most remote places. The Canary Current flows through the Canary Islands in a south-southwest direction transporting a large quantity of waste on its surface, which are deposited mainly on the beaches most exposed to prevailing winds and surface currents, those of north-northeast orientation.

Given their capacity to absorb chemical pollutants, microplastics represent a growing environmental concern in the oceans. Recent studies show that the Canary Islands are an area of accumulation of microplastics and tar rafted from the North Atlantic Ocean by the southward flowing Canary Current (Herrera *et al*. 2018, Camacho *et al*. 2019) (Figure 321). In addition, very high levels of contamination by DDT were found, which was banned years ago in Spain; and by Clorpirifós, a pesticide that is widely used in the Canary Islands.

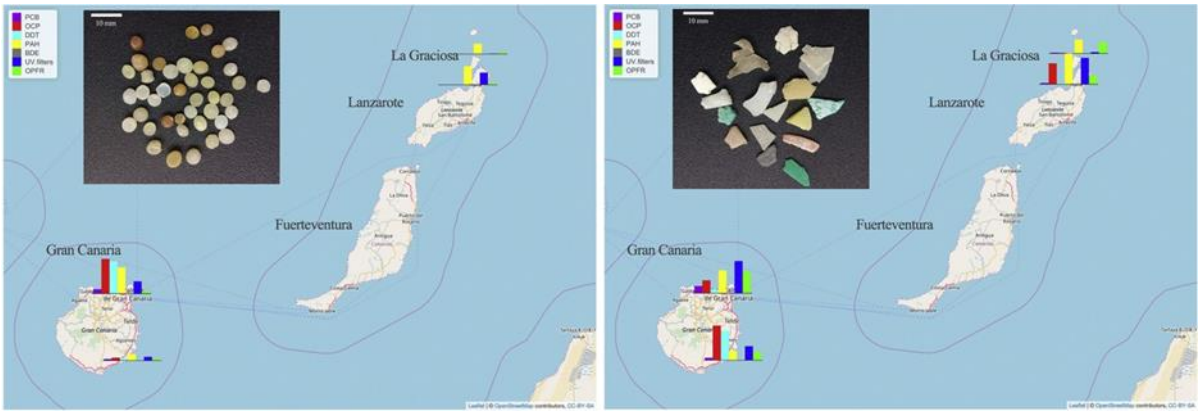


Figure 321. different types of marine debris and pollutant found in the Canary Islands. Figure from Camacho *et al.* (2019)

Different teams from the Canary Islands, as well as from the peninsular and international territory are working hard on this problem. The first international conference on microplastics, MICRO 2016, gathered in Lanzarote the main specialists on this issue, concluding with the elaboration of "the Lanzarote Declaration" (www.datosdelanzarote.com/Uploads/doc/Declaraci%C3%B3n-de-Lanzarote-sobre-los-micropl%C3%A1sticos-(2016)-20171023151147291z_Declaration__june21st2016_es.pdf), a synthesis document signed by 46 scientists, on behalf of more than 600 participants and of the 200 papers and communications of the Conference.

The MITECO (Ministerio para la Transición Ecologica) within the programs of monitoring the state of the marine environment in Spain, includes a control of marine litter both on the beaches and in the water column and the seabed, as well as garbage ingested by some marine indicator or gill species/ entanglement of living organisms in marine litter. Also included are specific subprograms on microplastics on beaches, in surface waters and in marine sediments (https://www.miteco.gob.es/es/costas/temas/proteccion-medio-marino/informe2013-2018_tcm30-486935.pdf). The beaches of the BM-1 Marine Garbage Monitoring Program belonging to the Canarias marine demarcation are El Socorro (Tenerife) and Janubio (Lanzarote). A total of 51 marine waste sampling campaigns were carried out in the annuities from 2013 to 2018, showing that plastic objects are the most frequent and represent 45.5% of the total. They are also noteworthy paper objects as a result of the large number of cigarette butts found (32.3%). To a lesser extent, wood and metal fragments appear 8.7% and 8.1% respectively, as can be seen in Figure 322.

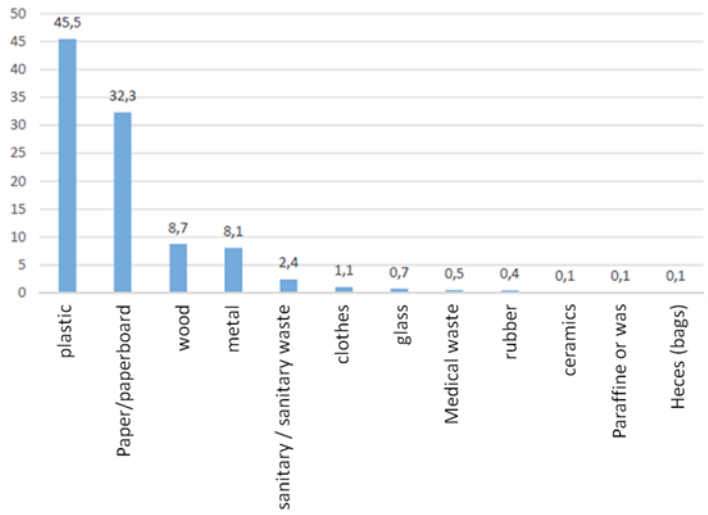


Figure 322. Type of waste found in the period 2013-2018 in the MITECO monitoring program

Legal framework and constraints

Legislation applicable to the Canary Islands context: summarize the applicable legislation and the developed matters

The legislation on the prevention of pollution is state and the main rules refer to the following aspects:

- Civil liability for oil pollution damage.
- Discharges in polluting waters in Spanish maritime waters.
- Safety regulations and prevention of pollution to be met by fishing vessels under 24 meters in length.
- Port facilities for receiving waste generated by ships and cargo residues.
- Rules relating to the implementation of the International Convention on civil liability arising from damage due to pollution of sea waters by hydrocarbons.

The applicable rules are the following:

- Royal Decree 1795/2008, of November 3, which establishes rules on the coverage of civil liability for damages caused by the pollution of hydrocarbons for fuel of ships.
- Royal Decree 394/2007, of March 31, on measures applicable to ships in transit that carry out polluting discharges into Spanish maritime waters.
- Royal Decree 543/2007, of April 27, which determines the safety and pollution prevention regulations to be met by fishing vessels under 24 meters in length (L).

- Royal Decree 1381/2002, of December 20, on port facilities for receiving waste generated by ships and cargo residues.

- Royal Decree 1892/2004, of September 10, which establishes rules for the execution of the International Convention on civil liability derived from damages due to the pollution of the waters of the sea by hydrocarbons.

Eventual administrative derivative acts: explain the required procedure

1. Civil responsibility for damages caused by hydrocarbon contamination.

- Royal Decree 1795/2008, of November 3, which establishes rules on the coverage of civil liability for damages caused by the pollution of hydrocarbons for fuel of ships.

Ship obligation:

Registered owners of ships over 1000 gross tonnage will have to subscribe an insurance or a financial guarantee that covers their liability, for damages due to pollution caused by hydrocarbons used as fuel, and for the costs or damages caused by all the reasonable measures that, after an event, any person takes, in order to avoid or reduce to a minimum the damages due to contamination, as stipulated in article 7, paragraph 1, of the International Convention on Civil Liability arising from damage due to pollution by hydrocarbons for fuel of ships, made in London on March 23, 2001, hereinafter Fuel Convention 2001.

Application and issuance of the certificate proving the existence of the insurance or financial guarantee.

- Certificate: you must request a certificate from the General Directorate of the Merchant Marine accrediting the existence of insurance or financial guarantee other than insurance.

2.- Rules on measures applicable to ships in transit that carry out polluting discharges in Spanish maritime waters.

- Royal Decree 394/2007, of March 31, on measures applicable to ships in transit that carry out polluting discharges into Spanish maritime waters.
- Obligation of cooperation between States: In the event that the Spanish maritime administration is aware of a polluting discharge carried out in non-inland marine waters and the vessel involved carries out its next stopover in a port of another Member State of the European Union, The Spanish maritime administration and that of the State of the port in question will cooperate closely with regard to the carrying out of inspections and the adoption of police measures and any other measures that may be relevant.
- Detention of the vessel, sanctioning file. When there is conclusive evidence that a ship navigating the Spanish territorial sea or waters located in the Spanish exclusive economic zone has carried out a pollutant discharge that supposes or could cause considerable damage to the natural resources of said waters or to the coast or the goods related to it, the Spanish maritime administration will adopt the necessary police measures, including, where appropriate, the detention of the vessel, for the protection of said legal assets will be initiated, if appropriate, the appropriate sanctioning procedure or will send the actions to the Public Prosecutor's Office, having to inform, in any case, the State of the flag of the

vessel. All in accordance with part XII, section 7, of the 1982 United Nations Convention on the Law of the Sea.

3.- The Regulation that regulates inspections of foreign ships in Spanish ports (Royal Decree 1737/2010, of December 23) establishes that the competent authority in Spain for the inspection of ships is the Ministry of Development which will exercise it through of the General Directorate of the Merchant Navy and the Maritime Captaincies in their quality, the latter of peripheral maritime Administration.

4.- Safety regulations and prevention of pollution to be met by fishing vessels under 24 meters in length (L)

Royal Decree 543/2007, of April 27, which determines the safety and pollution prevention regulations to be met by fishing vessels under 24 meters in length (L)

Article 17 Inspection and control for the flagging in Spain of imported vessels. Provides that all vessels or fishing vessels coming from another flag that request their registration in Spain will be submitted, for the extension of new certificates, to recognitions of the type of renewal, regulated in article 36 of the Regulation of inspection and certification of civil ships, corresponding to their class, size and date of construction, and they will be applied all the requirements of the corresponding international agreements, in addition to all the additional requirements of the national regulations corresponding to their class and size.

The fishing vessels will be subject to the following recognitions:

- Initial, for the issuance of the certificate of conformity and the technical information document.
- Renewal of the certificate of conformity, every five years from the initial issuance of the certificate, for those between length (L) equal to or greater than 6 meters and less than 24 meters.
- Intermediate, for the endorsement of the certificate of conformity between the second and third year after initial recognition or renewal, for those between length (L) equal to or greater than 12 meters and less than 24 meters.
- Extraordinary, randomly, to endorse the accuracy of the annual self-certification.
- In dry of the hull of the wooden boats of length (L) equal or greater than 6 meters, every year.
- Additional, after reform works.

5.- Rules on port installations for the reception of waste generated by ships and cargo residues. Royal Decree 1381/2002, of December 20, on port facilities for receiving waste generated by ships and cargo residues.

- The ports will have adequate facilities for the reception of waste generated by ships and cargo residues that meet the needs of the vessels that habitually use the port and of those types of vessels that, although they do not usually use the port, participate in the most important traffic of merchandise with said port, without causing unnecessary delays.
- Waste management and handling plans, referred to in article 5, shall determine the characteristics and conditions of waste and waste reception operations and facilities and shall comply with the basic, technical and service standards established by competent

Administrations and provide users with the necessary information regarding such operations and facilities.

Notification

The captain of a vessel that goes to a Spanish port must fill out the form in Annex II with truthfulness and accuracy and notify this information to the corresponding Maritime Captaincy and to the managing entity of the port with the advance that is established below:

- At least twenty-four hours before the expected arrival of the vessel, or
- As soon as the port of call is known, if such information is available less than twenty-four hours before arrival, or
- At the latest at the time of leaving the port of departure, if the duration of the trip is less than twenty-four hours.

In the event that the vessel has not indicated in the notification its intention to deliver waste or waste to the receiving port facility, but has been required, in accordance with Article 7 (3), to discharge the waste, the Maritime Captaincy will inform the managing body of the port of this. The captain of the vessel must request the reception service from a receiving port facility authorized in said port, sending a copy of said request to the managing entity and paying the corresponding fee for the requested waste reception service.

Delivery of waste generated by ships.

- The captain of a vessel calling at a Spanish port shall deliver, before leaving the port, all the waste generated by the vessel in an authorized port reception facility.
- The ship may leave the port of call without delivering the waste in said port, however, if it has been expressly authorized for it by the Maritime Captaincy of that port, which will base said authorization on the information provided in the notification issued in accordance with article 6 and with the result of the inspection carried out on board the ship, if it had been carried out, if it is inferred that the ship has sufficient storage capacity destined for all accumulated generated waste and that which is foreseeable are generated during the voyage to the next port of call.

6.- Civil liability derived from damages due to the pollution of the waters of the sea by hydrocarbons. Royal Decree 1892/2004, of September 10, which establishes rules for the execution of the International Convention on civil liability derived from damages due to the pollution of the waters of the sea by hydrocarbons.

Obligations

- Coverage of civil liability for damages caused by the pollution of the waters of the sea by hydrocarbons. As provided for in article 7, paragraph 1, of the International Convention on Civil Liability arising from Oil Pollution from Sea Water Damage, 1969, as amended by the London Protocol of November 27, 1992 (hereinafter referred to as the of 1992 Civil Liability), to which Spain acceded on June 6, 1995, the owners of ships carrying more than 2,000 tons of oil in bulk as cargo will have to take out insurance or a financial guarantee that covers their responsibility for damage caused by pollution, in accordance with the provisions of that agreement.
- It is forbidden to navigate to any Spanish merchant ship that carries more than 2,000 tons of oil in bulk, as cargo, if it does not have on board the certificate proving the existence, with full validity, of the insurance or financial guarantee referred to in section one.

- It is forbidden to enter or leave the Spanish port or the arrival or exit of an offshore installation located in the territorial sea to any foreign vessel that transports, as a bulk cargo, more than 2000 tons of hydrocarbons if it does not have a certificate of insurance or other financial guarantee in force and issued in accordance with the 1992 Civil Liability Convention and covering up to the limit of liability that corresponds to it, required under the above-mentioned agreement.

PART II

Current spatial distribution

In the **State Plan for the Protection of the Shore of the Sea against Pollution (Plan Ribera)**, developed by the General Directorate of Sustainability of the Coast and the Sea in collaboration with the Ministry of Development and Ministry of the Interior, it includes aspects such as atlas of sensitivity of the Spanish coast and an analysis of vulnerability and risk of it, as well as the logistical and management capacities necessary to deal with a pollution episode of significant dimension and intensity. Each zone contains the following layers for its study:

Potential hydrocarbon arrival to the Coast

- Volume arrived at the coast (m^3)
  - Potential arrival Volume arrived to the coast – Gasoil
  - Potential arrival Volume arrived to the coast – Middle fuel
  - Potential arrival Volume arrived to the coast - Heavy fuel
  - Potential arrival Volume arrived to the coast – Raw fuel
- Pollution severity (m^3/km)
  - Potential arrival Pollution severity – Gasoil
  - Potential arrival Pollution severity – Middle fuel
  - Potential arrival Pollution severity – Heavy fuel
  - Potential arrival Pollution severity – Raw fuel

Vulnerability of the Coast

- Ecologic vulnerability
  - Ecologic vulnerability Index
- Socio-economic vulnerability
  - Socio-economic Index

Damages caused by pollution

- Severity of ecologic damages (UDE/km)
  - Severity of ecologic damages – Gasoil
  - Severity of ecologic damages – Middle fuel
  - Severity of ecologic damages – Heavy fuel
  - Severity of ecologic damages – Raw fuel
- Severity of socio-economic damages (UDS/km)
  - Severity of socio-economic damages – Gasoil
  - Severity of socio-economic damages - Middle fuel
  - Severity of socio-economic damages - Heavy fuel
  - Severity of socio-economic damages – Raw fuel

Resulting risk

- Ecologic Risk (URE)

    - Total Ecologic Risk
- Socio-economic Risk (URS)
    - Total Socio-economic Risk

Similarly, from the **Spatial Data Infrastructure of MITECO**, Zones vulnerable to nitrate contamination are presented (Report four-year 2012-2015. Dir 91/676/EEC) together with the information regarding wastewater treatment plants and discharge areas according to the requirements of Directive 91/271/EEC.

From the **Canary Islands Environmental Information System (SiMAC, of its initials in Spanish)** the updated census of discharges from land to sea is presented, carried out by Civilport Ingenieros, S.L.U, between 2016 and 2017. Here are shown the characteristics of each discharge (location, responsible, type, driving, nature, origin, treatment, flow, etc.).

On the other hand, the **Insular Councils of Waters** of each island or hydrographic area developed the **Insular Hydrological Plans (2nd cycle 2015-2021)**. From these plans the following information is obtained (by island):

- Chemical state of surface water.
- Ecological potential of surface water.
- Significant pressures of surface water: Urban, thermal, industrial and desalination discharges.
- Diffuse pressures of surface water.
- Surface water control network: Control programs for monitoring natural coastal surface waters (oceanographic campaigns, macroalgae and phanerogams).
- Risk assessment of surface water: Estimated risk considering the existence or not of significant pressures on the mass of water and the type of impact existing in it. (High, medium, low, null).

Table 154. Cartographic information available for contamination.

Name	Source	Organization	Date	Definition
Damages by pollution. Ecologic Risk Density	MITECO Metadata Catalog	MITECO	2014	Information about the ecologic risk resulting from the potential arrival to the coast of the 4 types of hydrocarbon. It is part of the *Plan Estatal de Protección de Ribera del Mar contra la Contaminación.*
Damages by pollution. Socio-economic Risk Density	MITECO Metadata Catalog	MITECO	2014	Information about the socio-economic risk resulting from the potential arrival to the coast of the 4 types of hydrocarbon. It is part of *the Plan Estatal de Protección de Ribera del Mar contra la Contaminación.*
Damages by pollution. Severity of ecologic damages by raw, middle and heavy fuel, as well as by gasoil.	MITECO Metadata Catalog	MITECO	2014	Information about the potential ecologic damage caused by hydrocarbon per unit of coastline length (UDE/km) that could be passed one time every 1000 years. It is part of the *Plan Estatal de Protección de Ribera del Mar contra la Contaminación.*
Damages by pollution. Severity of socio-economic damages caused by raw, middle and heavy fuel, as well as by gasoil.	MITECO Metadata Catalog	MITECO	2014	Information about the potential socio-economic damage caused by hydrocarbon per unit of coastline length (UDE/km) that could be exceeded once every 1000 years. It is part of the *Plan Estatal de Protección de Ribera del Mar contra la Contaminación.*
Risk of Pollution. Severity of pollution by raw, middle and heavy fuel, and by gasoil	MITECO Metadata Catalog	MITECO	2014	Information about the potential hydrocarbon arrival. Pollution severity by hydrocarbon, specifically, arrival volume divided by the length of coastline (m^3/km) that could be exceeded once every 1000 years. It is part of the *Plan Estatal de Protección de Ribera del Mar contra la Contaminación.*
Risk of pollution. Volume of raw fuel, middle fuel, heavy fuel and gasoil arrived to the coast.	MITECO Metadata Catalog	MITECO	2014	Information about the potential hydrocarbon arrival, specifically, the arrival volume of hydrocarbon to each section of the coast (m^3) that could be exceeded once every 1000 years. It is part of *the Plan Estatal de Protección de Ribera del Mar contra la Contaminación.*
Link: https://www.miteco.gob.es/es/cartografia-y-sig/ide/descargas/costas-medio-marino/plan-ribera-descargas.aspx				
Zones vulnerable to nitrate contamination	IDE MITECO	MITECO	2017	Delimitation of areas vulnerable to nitrates of agricultural origin. This area will be included in the Register of Protected Areas of the Hydrological Plan of Cuenca.
Link: https://www.miteco.gob.es/es/cartografia-y-sig/ide/descargas/agua/zonas-vulnerables.aspx				
Wastewater treatment plants (EDAR)	IDE MITECO	MITECO	2017	EDARs according to the latest report "Cuestionario 2015" that contains the progress status of Directive 91/271 / EEC to date 12/31/2014.
Discharge points of EDAR	IDE MITECO	MITECO	2017	Active discharge points (whose data are in force and have not been discharged) according to the latest report "Cuestionario 2015" that contains the progress status of Directive 91/271 / EEC to date 12/31/2014.
Link: https://www.miteco.gob.es/es/cartografia-y-sig/ide/descargas/agua/situacion-q2015.aspx				
Census of discharges from land to sea	SiMAC	Government of the Canary Islands	2017	Update of the census of discharges from land to sea.
Link: http://www.gobiernodecanarias.org/medioambiente/piac/temas/aguas/medidas-y-factores/contaminacion-y-vertidos/medidas-tratamiento-vertidos/control-vertidos/actualizacion-censo-2017/				
Insular Hydrological Plans (2nd cycle 2015-2021)	Canary Islands Government	Insular Councils of Waters of each islands	2018-2019	- Chemical state of surface water. - Ecological potential of surface water. - Significant pressures of surface water. - Diffuse pressures of surface water. - Surface water control network. - Risk assessment of surface water.
Link: https://www.gobiernodecanarias.org/agricultura/aguas/temas/planificacion/hidrologica/				

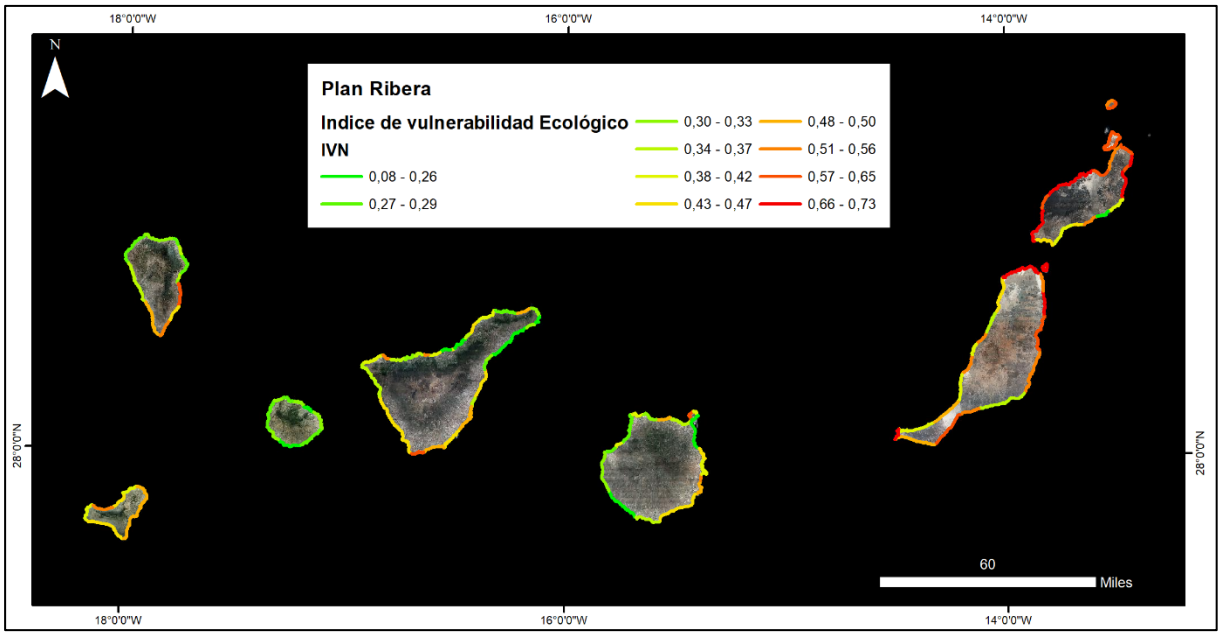


Figure 323. Index of ecologic vulnerability, *Plan Ribera* (source: IDE MITECO, 2019).

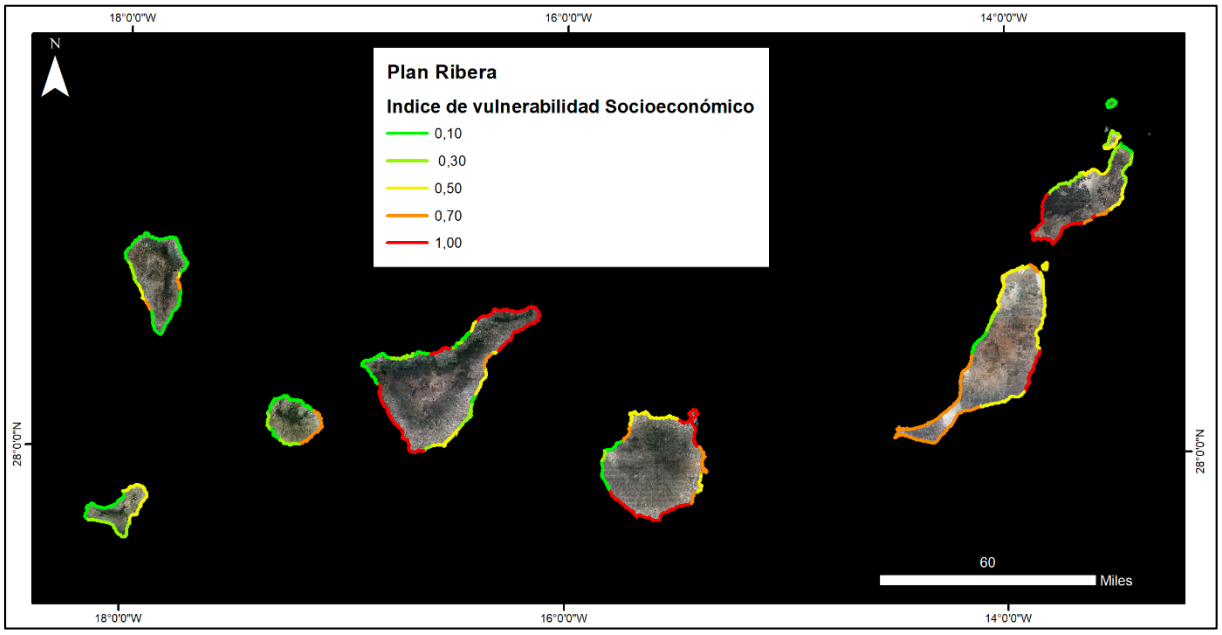


Figure 324. Index of socio-economic vulnerability, *Plan Ribera* (source: IDE MITECO, 2019).

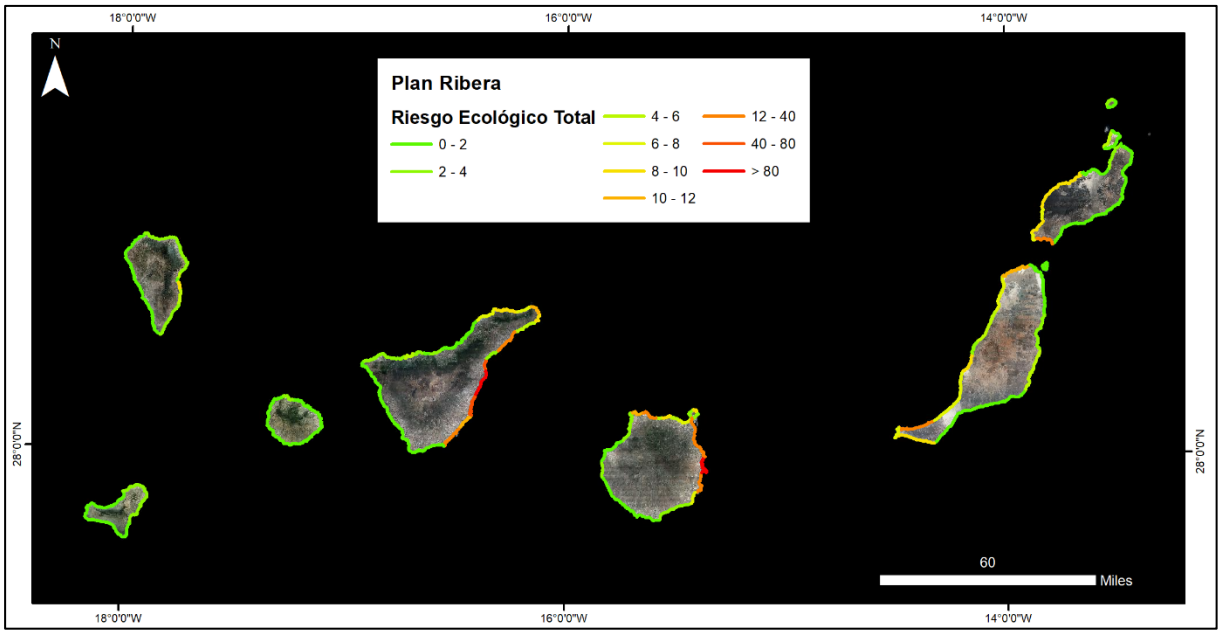


Figure 325. Ecologic risk, *Plan Ribera* (source: IDE MITECO, 2019).

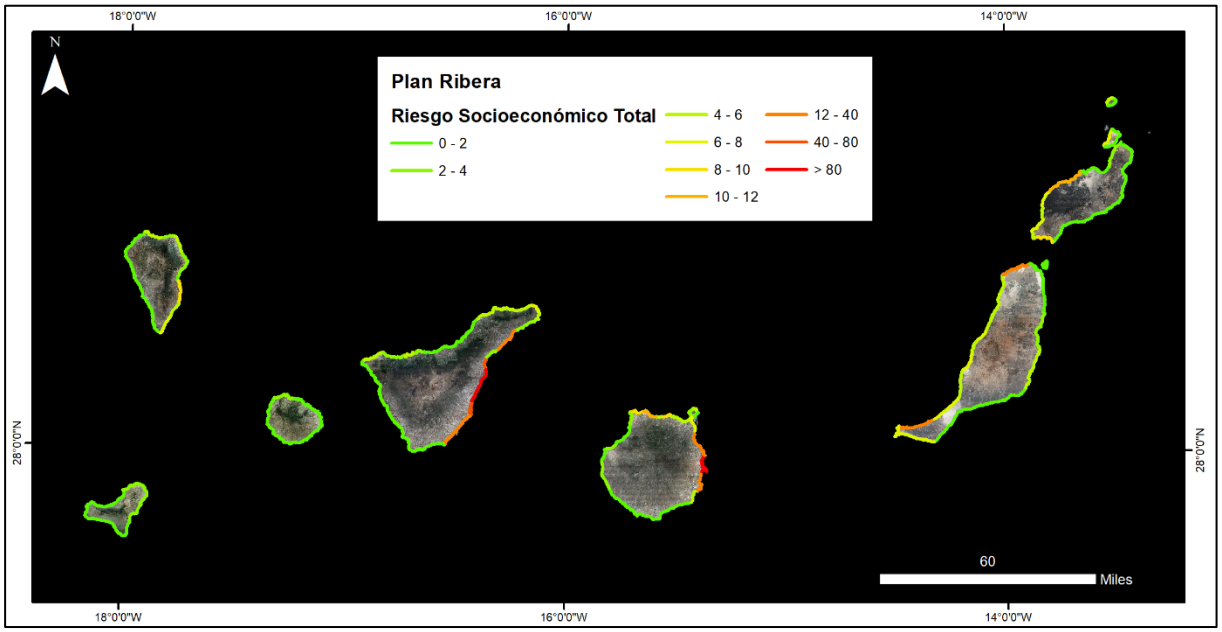


Figure 326. Socio-economic risk, *Plan Ribera* (source: IDE MITECO, 2019).

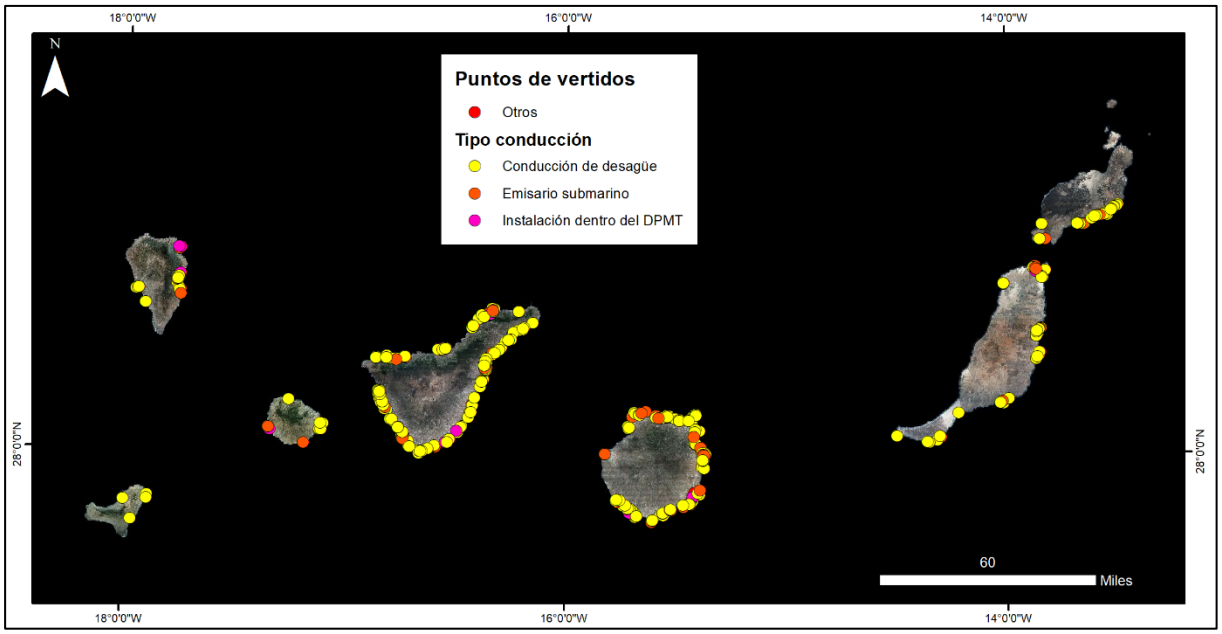


Figure 327. Census of discharges to the sea (source: SiMAC, 2019).

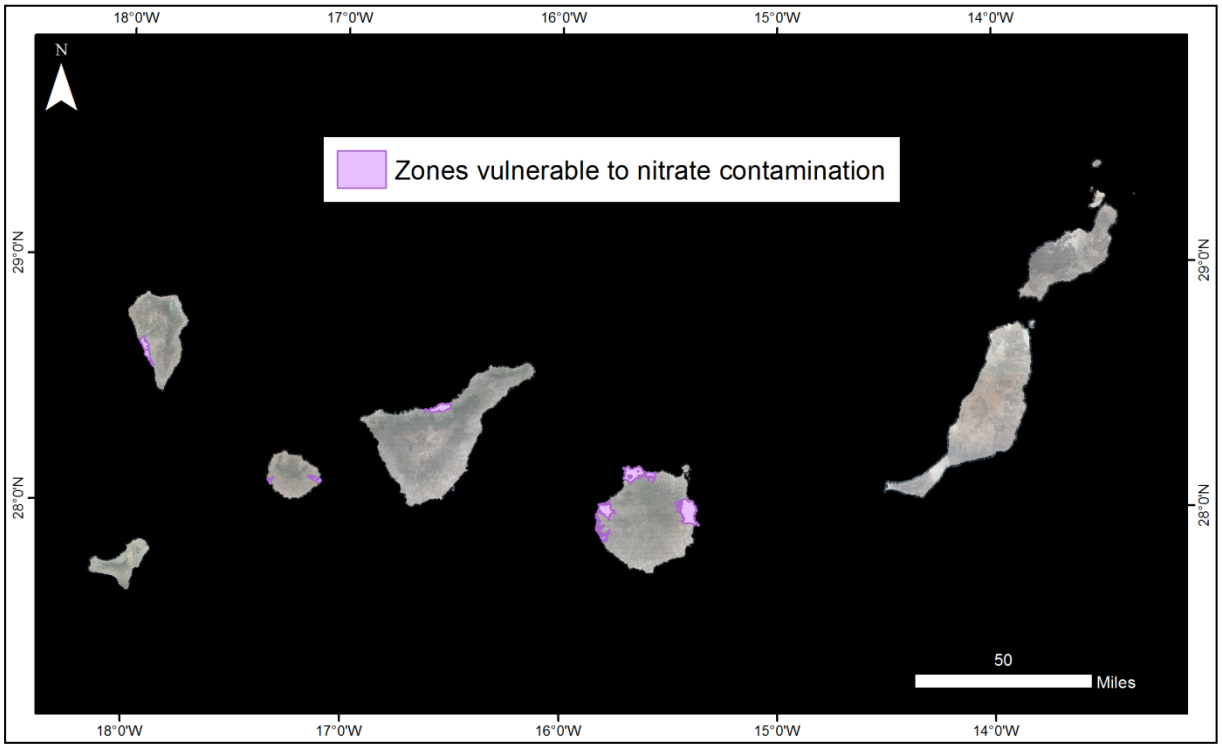


Figure 328. Delimitation of areas vulnerable to nitrates of agricultural origin (source: MITECO, 2017).

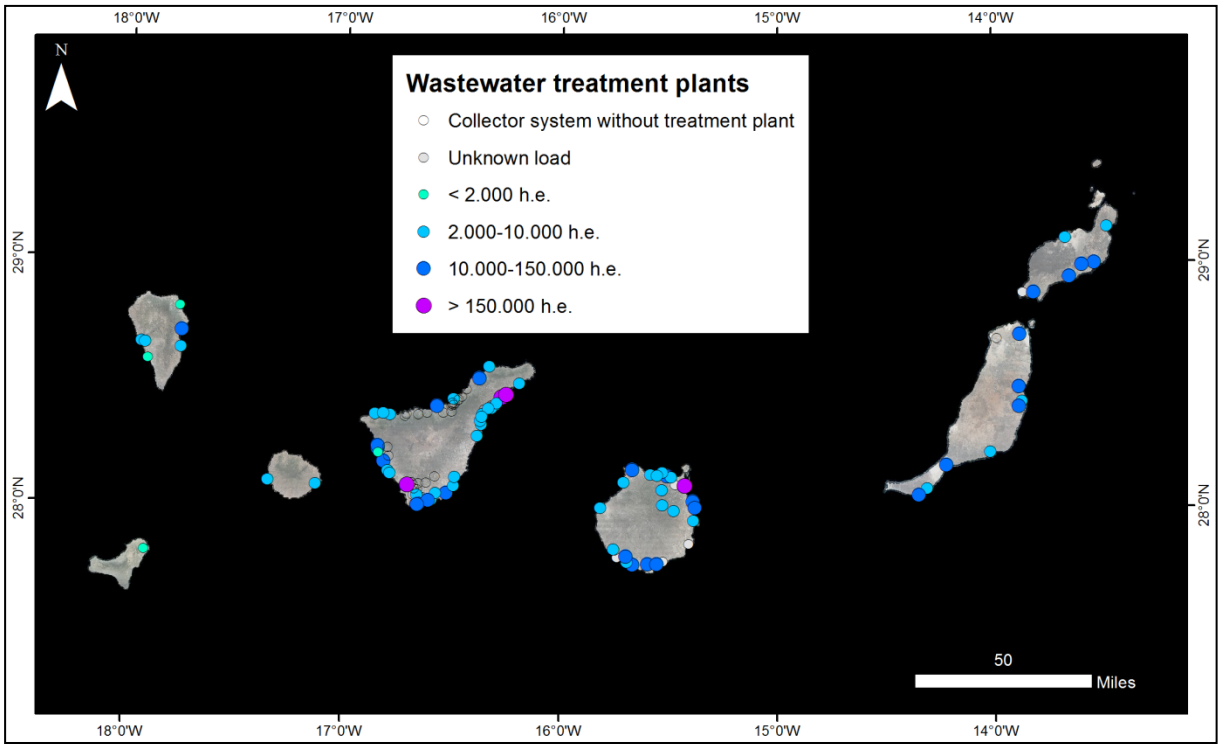


Figure 329. Wastewater treatment plants (EDAR) according to the latest report "Cuestionario 2015" (source: MITECO, 2017).

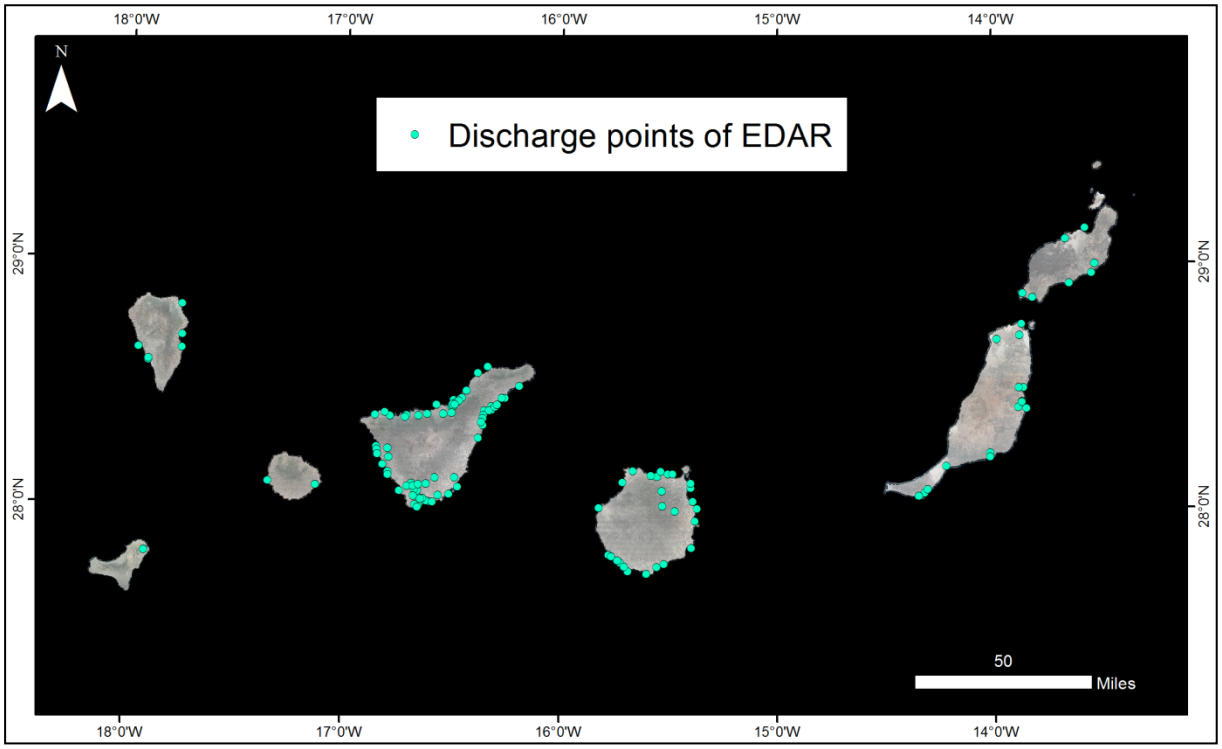


Figure 330. Active discharge points according to the latest report "Cuestionario 2015" (source: MITECO, 2017).

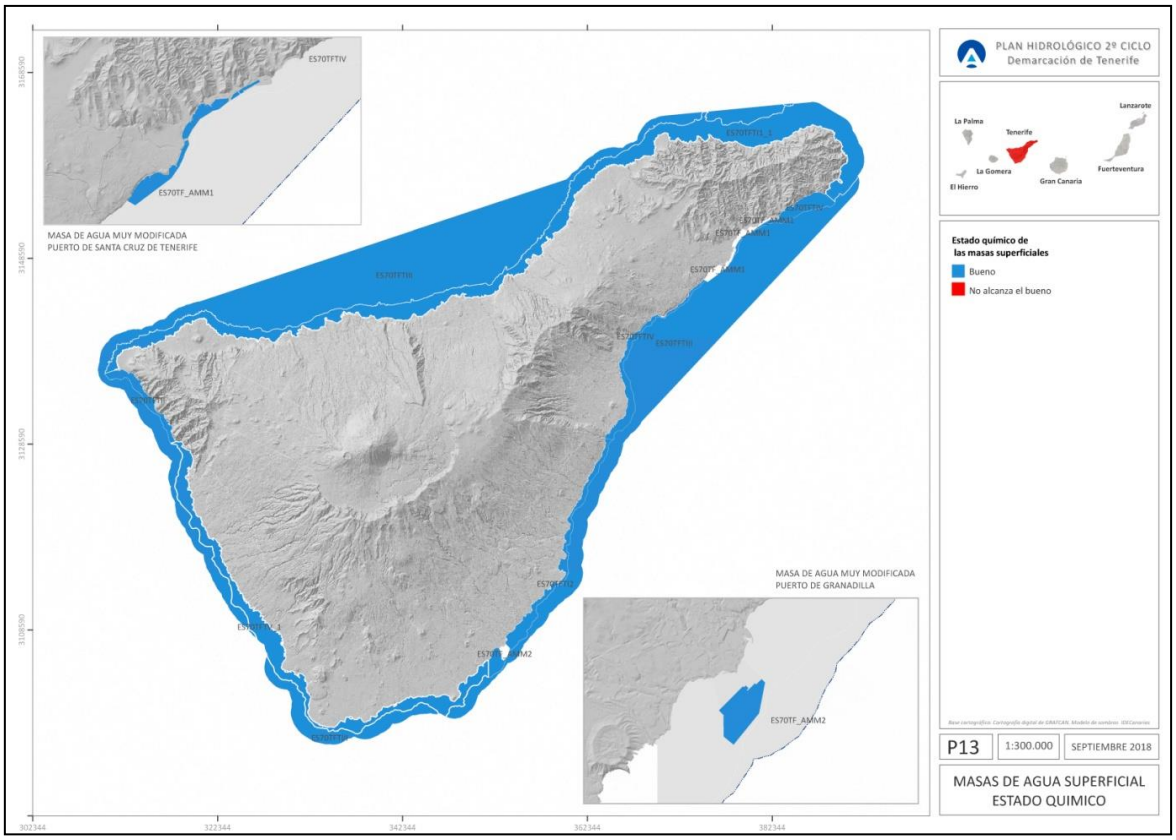


Figure 331. Chemical state of surface water (Taken from Plan Hidrológico de Tenerife, 2019)

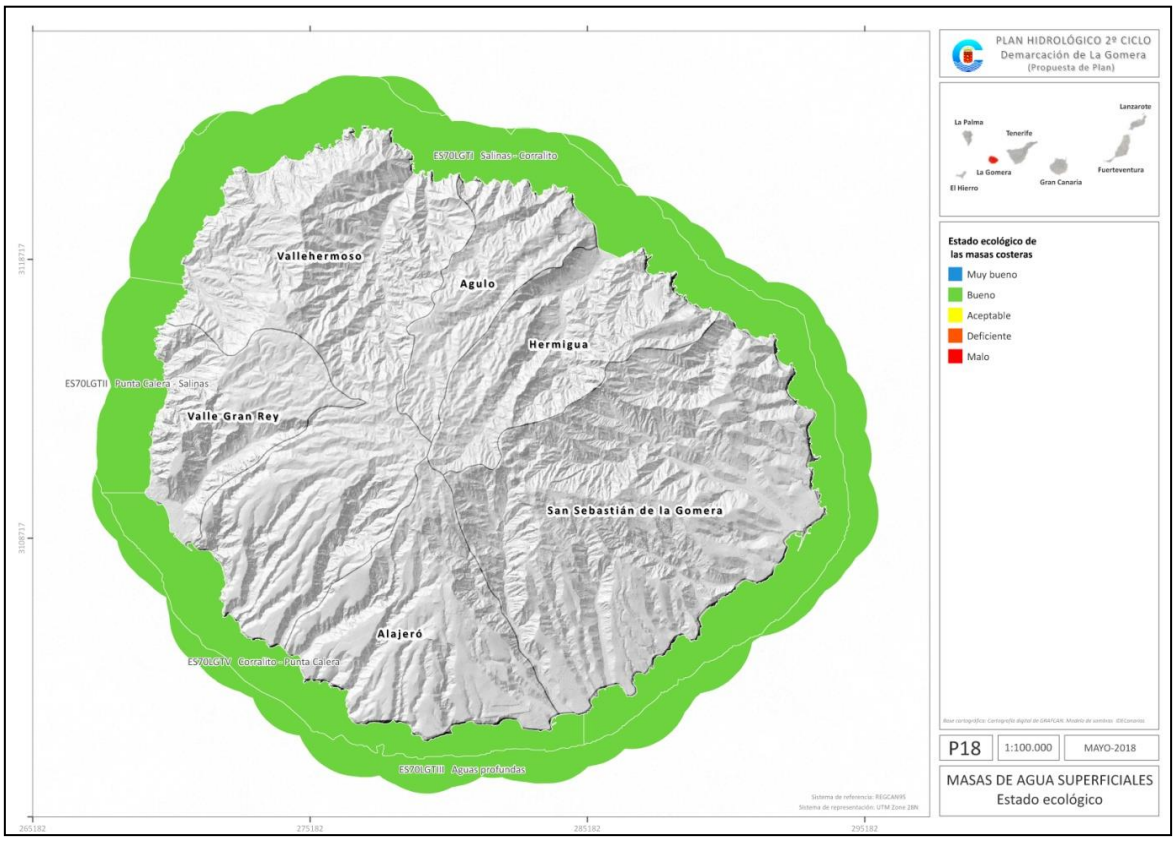


Figure 332. Ecological potential of surface water (Taken from Plan Hidrológico de La Gomera, 2018).

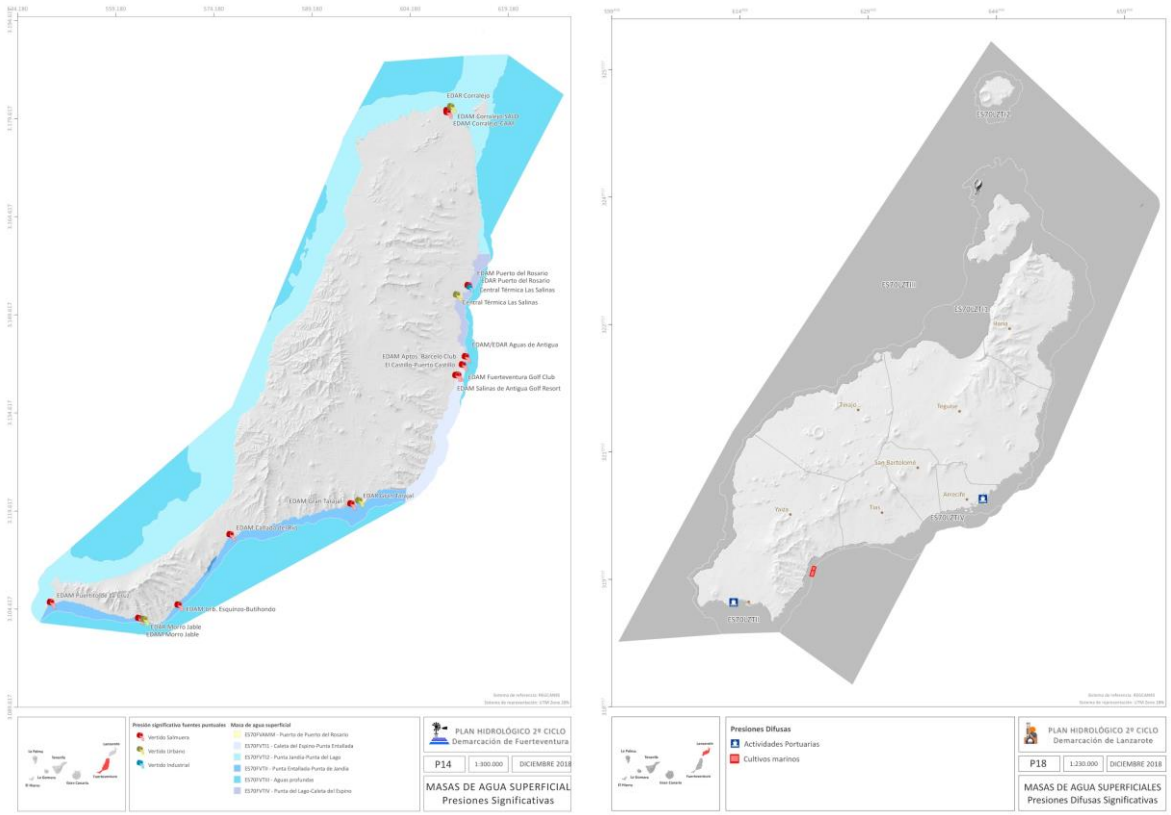


Figure 333. Significant pressures of surface water of Fuerteventura (left) and Diffuse pressures of surface water of Lanzarote (right) (Taken from Plan Hidrológico de Fuerteventura (2019) y Plan Hidrológico de Lanzarote (2019)).

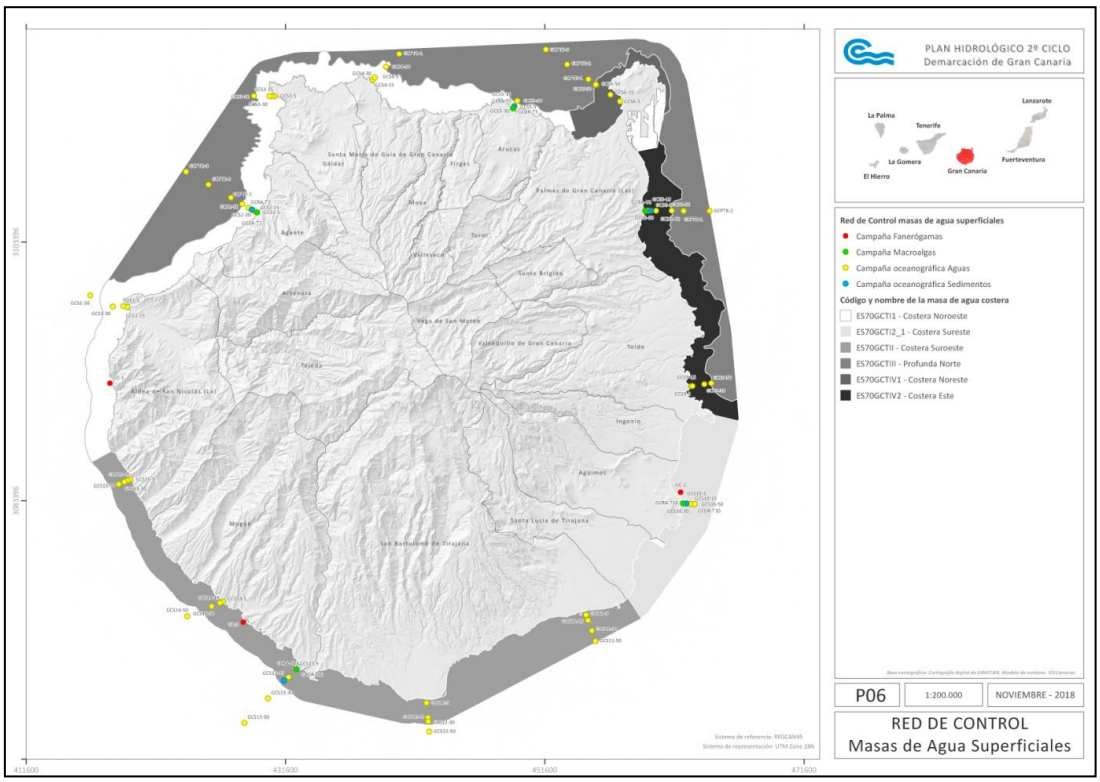


Figure 334. Surface water control network of Gran Canaria (Taken from Plan Hidrológico de Gran Canaria, 2019).

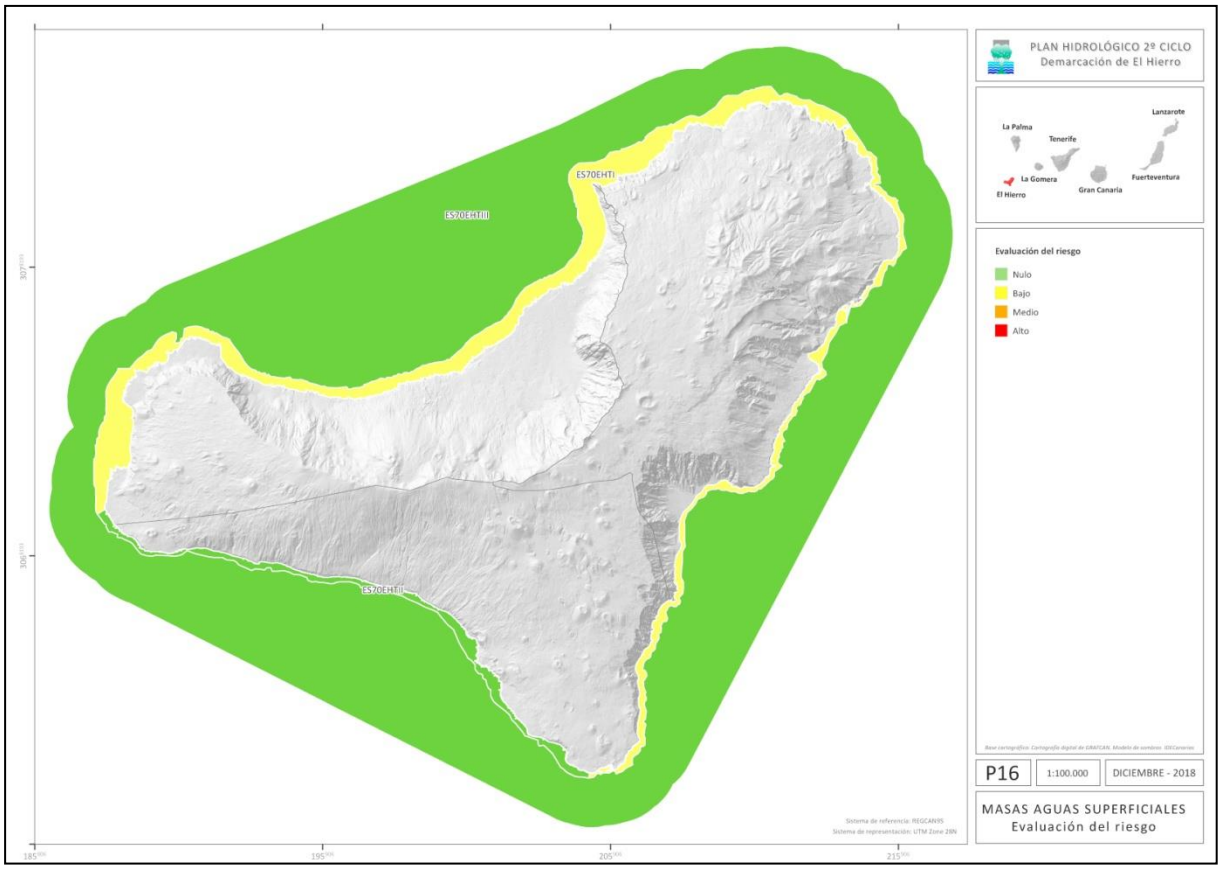


Figure 335. Risk assessment of surface water (Taken from Plan Hidrológico de El Hierro, 2019).

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Appendix 1. Sheets used in the 2nd MarSP stakeholder workshop of the Canary Islands

MARSP PANEL 1 LIMITACIONES PARA LOS SECTORES		SECTOR MARINO											
		1	2	3	4	5	6	7	8	9	10	11	12
LIMITACIONES		Acuicultura	Pesca	Recursos minerales	Energía	Defensa	Puertos	Transporte y navegación marítima	Infraestructuras	Turismo	Investigación científica y biotecnología marina	Arqueología submarina y patrimonio cultural	Conservación ambiental y Áreas marinas protegidas
A	Legales												
B	Administrativas												
C	Económicas												
D	Tecnológicas												
E	Sociales												
F	Ambientales												

Figure 336. Sheet 1: constraints for the development of maritime sectors (authors, 2019)

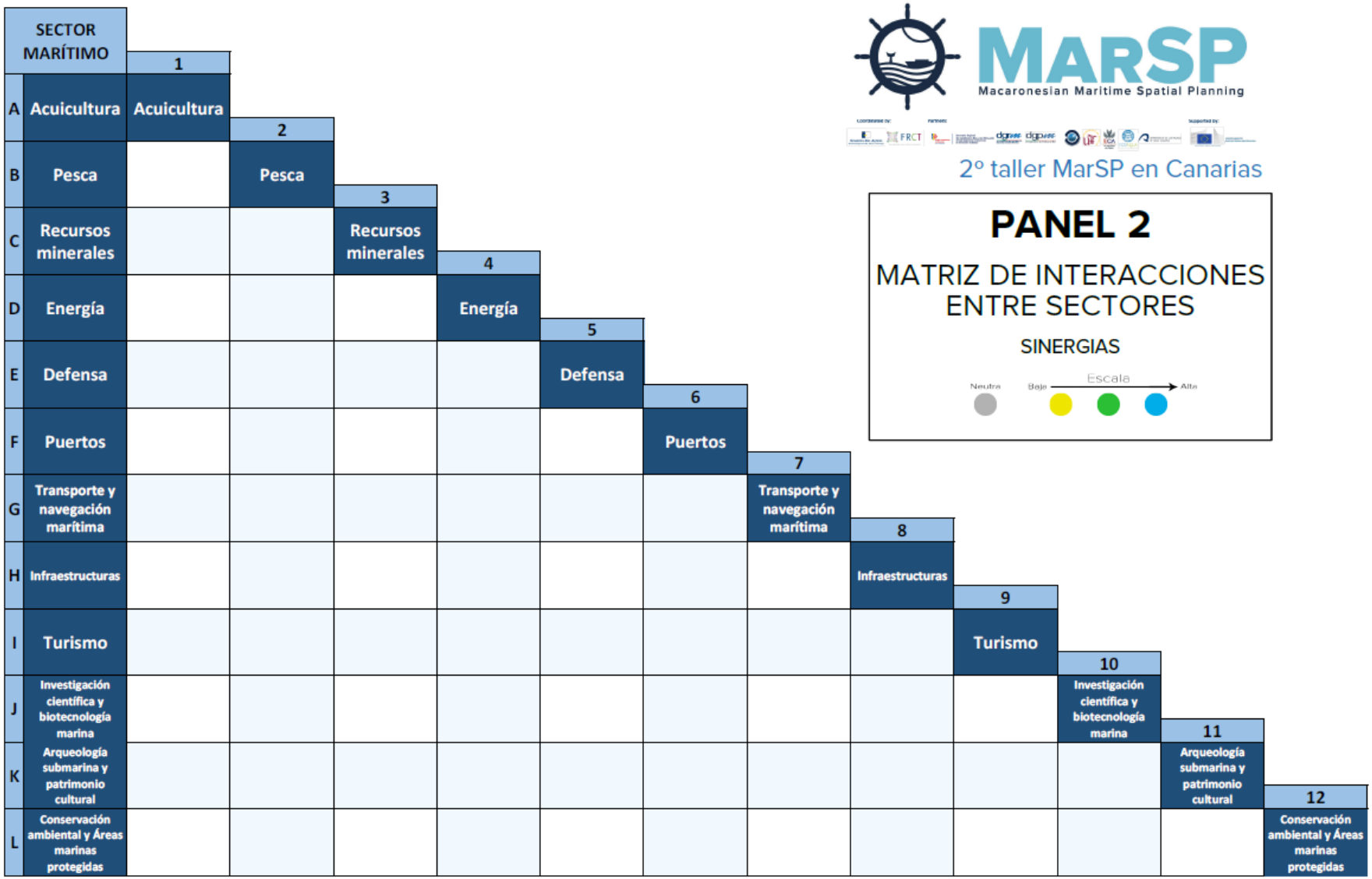

Figure 337. Sheet 2: matrix of synergies between maritime sectors (authors, 2019)

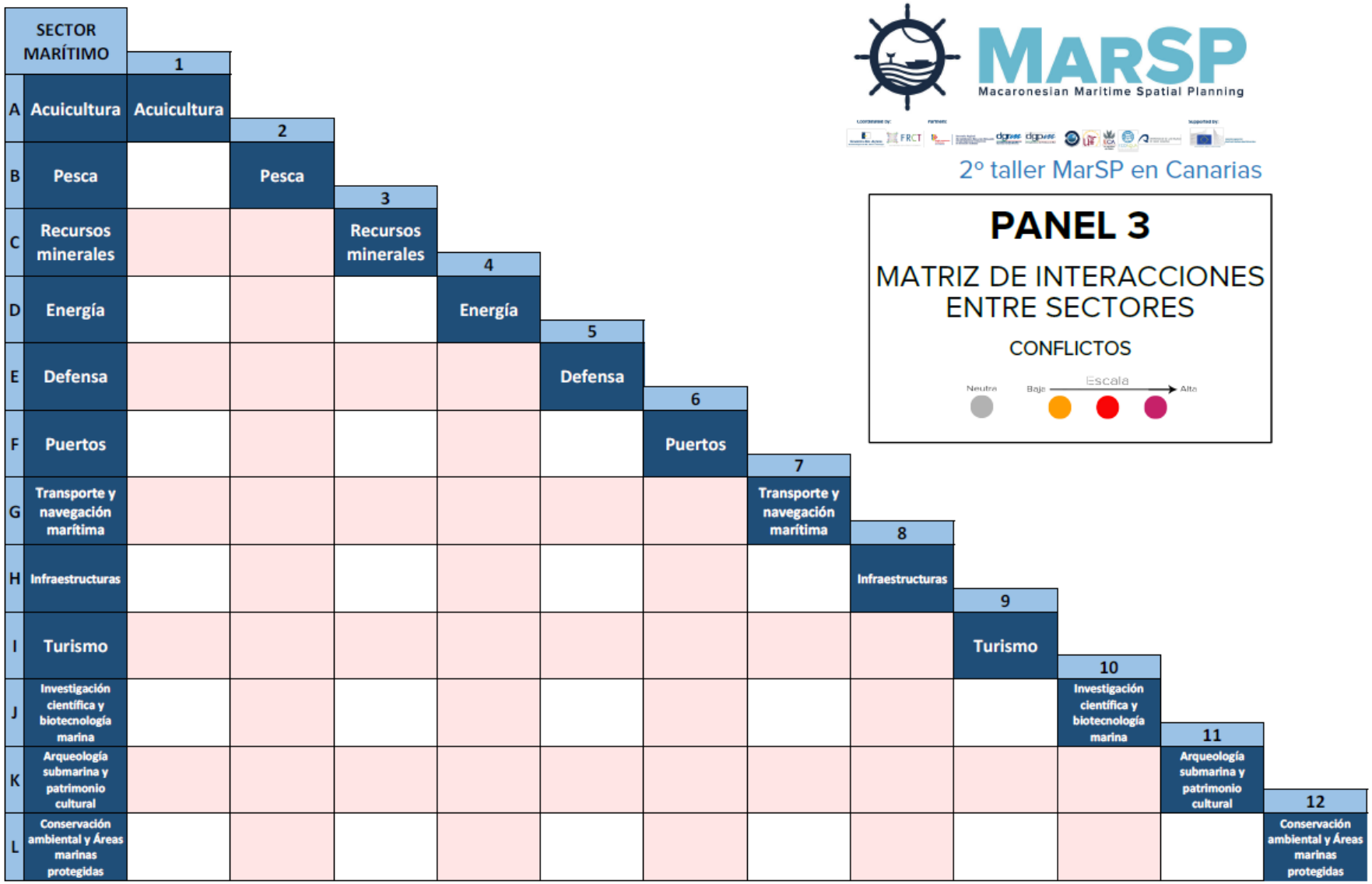

Figure 338. Sheet 3: matrix of conflicts between maritime sectors (authors, 2019)

MARSP 2º taller MarSP en Canarias **PANEL 4** INTERACCIÓN ENTRE TIERRA-MAR SINERGIAS Escala: Neutra · Bajo · Alto			SECTOR MARINO										
			1	2	3	4	5	6	7	8	9	10	11	12
SECTOR COSTERO (<30 m)			Acuicultura	Pesca	Recursos minerales	Energía	Defensa	Puertos	Transporte y navegación marítima	Infraestructuras	Turismo	Investigación científica y biotecnología marina	Arqueología submarina y patrimonio cultural	Conservación ambiental y Áreas marinas protegidas
Áreas críticas para el uso costero sostenible	A	Área especial natural, cultural y paisajística												
	B	Zonas de baño												
	C	Áreas edificadas en zonas de riesgo												
Protección ambiental	D	Áreas marinas protegidas												
	E	Áreas terrestres protegidas												
Áreas de Protección costera	F	Áreas edificadas												
	G	Agrícola, forestal y otros usos												
	H	Áreas de potencial turístico												
Infraestructuras	I	Aeropuertos												
	J	Carreteras												

Figure 339. Sheet 4: synergies in land-sea interactions (authors, 2019)

PANEL 5

INTERACCIÓN ENTRE TIERRA-MAR

CONFLICTOS

Escala: Neutra · Baja · Alta

SECTOR COSTERO (<30 m)			SECTOR MARINO											
			1	2	3	4	5	6	7	8	9	10	11	12
			Acuicultura	Pesca	Recursos minerales	Energía	Defensa	Puertos	Transporte y navegación marítima	Infraestructuras	Turismo	Investigación científica y biotecnología marina	Arqueología submarina y patrimonio cultural	Conservación ambiental y Áreas marinas protegidas
Áreas críticas para el uso costero sostenible	A	Área especial natural, cultural y paisajística												
	B	Zonas de baño												
	C	Áreas edificadas en zonas de riesgo												
Protección ambiental	D	Áreas marinas protegidas												
	E	Áreas terrestres protegidas												
Áreas de Protección costera	F	Áreas edificadas												
	G	Agrícola, forestal y otros usos												
	H	Áreas de potencial turístico												
Infraestructuras	I	Aeropuertos												
	J	Carreteras												

Figure 340. Sheet 5: conflicts in land-sea interactions (authors, 2019)

Appendix 2. Results of the working tables in the 2nd MarSP stakeholder workshop of the Canary Islands

Table 155. Results of Sheet 2: Synergies with other sectors

Code	Sector A	Sector B	Neutral	Low	Medium	High	TOTAL	V_Neutral	V_Low	V_Medium	V_High	Value
B1	B	1	2	1	2	4	9	-3	-1	1	3	0,8
C1	C	1	2	0	0	0	2	-3	-1	1	3	-3,0
C2	C	2	2	1	0	2	5	-3	-1	1	3	-0,2
D1	D	1	1	0	3	3	7	-3	-1	1	3	1,3
D2	D	2	1	2	1	0	4	-3	-1	1	3	-1,0
D3	D	3	1	0	0	0	1	-3	-1	1	3	-3,0
E1	E	1	1	1	1	0	3	-3	-1	1	3	-1,0
E2	E	2	2	1	0	0	3	-3	-1	1	3	-2,3
E3	E	3	0	1	0	0	1	-3	-1	1	3	-1,0
E4	E	4	0	0	0	0	0	-3	-1	1	3	NO DATA
F1	F	1	0	0	0	3	3	-3	-1	1	3	3,0
F2	F	2	0	0	0	5	5	-3	-1	1	3	3,0
F3	F	3	0	0	1	0	1	-3	-1	1	3	1,0
F4	F	4	0	0	3	2	5	-3	-1	1	3	1,8
F5	F	5	1	0	0	0	1	-3	-1	1	3	-3,0
G1	G	1	1	2	0	0	3	-3	-1	1	3	-1,7
G2	G	2	0	4	0	1	5	-3	-1	1	3	-0,2
G3	G	3	0	0	0	0	0	-3	-1	1	3	NO DATA
G4	G	4	1	1	0	0	2	-3	-1	1	3	-2,0
G5	G	5	1	1	0	1	3	-3	-1	1	3	-0,3
G6	G	6	0	0	0	7	7	-3	-1	1	3	3,0
H1	H	1	0	0	2	1	3	-3	-1	1	3	1,7
H2	H	2	0	1	1	2	4	-3	-1	1	3	1,5
H3	H	3	0	0	0	1	1	-3	-1	1	3	3,0
H4	H	4	0	0	0	2	2	-3	-1	1	3	3,0
H5	H	5	0	0	0	0	0	-3	-1	1	3	NO DATA
H6	H	6	0	0	0	3	3	-3	-1	1	3	3,0
H7	H	7	0	0	0	1	1	-3	-1	1	3	3,0
I1	I	1	0	1	2	0	3	-3	-1	1	3	0,3
I2	I	2	0	1	3	5	9	-3	-1	1	3	1,9
I3	I	3	1	0	0	0	1	-3	-1	1	3	-3,0
I4	I	4	0	0	0	2	2	-3	-1	1	3	3,0
I5	I	5	2	0	0	0	2	-3	-1	1	3	-3,0
I6	I	6	0	0	0	4	4	-3	-1	1	3	3,0
I7	I	7	0	0	1	2	3	-3	-1	1	3	2,3
I8	I	8	0	0	0	2	2	-3	-1	1	3	3,0
J1	J	1	0	0	0	7	7	-3	-1	1	3	3,0
J2	J	2	0	0	0	7	7	-3	-1	1	3	3,0
J3	J	3	0	0	2	0	2	-3	-1	1	3	1,0

J4	J	4	0	0	2	1	3	-3	-1	1	3	1,7
J5	J	5	1	0	0	0	1	-3	-1	1	3	-3,0
J6	J	6	1	0	0	0	1	-3	-1	1	3	-3,0
J7	J	7	0	0	1	1	2	-3	-1	1	3	2,0
J8	J	8	0	0	0	1	1	-3	-1	1	3	3,0
J9	J	9	0	0	0	2	2	-3	-1	1	3	3,0
K1	K	1	0	0	0	0	0	-3	-1	1	3	NO DATA
K2	K	2	1	1	0	0	2	-3	-1	1	3	-2,0
K3	K	3	1	0	0	0	1	-3	-1	1	3	-3,0
K4	K	4	0	0	0	0	0	-3	-1	1	3	NO DATA
K5	K	5	1	0	0	0	1	-3	-1	1	3	-3,0
K6	K	6	1	1	0	1	3	-3	-1	1	3	-0,3
K7	K	7	0	0	0	0	0	-3	-1	1	3	NO DATA
K8	K	8	1	0	0	0	1	-3	-1	1	3	-3,0
K9	K	9	0	0	0	3	3	-3	-1	1	3	3,0
K10	K	10	0	0	0	2	2	-3	-1	1	3	3,0
L1	L	1	0	0	3	1	4	-3	-1	1	3	1,5
L2	L	2	0	0	1	8	9	-3	-1	1	3	2,8
L3	L	3	0	0	0	0	0	-3	-1	1	3	NO DATA
L4	L	4	0	0	0	2	2	-3	-1	1	3	3,0
L5	L	5	1	0	0	0	1	-3	-1	1	3	-3,0
L6	L	6	0	1	1	0	2	-3	-1	1	3	0,0
L7	L	7	1	0	0	1	2	-3	-1	1	3	0,0
L8	L	8	1	1	0	1	3	-3	-1	1	3	-0,3
L9	L	9	0	0	4	1	5	-3	-1	1	3	1,4
L10	L	10	0	0	0	8	8	-3	-1	1	3	3,0
L11	L	11	0	0	0	5	5	-3	-1	1	3	3,0

Table 156. Results of Sheet 3: Conflicts with other sectors

Code	Sector A	Sector B	Neutral	Low	Medium	High	TOTAL	V_Neutral	V_Low	V_Medium	V_High	Value
B1	B	1	0	4	4	3	11	-3	-1	1	3	0,8
C1	C	1	0	0	0	3	3	-3	-1	1	3	3,0
C2	C	2	0	0	0	5	5	-3	-1	1	3	3,0
D1	D	1	1	0	0	1	2	-3	-1	1	3	0,0
D2	D	2	0	4	2	0	6	-3	-1	1	3	-0,3
D3	D	3	1	1	0	0	2	-3	-1	1	3	-2,0
E1	E	1	0	0	0	2	2	-3	-1	1	3	3,0
E2	E	2	1	0	0	3	4	-3	-1	1	3	1,5
E3	E	3	1	0	0	0	1	-3	-1	1	3	-3,0
E4	E	4	0	1	1	0	2	-3	-1	1	3	0,0
F1	F	1	1	1	0	1	3	-3	-1	1	3	-0,3
F2	F	2	0	1	0	2	3	-3	-1	1	3	1,7
F3	F	3	0	1	0	1	2	-3	-1	1	3	1,0
F4	F	4	0	1	1	0	2	-3	-1	1	3	0,0
F5	F	5	1	0	0	0	1	-3	-1	1	3	-3,0
G1	G	1	0	0	1	2	3	-3	-1	1	3	2,3
G2	G	2	0	1	2	3	6	-3	-1	1	3	1,7
G3	G	3	1	0	0	0	1	-3	-1	1	3	-3,0
G4	G	4	0	2	0	0	2	-3	-1	1	3	-1,0
G5	G	5	1	0	0	1	2	-3	-1	1	3	0,0
G6	G	6	2	0	0	0	2	-3	-1	1	3	-3,0
H1	H	1	1	0	0	1	2	-3	-1	1	3	0,0
H2	H	2	0	1	1	1	3	-3	-1	1	3	1,0
H3	H	3	0	1	0	0	1	-3	-1	1	3	-1,0
H4	H	4	0	0	2	1	3	-3	-1	1	3	1,7
H5	H	5	1	0	0	1	2	-3	-1	1	3	0,0
H6	H	6	2	0	0	0	2	-3	-1	1	3	-3,0
H7	H	7	1	0	0	0	1	-3	-1	1	3	-3,0
I1	I	1	1	2	0	2	5	-3	-1	1	3	0,2
I2	I	2	0	0	2	2	4	-3	-1	1	3	2,0
I3	I	3	0	0	0	1	1	-3	-1	1	3	3,0
I4	I	4	0	0	1	0	1	-3	-1	1	3	1,0
I5	I	5	0	0	1	1	2	-3	-1	1	3	2,0
I6	I	6	1	2	0	1	4	-3	-1	1	3	-0,5
I7	I	7	1	0	0	2	3	-3	-1	1	3	1,0
I8	I	8	0	0	0	2	2	-3	-1	1	3	3,0
J1	J	1	3	1	1	0	5	-3	-1	1	3	-1,8
J2	J	2	2	0	2	0	4	-3	-1	1	3	-1,0
J3	J	3	0	0	1	0	1	-3	-1	1	3	1,0
J4	J	4	0	0	1	0	1	-3	-1	1	3	1,0
J5	J	5	0	0	1	0	1	-3	-1	1	3	1,0
J6	J	6	0	0	0	1	1	-3	-1	1	3	3,0

J7	J	7	0	0	0	2	2	-3	-1	1	3	**3,0**
J8	J	8	0	0	0	1	1	-3	-1	1	3	**3,0**
J9	J	9	0	0	0	1	1	-3	-1	1	3	**3,0**
K1	K	1	1	1	1	1	4	-3	-1	1	3	**0,0**
K2	K	2	1	0	1	0	2	-3	-1	1	3	**-1,0**
K3	K	3	0	0	1	0	1	-3	-1	1	3	1,0
K4	K	4	0	0	0	1	1	-3	-1	1	3	**3,0**
K5	K	5	0	0	0	0	0	-3	-1	1	3	NO DATA
K6	K	6	0	1	2	2	5	-3	-1	1	3	1,4
K7	K	7	0	1	0	1	2	-3	-1	1	3	1,0
K8	K	8	0	0	1	1	2	-3	-1	1	3	2,0
K9	K	9	0	1	0	0	1	-3	-1	1	3	**-1,0**
K10	K	10	0	0	1	0	1	-3	-1	1	3	1,0
L1	L	1	0	1	3	4	8	-3	-1	1	3	1,8
L2	L	2	0	2	3	2	7	-3	-1	1	3	1,0
L3	L	3	0	0	0	7	7	-3	-1	1	3	**3,0**
L4	L	4	0	0	2	3	5	-3	-1	1	3	**2,2**
L5	L	5	0	0	0	4	4	-3	-1	1	3	**3,0**
L6	L	6	0	0	1	7	8	-3	-1	1	3	**2,8**
L7	L	7	0	1	1	5	7	-3	-1	1	3	**2,1**
L8	L	8	0	0	0	6	6	-3	-1	1	3	**3,0**
L9	L	9	0	1	0	7	8	-3	-1	1	3	**2,5**
L10	L	10	1	0	0	0	1	-3	-1	1	3	**-3,0**
L11	L	11	1	1	0	0	2	-3	-1	1	3	**-2,0**

Table 157. Results of Sheet 4: Synergies in land-sea interactions

Code	T Sector	S Sector	Neutral	Low	Medium	High	TOTAL	V_Neutral	V_Low	V_Medium	V_High	Value
A1	A	1	0	4	0	0	4	-3	-1	1	3	-1,0
A2	A	2	1	1	1	0	3	-3	-1	1	3	-1,0
A3	A	3	1	0	0	0	1	-3	-1	1	3	-3,0
A4	A	4	0	0	1	1	2	-3	-1	1	3	2,0
A5	A	5	1	0	0	1	2	-3	-1	1	3	0,0
A6	A	6	1	2	0	1	4	-3	-1	1	3	-0,5
A7	A	7	0	0	0	0	0	-3	-1	1	3	NO DATA
A8	A	8	2	0	0	0	2	-3	-1	1	3	-3,0
A9	A	9	2	1	2	3	8	-3	-1	1	3	0,5
A10	A	10	0	0	0	5	5	-3	-1	1	3	3,0
A11	A	11	1	0	2	3	6	-3	-1	1	3	1,3
A12	A	12	0	0	0	8	8	-3	-1	1	3	3,0
B1	B	1	2	0	0	0	2	-3	-1	1	3	-3,0
B2	B	2	1	1	0	0	2	-3	-1	1	3	-2,0
B3	B	3	1	1	0	0	2	-3	-1	1	3	-2,0
B4	B	4	1	0	1	0	2	-3	-1	1	3	-1,0
B5	B	5	1	0	1	0	2	-3	-1	1	3	-1,0
B6	B	6	1	3	0	0	4	-3	-1	1	3	-1,5
B7	B	7	2	0	0	0	2	-3	-1	1	3	-3,0
B8	B	8	2	0	1	0	3	-3	-1	1	3	-1,7
B9	B	9	0	0	1	7	8	-3	-1	1	3	2,8
B10	B	10	1	0	2	3	6	-3	-1	1	3	1,3
B11	B	11	0	1	3	0	4	-3	-1	1	3	0,5
B12	B	12	0	1	1	2	4	-3	-1	1	3	1,5
C1	C	1	1	0	0	0	1	-3	-1	1	3	-3,0
C2	C	2	0	1	0	0	1	-3	-1	1	3	-1,0
C3	C	3	0	0	0	0	0	-3	-1	1	3	NO DATA
C4	C	4	0	0	0	0	0	-3	-1	1	3	NO DATA
C5	C	5	0	0	0	0	0	-3	-1	1	3	NO DATA
C6	C	6	0	1	0	0	1	-3	-1	1	3	-1,0
C7	C	7	1	1	0	0	2	-3	-1	1	3	-2,0
C8	C	8	0	0	0	0	0	-3	-1	1	3	NO DATA
C9	C	9	0	0	1	1	2	-3	-1	1	3	2,0
C10	C	10	0	0	1	2	3	-3	-1	1	3	2,3
C11	C	11	0	0	0	1	1	-3	-1	1	3	3,0
C12	C	12	0	1	0	0	1	-3	-1	1	3	-1,0
D1	D	1	0	2	3	0	5	-3	-1	1	3	0,2
D2	D	2	0	0	1	6	7	-3	-1	1	3	2,7
D3	D	3	0	1	0	0	1	-3	-1	1	3	-1,0
D4	D	4	0	0	0	1	1	-3	-1	1	3	3,0
D5	D	5	1	0	0	1	2	-3	-1	1	3	0,0
D6	D	6	1	1	1	0	3	-3	-1	1	3	-1,0

D7	D	7	1	1	0	0	2	-3	-1	1	3	**-2,0**
D8	D	8	1	0	0	0	1	-3	-1	1	3	**-3,0**
D9	D	9	1	1	1	5	8	-3	-1	1	3	1,5
D10	D	10	0	0	0	12	12	-3	-1	1	3	**3,0**
D11	D	11	0	0	2	4	6	-3	-1	1	3	**2,3**
D12	D	12	0	0	1	10	11	-3	-1	1	3	**2,8**
E1	E	1	0	0	3	0	3	-3	-1	1	3	1,0
E2	E	2	1	0	0	2	3	-3	-1	1	3	1,0
E3	E	3	1	0	0	0	1	-3	-1	1	3	**-3,0**
E4	E	4	0	0	0	1	1	-3	-1	1	3	**3,0**
E5	E	5	1	0	0	1	2	-3	-1	1	3	**0,0**
E6	E	6	0	0	1	1	2	-3	-1	1	3	2,0
E7	E	7	1	0	0	0	1	-3	-1	1	3	**-3,0**
E8	E	8	1	0	0	0	1	-3	-1	1	3	**-3,0**
E9	E	9	1	0	0	6	7	-3	-1	1	3	**2,1**
E10	E	10	0	0	0	6	6	-3	-1	1	3	**3,0**
E11	E	11	0	0	0	2	2	-3	-1	1	3	**3,0**
E12	E	12	0	1	0	9	10	-3	-1	1	3	**2,6**
F1	F	1	0	0	3	0	3	-3	-1	1	3	1,0
F2	F	2	0	1	1	0	2	-3	-1	1	3	**0,0**
F3	F	3	0	0	0	0	0	-3	-1	1	3	NO DATA
F4	F	4	0	0	2	1	3	-3	-1	1	3	1,7
F5	F	5	0	0	0	0	0	-3	-1	1	3	NO DATA
F6	F	6	0	0	3	0	3	-3	-1	1	3	1,0
F7	F	7	0	0	1	0	1	-3	-1	1	3	1,0
F8	F	8	0	0	0	2	2	-3	-1	1	3	**3,0**
F9	F	9	0	2	0	2	4	-3	-1	1	3	1,0
F10	F	10	0	1	0	0	1	-3	-1	1	3	**-1,0**
F11	F	11	0	0	0	2	2	-3	-1	1	3	**3,0**
F12	F	12	0	0	0	0	0	-3	-1	1	3	NO DATA
G1	G	1	0	1	1	1	3	-3	-1	1	3	1,0
G2	G	2	1	0	0	0	1	-3	-1	1	3	**-3,0**
G3	G	3	0	0	0	0	0	-3	-1	1	3	NO DATA
G4	G	4	0	0	0	0	0	-3	-1	1	3	NO DATA
G5	G	5	0	0	0	0	0	-3	-1	1	3	NO DATA
G6	G	6	2	0	0	0	2	-3	-1	1	3	**-3,0**
G7	G	7	0	0	1	0	1	-3	-1	1	3	1,0
G8	G	8	1	0	0	0	1	-3	-1	1	3	**-3,0**
G9	G	9	0	0	1	1	2	-3	-1	1	3	2,0
G10	G	10	0	0	3	2	5	-3	-1	1	3	1,8
G11	G	11	0	1	0	1	2	-3	-1	1	3	1,0
G12	G	12	0	0	1	2	3	-3	-1	1	3	**2,3**
H1	H	1	0	0	3	2	5	-3	-1	1	3	1,8
H2	H	2	0	2	1	1	4	-3	-1	1	3	0,5
H3	H	3	0	0	0	0	0	-3	-1	1	3	NO DATA

H4	H	4	0	0	0	0	0	-3	-1	1	3	NO DATA
H5	H	5	2	0	0	0	2	-3	-1	1	3	-3,0
H6	H	6	1	0	1	2	4	-3	-1	1	3	1,0
H7	H	7	0	1	0	2	3	-3	-1	1	3	1,7
H8	H	8	0	0	0	2	2	-3	-1	1	3	3,0
H9	H	9	0	0	0	3	3	-3	-1	1	3	3,0
H10	H	10	0	1	0	1	2	-3	-1	1	3	1,0
H11	H	11	0	0	1	2	3	-3	-1	1	3	2,3
H12	H	12	1	1	1	1	4	-3	-1	1	3	0,0
I1	I	1	0	0	0	3	3	-3	-1	1	3	3,0
I2	I	2	0	0	2	1	3	-3	-1	1	3	1,7
I3	I	3	0	0	0	0	0	-3	-1	1	3	NO DATA
I4	I	4	0	0	0	2	2	-3	-1	1	3	3,0
I5	I	5	0	0	0	2	2	-3	-1	1	3	3,0
I6	I	6	1	0	0	1	2	-3	-1	1	3	0,0
I7	I	7	0	0	2	1	3	-3	-1	1	3	1,7
I8	I	8	1	0	0	0	1	-3	-1	1	3	-3,0
I9	I	9	0	1	0	6	7	-3	-1	1	3	2,4
I10	I	10	1	0	0	0	1	-3	-1	1	3	-3,0
I11	I	11	1	0	0	0	1	-3	-1	1	3	-3,0
I12	I	12	1	1	1	0	3	-3	-1	1	3	-1,0
J1	J	1	0	0	1	3	4	-3	-1	1	3	2,5
J2	J	2	0	1	1	1	3	-3	-1	1	3	1,0
J3	J	3	0	1	1	0	2	-3	-1	1	3	0,0
J4	J	4	0	1	1	0	2	-3	-1	1	3	0,0
J5	J	5	0	0	0	1	1	-3	-1	1	3	3,0
J6	J	6	0	0	1	4	5	-3	-1	1	3	2,6
J7	J	7	0	0	1	0	1	-3	-1	1	3	1,0
J8	J	8	0	0	0	2	2	-3	-1	1	3	3,0
J9	J	9	0	1	0	5	6	-3	-1	1	3	2,3
J10	J	10	0	0	0	0	0	-3	-1	1	3	NO DATA
J11	J	11	1	0	0	0	1	-3	-1	1	3	-3,0
J12	J	12	1	0	1	0	2	-3	-1	1	3	-1,0

Table 158. Results of Sheet 5: Conflicts in land-sea interactions

Code	T Sector	S Sector	Neutral	Low	Medium	High	TOTAL	V_Neutral	V_Low	V_Medium	V_High	Value
A1	A	1	0	1	2	1	4	-3	-1	1	3	1,0
A2	A	2	0	1	3	0	4	-3	-1	1	3	0,5
A3	A	3	0	0	1	2	3	-3	-1	1	3	**2,3**
A4	A	4	0	0	3	3	6	-3	-1	1	3	2,0
A5	A	5	0	0	2	0	2	-3	-1	1	3	1,0
A6	A	6	0	1	2	2	5	-3	-1	1	3	1,4
A7	A	7	0	0	1	0	1	-3	-1	1	3	1,0
A8	A	8	0	0	3	0	3	-3	-1	1	3	1,0
A9	A	9	1	1	2	2	6	-3	-1	1	3	0,7
A10	A	10	1	0	0	0	1	-3	-1	1	3	**-3,0**
A11	A	11	1	0	0	0	1	-3	-1	1	3	**-3,0**
A12	A	12	1	0	0	0	1	-3	-1	1	3	**-3,0**
B1	B	1	1	0	2	4	7	-3	-1	1	3	1,6
B2	B	2	0	3	2	0	5	-3	-1	1	3	**-0,2**
B3	B	3	0	0	1	2	3	-3	-1	1	3	**2,3**
B4	B	4	0	1	2	0	3	-3	-1	1	3	0,3
B5	B	5	0	0	0	2	2	-3	-1	1	3	**3,0**
B6	B	6	0	1	4	3	8	-3	-1	1	3	1,5
B7	B	7	0	0	1	6	7	-3	-1	1	3	**2,7**
B8	B	8	0	0	1	6	7	-3	-1	1	3	**2,7**
B9	B	9	0	0	1	1	2	-3	-1	1	3	2,0
B10	B	10	0	3	0	0	3	-3	-1	1	3	**-1,0**
B11	B	11	0	0	2	0	2	-3	-1	1	3	1,0
B12	B	12	1	3	0	0	4	-3	-1	1	3	**-1,5**
C1	C	1	0	3	1	2	6	-3	-1	1	3	0,7
C2	C	2	1	0	1	2	4	-3	-1	1	3	1,0
C3	C	3	1	1	0	0	2	-3	-1	1	3	**-2,0**
C4	C	4	0	0	0	0	0	-3	-1	1	3	NO DATA
C5	C	5	0	0	0	0	0	-3	-1	1	3	NO DATA
C6	C	6	0	1	0	0	1	-3	-1	1	3	**-1,0**
C7	C	7	0	0	0	0	0	-3	-1	1	3	NO DATA
C8	C	8	0	0	0	0	0	-3	-1	1	3	NO DATA
C9	C	9	0	0	4	1	5	-3	-1	1	3	1,4
C10	C	10	0	0	2	0	2	-3	-1	1	3	1,0
C11	C	11	0	0	0	0	0	-3	-1	1	3	NO DATA
C12	C	12	0	0	2	2	4	-3	-1	1	3	2,0
D1	D	1	1	0	2	2	5	-3	-1	1	3	1,0
D2	D	2	0	3	1	3	7	-3	-1	1	3	1,0
D3	D	3	0	0	2	5	7	-3	-1	1	3	**2,4**
D4	D	4	0	0	1	4	5	-3	-1	1	3	**2,6**
D5	D	5	0	0	2	2	4	-3	-1	1	3	2,0
D6	D	6	0	0	2	3	5	-3	-1	1	3	**2,2**

D7	D	7	0	0	4	3	7	-3	-1	1	3	1,9
D8	D	8	0	1	1	3	5	-3	-1	1	3	1,8
D9	D	9	0	2	2	1	5	-3	-1	1	3	0,6
D10	D	10	0	3	0	0	3	-3	-1	1	3	-1,0
D11	D	11	1	0	0	0	1	-3	-1	1	3	-3,0
D12	D	12	1	0	0	0	1	-3	-1	1	3	-3,0
E1	E	1	2	0	2	0	4	-3	-1	1	3	-1,0
E2	E	2	3	0	0	0	3	-3	-1	1	3	-3,0
E3	E	3	0	0	1	2	3	-3	-1	1	3	2,3
E4	E	4	0	0	1	3	4	-3	-1	1	3	2,5
E5	E	5	0	1	1	2	4	-3	-1	1	3	1,5
E6	E	6	0	0	2	1	3	-3	-1	1	3	1,7
E7	E	7	0	0	1	1	2	-3	-1	1	3	2,0
E8	E	8	0	1	1	0	2	-3	-1	1	3	0,0
E9	E	9	0	1	1	2	4	-3	-1	1	3	1,5
E10	E	10	1	1	0	0	2	-3	-1	1	3	-2,0
E11	E	11	0	0	0	0	0	-3	-1	1	3	NO DATA
E12	E	12	1	0	0	0	1	-3	-1	1	3	-3,0
F1	F	1	1	0	1	1	3	-3	-1	1	3	0,3
F2	F	2	0	1	1	0	2	-3	-1	1	3	0,0
F3	F	3	0	0	0	0	0	-3	-1	1	3	NO DATA
F4	F	4	0	1	1	0	2	-3	-1	1	3	0,0
F5	F	5	0	1	0	1	2	-3	-1	1	3	1,0
F6	F	6	0	0	1	1	2	-3	-1	1	3	2,0
F7	F	7	0	0	0	0	0	-3	-1	1	3	NO DATA
F8	F	8	0	0	0	0	0	-3	-1	1	3	NO DATA
F9	F	9	0	1	0	1	2	-3	-1	1	3	1,0
F10	F	10	0	0	1	1	2	-3	-1	1	3	2,0
F11	F	11	1	0	0	0	1	-3	-1	1	3	-3,0
F12	F	12	0	2	3	1	6	-3	-1	1	3	0,7
G1	G	1	1	0	0	2	3	-3	-1	1	3	1,0
G2	G	2	0	1	3	2	6	-3	-1	1	3	1,3
G3	G	3	0	0	0	0	0	-3	-1	1	3	NO DATA
G4	G	4	0	0	0	0	0	-3	-1	1	3	NO DATA
G5	G	5	0	0	0	0	0	-3	-1	1	3	NO DATA
G6	G	6	0	0	0	0	0	-3	-1	1	3	NO DATA
G7	G	7	0	0	0	0	0	-3	-1	1	3	NO DATA
G8	G	8	0	0	0	0	0	-3	-1	1	3	NO DATA
G9	G	9	0	0	0	0	0	-3	-1	1	3	NO DATA
G10	G	10	0	2	0	0	2	-3	-1	1	3	-1,0
G11	G	11	0	0	0	0	0	-3	-1	1	3	NO DATA
G12	G	12	0	0	2	4	6	-3	-1	1	3	2,3
H1	H	1	1	0	2	2	5	-3	-1	1	3	1,0
H2	H	2	0	0	0	1	1	-3	-1	1	3	3,0
H3	H	3	0	0	1	3	4	-3	-1	1	3	2,5
H4	H	4	0	2	0	0	2	-3	-1	1	3	-1,0

H5	H	5	0	0	1	1	2	-3	-1	1	3	2,0
H6	H	6	0	1	2	1	4	-3	-1	1	3	1,0
H7	H	7	0	0	1	0	1	-3	-1	1	3	1,0
H8	H	8	0	0	1	0	1	-3	-1	1	3	1,0
H9	H	9	0	0	0	0	0	-3	-1	1	3	NO DATA
H10	H	10	0	2	0	1	3	-3	-1	1	3	0,3
H11	H	11	0	1	0	3	4	-3	-1	1	3	2,0
H12	H	12	0	2	2	2	6	-3	-1	1	3	1,0
I1	I	1	1	0	0	1	2	-3	-1	1	3	**0,0**
I2	I	2	1	0	0	0	1	-3	-1	1	3	**-3,0**
I3	I	3	0	0	0	0	0	-3	-1	1	3	NO DATA
I4	I	4	0	0	0	2	2	-3	-1	1	3	**3,0**
I5	I	5	0	0	0	0	0	-3	-1	1	3	NO DATA
I6	I	6	1	0	0	0	1	-3	-1	1	3	**-3,0**
I7	I	7	0	0	0	0	0	-3	-1	1	3	NO DATA
I8	I	8	0	0	0	1	1	-3	-1	1	3	**3,0**
I9	I	9	0	0	0	1	1	-3	-1	1	3	**3,0**
I10	I	10	0	0	1	0	1	-3	-1	1	3	1,0
I11	I	11	0	0	0	0	0	-3	-1	1	3	NO DATA
I12	I	12	0	1	3	2	6	-3	-1	1	3	1,3
J1	J	1	1	0	0	0	1	-3	-1	1	3	**-3,0**
J2	J	2	1	0	0	0	1	-3	-1	1	3	**-3,0**
J3	J	3	0	0	1	0	1	-3	-1	1	3	1,0
J4	J	4	0	0	0	0	0	-3	-1	1	3	NO DATA
J5	J	5	0	0	0	0	0	-3	-1	1	3	NO DATA
J6	J	6	1	0	0	0	1	-3	-1	1	3	**-3,0**
J7	J	7	0	0	0	0	0	-3	-1	1	3	NO DATA
J8	J	8	0	0	0	0	0	-3	-1	1	3	NO DATA
J9	J	9	0	0	0	0	0	-3	-1	1	3	NO DATA
J10	J	10	0	0	0	0	0	-3	-1	1	3	NO DATA
J11	J	11	0	0	0	0	0	-3	-1	1	3	NO DATA
J12	J	12	0	1	2	2	5	-3	-1	1	3	1,4