



MSP-OR

Advancing Maritime
Spatial Planning
in Outermost Regions

CONCLUSIONS AND RECOMMENDATIONS ON INTEGRATING MSP AND ENVIRONMENTAL POLICIES (DOWNSCALED TO THE SPECIFIC MARITIME SECTORS)

August 2024

Grant Agreement number:
101035822 — MSP-OR — EMFF-MSP-2020

www.msp-or.eu

Coordinated by



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Funding



Co-funded by
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Las Palmas de
Gran Canaria



SHM
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Document information	
Project acronym	MSP-OR
Project name	Advancing Maritime Spatial Planning in Outermost Regions
Grant Agreement number	101035822 — MSP-OR — EMFF-MSP-2020
Start of the project	September 2021
Duration	36 months

WP number and name	WP4 – Ecosystem Approach to Regional MSP Challenges
Task number and name	Task 4.3. MSP and the Environmental Directives Coherent implementation
Deliverable name	D4.4. Conclusions and recommendations on integrating MSP and environmental policies (downscaled to the specific maritime sectors)
Due date of deliverable (according to GA)	August 2024
Actual submission date	August 2024
Dissemination level	Public

Partner(s) responsible	MTERD
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Document progress			
Version	Status	Date	Authors
1	1 st Draft version	26/06/2024	Ferrán Ubiñana, Elittoral (subcontractor)
1	1 st Draft version	28/06/2024	Aurora Mesa y Esther Hidalgo, MTERD
1	1 st Draft version	08/07/2024	Cristina Cervera y Mónica Campillo, IEO-CSIC
1	1 st Draft version	09/07/2024	Víctor Cordero, ULPGC
1	1 st Draft version	19/07/2024	Isabel Moreno, CEDEX
2	2 nd Draft version	22/07/2024	Ana Iñigo, FBIO
2	Final Version	24/07/2024	Aurora Mesa y Esther Hidalgo, MTERD

Acknowledgements:

This document was produced for the MSP-OR project, which has received funding from the European Maritime and Fisheries Fund of the European Union under the Grant Agreement number: 101035822 — MSP-OR — EMFF-MSP-2020.

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Citation: Ubiñana Fernández, F., Hidalgo Froilan, E., Mesa Fraile, A., Campillos-Llanos, M., Cervera-Núñez, C., Moreno Aranda, I.M., Cordero Penín, V., Íñigo Rodríguez, A. 2024. Conclusions and recommendations on integrating MSP and environmental policies (downscaled to the specific maritime sectors (D.4.4) on the MSP-OR project, European Climate, Infrastructure and Environment Executive Agency, Grant Agreement no. GA 101035822 — MSP-OR — EMFF-MSP-2020.

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ABSTRACT

The objective of task 4.3 in the MSP-OR project is to analyze how the Maritime Spatial Planning Directive could provide the added value to integrate all measures deriving from the European Union environmental Directives holistically, integrating the planning and management of maritime spaces, both inside and outside Maritime Protected Areas. All this downscaled to two specific sectors in the Canary Islands.

This report summarises the analysis for integrating environmental directives in the Canary Islands Maritime Spatial Planning. Starting from a first identification and analysis of the obligations established by the environmental directives of the European Union related to the marine environment in the specific context of the Canary Islands, the tools Spain has provided to comply with these directives are analyzed. These tools have fundamentally been the Law 41/2010, of 29th December, on the protection of the marine environment, the Royal Decree 363/2017, of 8th April, establishing a framework for maritime spatial planning, the Spanish Marine Strategies (EEMM) and the Spanish Maritime Spatial Plans. Another element of interest has been the integration of the concept of the Ecosystem-Based Approach in the Maritime Spatial Plans and its practical application in the Spanish context.

Once this first theoretical framework has been established, the analysis has focused on two specific case studies: nautical-recreational activities and offshore wind development. The objective of both case studies is to analyze how the maritime spatial plans integrate the environmental requirements demanded for both sectors and how this integration can be improved based on the definition of new environmental objectives, indicators, or measures.

In the case of nautical-recreational activities, the plans present a good integration of these activities, which are present in terms of planning objectives and measures, both general and sectoral. However, they lack essential information to measure the real impact of these activities and to establish their appropriate zoning. Thus, some of the measures contemplated are improving crucial information to monitor possible environmental effects and defining specific anchoring areas for recreational boats.

Regarding offshore wind energy development, the maritime spatial plans carry out an exhaustive analysis of the interactions of this activity with other uses and activities, defining the High Potential Areas for the Development of Offshore Wind (ZAPER) and establishing concrete measures for the evaluation of the development of the activity. However, it is possible to apply improvements, such as better integration of high-resolution spatial information at a regional scale related to the maritime activities with which it presents incompatibilities (e.g. fishing) and with the environmental values present in the ZAPERs that could be affected (e.g. deep benthic communities) and an improvement in the administrative and methodological processes for reviewing plans in this regard.

INTRODUCTION

This work, which is part of Work Package 4—Ecosystem Approach to Regional MSP Challenges, is designed to integrate the scale of analysis and management. We aim to achieve this by applying a nested, ecosystem-based approach. This approach is crucial for ensuring appropriate marine spatial planning and management, which will help maintain ecosystem services and connectivity.

Questions arising from the articulation of scales for applying EBM (Ecosystem Based Management) in the MSP relate to the following:

- What is the correct level of detail and mandatory regulation in national MSP planning?
- Are the responsibilities of the different authorities well defined so that the hierarchy between them is respected and useful?
- How can the ecosystem approach be strengthened/promoted by implementing measures related to administrative boundaries, ensuring ecological connectivity for biodiversity and ecosystem functioning?

The objective of this work package is, therefore, to explore answers to these questions through the implementation of downscaling case studies (Portuguese maritime protected areas and local planning for important activity centres located in specific ecological areas in French Guiana) and the development and testing (in the Canary Islands and French Guiana) of the concept of green infrastructure, and the analysis of the integration of the MSP Directive with other directives that apply in the marine environment, related to environmental concerns.

This deliverable responds to the last section, the analysis of the integration of the MSP Directive and its application in Spain through the Maritime Spatial Plans, with other directives that apply to the marine environment related to environmental interests. Directive 2014/89/EU of the European Parliament and Council of 23 July 2014, which establishes a framework for maritime spatial planning, requires maritime spatial planning to apply an ecosystem-based approach, as mentioned in Article 1(3) of Directive 2008/56/EC (Marine Strategy Framework Directive). It also states that maritime spatial planning will contribute, among others, to achieving the objectives of Directive 2009/147/EC (Birds Directive), Directive 92/43/EEC (Habitats Directive), Directive 2000/60/EC (Water Framework Directive), and the aforementioned Directive 2008/56/EC (Marine Strategy Framework Directive), among others.

The marine environment and the specific human activities that take place in a maritime area are then affected by overlapping regulations, which may establish different obligations and requirements. The challenge for the competent authorities is to achieve coherence and integration of these distinct but complementary environmental policies, as well as to ensure that MSP promotes sustainable economic activities without compromising the environmental objectives set, both for biodiversity conservation and for good environmental status as a whole. The Nature Directives (Birds and Habitats Directives) require the establishment of a coherent and well-managed network of Natura 2000 sites. Similarly, the Marine Strategy Framework Directive and the Water Framework Directive require the establishment and implementation of measures programmes.

The Maritime Spatial Planning Directive could bring the added value of integrating all these environmental policies holistically into the planning and management of maritime spaces both inside and outside Marine Protected Areas.

This document presents the conclusions and recommendations on the integration of environmental planning and policies that allow for better integration of the regulatory framework of environmental obligations in the marine

environment in the Canary Islands into the MSPs for two specific sectors, nautical-recreational activities and the development of marine renewable energy. This work has been divided into different analyses, which have taken the form of specific reports on the different issues to be addressed and are attached as annexes to this document for consultation and analysis:

- **Report 1. Regulatory framework for environmental obligations in the marine environment in the Canary Islands.** This report identifies all those environmental obligations that concern the recreational and offshore wind energy sectors in the Canary Islands. Also, it analyses specific aspects of maritime management, such as the integration of the concept of the “Ecosystem Based Approach”. It also analyses the relationship between the main legislative tools in Spain in relation to Maritime Spatial Planning and the protection of the maritime environment: Law 41/2010, of 29 December, on the protection of the marine environment, and Royal Decree 363/2017, of 8 April, which establishes a framework for maritime spatial planning. This preliminary analysis work allows the identification of environmental obligations for both sectors to determine what limitations exist in the MSPs for fulfilling these obligations and what improvements can be made in this regard.
- **Report 2. Case study on nautical-recreational activities in the Canary Islands.** It addresses a critical analysis of how Maritime Spatial Plans can help integrate the environmental regulatory requirements of the nautical-recreational activities sector (recreational boating, anchoring and whale watching) in the Canary Islands. The report contains a series of recommendations to better identify the areas in the Maritime Spatial Plans that may suffer more significant pressures due to these activities, as well as measures focused especially on management to reduce their impacts.
- **Report 3. Case study on offshore wind energy in the Canary Islands.** A critical analysis is carried out with the same objective of looking at how Maritime Spatial Plans can help integrate the requirements of the environmental regulations of a specific sector, in this case, offshore wind energy in the Canary Islands. In the case of offshore wind energy, the Maritime Spatial Plans carry out a more detailed diagnosis to zone the potential areas for developing the activity (known as high-potential areas for offshore wind farms). The main points for improvement for the environmental integration of the activity in the Maritime Spatial Plans relate to an improvement of existing information gaps, in particular regarding the zoning of other activities that may interact with offshore wind, such as artisanal fisheries and the coastal tourism sector or nautical recreational activities, and to the need for high-resolution environmental data at a regional scale, such as benthic communities from 50 metres depth. It also identifies concrete measures that could be incorporated into the sector and the MSPs, such as permanent consultation processes with the fisheries sector for adaptive management of high-potential areas for offshore wind farms.

The following sections summarise the main points and conclusions reached in the reports mentioned above, and the main conclusions directly related to the objectives of the MSP-OR project.

REGULATORY FRAMEWORK OF THE MARINE ENVIRONMENTAL DIRECTIVES IN THE CANARY MARINE DEMARCATION

LEGAL AND REGULATORY FRAMEWORK OF THE EUROPEAN UNION

- The European Union's Integrated Maritime Policy (IMP) is defined as “a holistic approach to all sea-related policies of the Union. It is based on the idea that by coordinating its wide range of activities related to oceans, seas and coasts, the Union can derive greater benefits from its maritime space with less impact on the environment”.
- The IMP has been developed on the basis of five converging policy areas: blue growth, marine data and knowledge, maritime spatial planning, integrated maritime surveillance and maritime basin strategies. Each of these areas has been developed by a set of initiatives, communications and standards that have led to the convergence of what we understand today as IMP. In the field of maritime spatial planning, the Maritime Spatial Framework Directive (MSFD) (Directive 2014/89/EU) was published in 2014, which is a directive that emerges directly from the IMP.
- The main directives identified for the management and protection of the marine environment are the Marine Strategy Framework Directive 2008/56/EC and Directive 2014/89/EU, which establish a framework for maritime spatial planning. However, other environmental directives are essential when integrating the environmental vector into Maritime Spatial Planning: Directive 92/43/EC (Habitats Directive), Directive 2000/60/EC - (Water Framework Directive WFD), Directive 2009/147/EC (Birds Directive) and Directive 2011/92/EU - on the assessment of the effects of certain public and private projects on the environment.

MEASURES ESTABLISHED IN SPAIN TO COMPLY WITH THE REQUIREMENTS OF THE DIRECTIVES ON THE MANAGEMENT AND PROTECTION OF THE MARINE ENVIRONMENT

In Spain, the measures established to comply with the directives in the previous section have been as follows:

- Approval of the consolidated text of the Water Law, approved by Royal Legislative Decree 1/2001 of 20 July 2001, which transposes Directive 2000/60/EC into Spanish law, establishing a community framework for action in the field of water policy.
- Approval of Law 42/2007 of 13 December 2007 on Natural Heritage and Biodiversity, which transposes Directive 79/409/EEC on the conservation of wild birds (Birds Directive) and Directive 92/43/EEC on the conservation of natural habitats and of wild fauna and flora (Habitats Directive).
- Approval of Law 41/2010, of 29 December, on the Protection of the Marine Environment, which leads to the Marine Strategies and transposes Directive 2008/56/EC.
- Approval of Law 21/2013 on environmental assessment, transposing Directive 2001/42/EC on the assessment of certain plans and programmes on the environment, and Directive 2011/92/EU on the assessment of the effects of certain public and private projects on the environment.
- Royal Decree 363/2017, of 8 April, establishing a framework for maritime spatial planning and transposing Directive 2014/89/EU, was approved. In 2023, another Royal Decree (RD 150/2023, of 28 February, approving the maritime spatial plans of the five Spanish marine demarcations) led to the final approval of the Maritime Spatial Plans.

THE RELATIONSHIP BETWEEN LAW 41/2010, RD 363/2017, LAW 21/2013, MS AND MSP

To date, Marine Strategies (MSs) are the main planning tool for the marine environment, which means all other sectoral policies must be aligned with their objectives and principles, including the MSPs. The MSs provide an up-to-date information base on which the MSPs can subsequently manage according to the best available environmental information and set their management objectives based on the environmental objectives of the MSs to contribute to the achievement of the Good Environmental Status. To comply with the Good Environmental Status, the MSPs integrate criteria related to sectoral environmental legislation, e.g. Law 42/2007 of 13 December on Natural Heritage and Biodiversity or Law 21/2013 of 9 December on Environmental Assessment. In addition, Royal Decree 363/2017 is published as a regulatory development of article 4.2 of Law 41/2010 on the protection of the marine environment, which states that “the Government may approve common guidelines for all marine strategies to ensure the coherence of their objectives, in aspects such as [...] f) the management of activities that are carried out or may affect the marine environment”. In this way, the MSPs are established as a measure within the Marine Strategies to contribute to achieving and maintaining the good environmental status of Spanish marine demarcations.

Another point where the MSPs integrate sectoral legislation related to the environment is in the case of offshore wind and its environmental assessment. In the case of offshore wind energy, the criteria of the MSPs define a set of studies that developers must consider for the appropriate assessment of their environmental impact (provided for in Law 21/2013), which includes, among others, studies of potentially affected birdlife, characterisation of marine benthic habitats, acoustic studies (before, during and after the installation), landscape impact and integration studies and analysis of fishing activity in the area.

INTEGRATION OF ECOSYSTEM-BASED APPROACHES INTO SPANISH MARITIME SPATIAL PLANS

MSP should apply the ecosystem approach as set out in the Marine Strategy Framework Directive to ensure that the combined pressures of all activities are kept at levels compatible with the achievement of good environmental status and that the capacity of marine ecosystems to respond to human-induced changes is not compromised while contributing to the sustainable use of marine goods and services by present and future generations. This integration of the ecosystem approach into the MSPs is traced through a set of points. The first that can be highlighted is the regulatory hierarchy established between the MSs linked to a regulation with the rank of Law (Law 41/2010) and the MSPs linked to a regulation with the rank of Royal Decree (363/2017), which implements the aforementioned law. Another point in this integration is the merging of much of the information provided by the MS and their monitoring plans into the MSPs, and vice versa.

On the other hand, there is an integration of EBAs in the different parts of the development of the MSPs: objectives, diagnosis, criteria, measures and monitoring:

- **Objectives:** The MSPs’ objective integrates EBAs by contemplating sustainable growth in activity management and promoting “sustainable activity and growth in maritime sectors in a way that is compatible with respect for the values of marine areas and the sustainable use of resources.” This main objective is divided into three groups of specific objectives: those of general interest, horizontal multi-sectoral objectives and sectoral objectives. Within the objectives of general interest, some objectives integrate EBAs, such as MA.1. “Promote connectivity, functionality and resilience of marine ecosystems through Marine Green Infrastructure (MGI)” or “MA.2. Ensure vulnerable and/or protected habitats and species are not affected by the location of human activities requiring the use of marine space”. The third group of sectoral objectives mentioned above (aquaculture, fisheries, offshore wind, etc.) includes some objectives to integrate the ecological dimension in each sector, e.g. in the case of fisheries

“P.2. Achieve Maximum Sustainable Yield for commercial species stocks and reduce the negative impact of fishing activities on biodiversity”. In other cases, such as in tourism and recreational activities, one of the objectives is to contribute to this integration: “TR.2. To ensure that public use and enjoyment of the coastline, associated with tourism and recreational activities, is carried out sustainably and does not jeopardise the good environmental status of the marine environment”.

- **Diagnosis:** In the diagnosis of the MSPs, an ecological and socio-economic analysis is established for each marine demarcation. In each of the demarcations, the EBA is integrated by analysing the limitations of each sector in terms of the sectoral regulations and management plans of the marine protected areas. A specific analysis is also carried out of the interactions between the different activities and uses of the maritime space in each demarcation, including specific sectoral analyses, as in offshore wind energy, using the “traffic light” methodology for the definition of high-potential areas for offshore wind farms (HPAOWF), considering their interaction with the habitats and species present in each area.
- **Criteria:** the MSPs also establish common criteria for the sustainable coexistence of the different uses, activities and interests that integrate aspects of sectoral regulations, e.g. “Care will be taken to minimise environmental impact, regardless of whether the activity is subject to the corresponding state or regional environmental assessment regulations”. In addition to these common criteria, there are sectoral criteria, e.g. for recreational activities: “Unregulated free anchoring of nautical-recreational vessels involving the placement of anchors or other anchoring devices on the seabed shall be avoided in areas where marine angiosperms or other benthic species listed in the LESPRES or the CEEA [Spanish acronyms for the List of Wildlife Species under Special Protection Regime and the Spanish Catalogue of Threatened Species] are present”
- **Measures:** Many measures have been established within the MSPs that seek to integrate different aspects of environmental variables into the MSPs. Some measures are more cross-cutting, e.g. “KOEM1: Spatial analysis of cumulative pressures arising from the spatial concentration of certain uses and activities”. Other measures address specific aspects, such as the Maritime Green Infrastructure (MGI) under MSO3: “Definition and incorporation in the MSPs of the elements that make up the marine green infrastructure”. There are also measures covering the integration of EBA at the sectoral level, e.g. “OEM4: development of recreational craft anchoring management plans” or “ER3: Analysis of the potential effects of offshore wind farms on marine ecosystems”.
- **Monitoring:** the MSPs, like any planning tool, include a set of indicators that allow them to be monitored periodically so that their effectiveness can be evaluated. The MSP monitoring programme is fed by information from different sources and planning tools, considering some MS indicators as its own indicators and including new indicators related to the environment, such as the evolution of the marine protected area or the number of new management plans approved.

CASE STUDY ON NAUTICAL-RECREATIONAL ACTIVITIES: CONCLUSIONS AND RECOMMENDATIONS

CONCLUSIONS ON THE CONTRIBUTIONS OF MARITIME SPATIAL PLANNING TO THE ACHIEVEMENT OF THE ENVIRONMENTAL OBJECTIVES OF THE RECREATIONAL SECTOR IN THE CANARY ISLANDS

It is assumed that Maritime Spatial Planning is an indispensable tool to avoid possible conflicts and guarantee the sustainability of the nautical-recreational activities analysed in the marine environment of the Canary Islands. The main environmental and socio-economic pressures and impacts generated by nautical-recreational activities, whether from whale watching or recreational boating activities, are common to both practices. The presence mainly causes them and bad practices in the use of vessels (e.g. unregulated anchoring). The pressures and impacts identified are:

- **Underwater noise:** Increased underwater noise is considered a stress on different components of the marine environment, in particular cetaceans, which are highly sensitive to this factor. Increased underwater noise from motorised vessels impacts cetacean and sea turtle populations by masking their communication patterns and physiological processes. According to the initial assessment and good environmental status of the marine strategy for the Canary Islands marine demarcation (descriptor 11: underwater noise), it is currently impossible to assess the current status of environmental noise and impulsive sound emissions in the demarcation with the existing information.
- **Collisions:** Vessel collisions with cetaceans, which have a greater impact on fast ferries, are considered a direct impact that is particularly relevant in the channels between Tenerife and La Gomera, Tenerife and Gran Canaria, and the strait between Lanzarote and Fuerteventura. Collisions with different species have been documented, with sperm whales being the most affected, followed by pilot whales.
- **Disturbance of benthic habitats:** Disturbance of the seabed is considered an impact, mainly due to the pressure exerted on benthic habitats by unregulated anchoring of nautical-recreational activities. This pressure mainly affects seagrass meadows, which play an important ecological role in marine ecosystems.
- **Marine litter and water pollution:** the increase in the concentration of different types of marine litter and liquid discharges leads to increased pollution pressures in marine waters, which have direct effects on all organisms in the food web, from small pelagic to large cetaceans and marine mammals. The direct impacts caused by these phenomena are transmitted to other spheres of the marine environment, such as habitats, ecosystems and economic sectors, namely, tourism, fisheries and shipping.
- **Maritime safety:** Recreational activities also impact maritime safety by increasing the density of vessels, which potentially increases the risk of collision between recreational vessels or between recreational and commercial vessels in areas of high maritime traffic density.

In the socio-economic sphere, nautical-recreational activities also generate a series of conflicts with other actors in the marine environment due to competition for the use of the marine space and its resources, for example, with local fishing communities or within the same sector, by increasing the density of recreational uses or activities in a specific area, as is the case with the increase in the number of companies and boats dedicated to whale watching in the south of Tenerife.

The first approach of the MSPs to the integration of environmental criteria in this specific sector is carried out by considering the programme of measures of the Marine Strategies on nautical-recreational activities. These measures include:

Table 1 measures included in the Marine Strategies with implications for the nautical-recreational activities sector (Source: Spanish Marine Strategies): EEMM)

Measures included in the Marine Strategies with implications for the marine leisure sector	
Biodiversity measures	BIO31. Actions related to reducing the risk of collision of large vessels with cetaceans.
	BIO51. Regulation of anchorages over phanerogam meadows and other sensitive habitats
	BIO63. Study of the carrying capacity of recreational activities in marine protected areas and areas under high tourist pressure
	BIO64. Development of Codes of Good Practice for Recreational Activities.
Horizontal measurements	BIO67. Promotion of projects that propose the reduction of disturbance to fauna caused by tourist-recreational activities.
	H11. Awareness-raising programmes aimed at beach users, nautical-recreational tourism companies, as well as the fishing and agricultural sectors and civil society in general
	H12: Elaboration and implementation of a curriculum related to the respect and protection of protected cetaceans, turtles, seabirds and elasmobranchs, as well as marine litter, in the official boat master courses of the recreational and fishing sector

The MSEPs have been specifically designed to define sector-specific objectives and criteria for integrating the recreational sector’s environmental objectives. They also set out measures to be implemented during the first cycle of the MSP, such as “MSP4. Elaboration of anchoring management plans for recreational craft.”

Among the sectoral management objectives for tourism and recreational activities included in the MSs are the following:

TR.1. Preserve the seascape in areas where it is relevant to tourism and/or cultural value.

TR.2. Ensure that public use and enjoyment of the coastline, associated with tourism and recreational activities, is carried out sustainably and does not jeopardise the good environmental status of the marine environment.

In addition to these objectives, a set of sectoral criteria is established, which directly impacts nautical-recreational activities.

- k. Unregulated free anchoring of nautical-recreational vessels involving the placement of anchors or other anchoring devices on the seabed shall be avoided in areas where marine angiosperms or other benthic species included in the LESPRES or the CEEA are present. All this considers that Law 42/2007 of 13 December 2007 prohibits causing damage to these species. Likewise, this type of anchoring shall also be avoided in areas with underwater cultural heritage elements that may be affected by this practice.
- m. In areas identified as having a higher probability of collisions between vessels and large cetaceans, work will be carried out to establish impact mitigation measures to avoid such collisions, both for maritime safety and for the conservation of the species.

Finally, the MSPs include a set of measures for nautical-recreational activities. Some of these measures are common to both Maritime Strategies and MSPs, such as the measure: “MSP4. In areas where there is a high density of unregulated anchoring of recreational craft, management plans for such anchoring shall be drawn up, seeking solutions on an appropriate scale”.

In addition, the following specific measures for nautical-recreational activities are included in the MSPs:

- Measure MSP5: Establishment of working groups to address management issues at the appropriate detail and scale, including, among other things, the anchoring of recreational vessels and their interaction with vulnerable benthic habitats, navigation, and collisions with cetaceans.
- Measure MSP8: Creation of a web/app application that collects and provides citizens with easily accessible information on the use of the sea, its restrictions, and management provisions established in this plan.

CONCLUSIONS ON THE LIMITATIONS OF MARITIME SPATIAL PLANNING WITH REGARD TO THE RECREATIONAL SECTOR IN THE CANARIES

The main limitation identified in the MSPs for managing recreational activities that require the use of a boat, such as sailing, anchoring, or cetacean watching, is the lack of information on the spatial and temporal distribution of the boats that carry out these activities, especially regarding vessels.

This lack of information is mainly related to the non-obligatory nature of onboard geolocation systems, such as the Automatic Identification System (AIS), on recreational vessels¹ (Royal Decree 210/2004, of 6 February, establishing a maritime traffic monitoring and information system). Recreational vessels² are required to have this system (Royal Decree 804/2014, of 19 September), establishing the legal regime and safety and pollution prevention rules for recreational vessels carrying up to twelve passengers. This system allows the traceability of vessels and, therefore, allows the determination of densities in specific areas that can serve as a basis for decision-making.

There is another information gap regarding baseline information on seabed typologies and biological communities (habitat types) in areas from 50 metres depth onwards. Although progress is being made in deepening our knowledge of this type of area, this information is limited when it comes to ordering and assessing the impact that different recreational activities, especially anchoring boats, could be causing.

Lastly, a limitation observed in the MSPs is a lack of recommendations on cross-cutting criteria to be developed by the different management plans of the protected natural areas, where the development of nautical-recreational activities attracted by the ecological values of these areas is often concentrated. The promotion of regulatory measures within these areas (speed limits, definition of sensitive areas, anchoring zones, etc.) would reduce some impacts linked to these activities.

RECOMMENDATIONS FOR A BETTER INTEGRATION IN THE MSP OF THE OBLIGATIONS DERIVED FROM THE ENVIRONMENTAL REGULATIONS FOR THE NAUTICAL-RECREATIONAL ACTIVITIES SECTOR IN THE CANARY ISLANDS

The main recommendations for improving the integration of environmental regulations in the MSPs, in relation to these activities, include a greater specification of criteria aimed at complying with the regulations in force or favouring the creation of new regulations that allow for the implementation of new measures. The recommendation of cross-cutting criteria by the MSPs, which could potentially be developed and included in the framework of the management plans of marine protected areas, would also make the implementation of the objectives of existing environmental legislation more effective.

Recommendations to explore better integration in the MSPs of the obligations arising from environmental regulations for the recreational boating and anchoring sector and cetacean watching are:

- Define safety distances between different recreational uses in higher-density areas (less than 200 metres from the coastline in front of beaches and 50 metres for the rest of the coastline or protected natural areas), where provisions derived from municipal beach regulations should be considered.

¹ "Recreational craft": Any vessel of any type, regardless of its means of propulsion, with a hull length (l_h) between 2.5 and 24 metres, measured according to the criteria established in the UNE-EN ISO 8666 standard, used for sport, leisure and recreational boating training or instruction, even when operated for profit.

² "Recreational Vessel": Any vessel of any type, irrespective of its mode of propulsion, with a hull length (l_h) exceeding 24 metres, with a gross tonnage of less than 3000 GT and carrying up to 12 passengers in addition to the crew, intended for pleasure navigation, tourism, leisure, sport or non-professional fishing, whether used by its owner or by any other person on charter, hire, lease, hire-passenger contract, transfer or otherwise

- Promote the implementation of radio warning systems that inform vessels when they enter protected natural spaces.
- Define criteria guidelines (load capacities, navigation speeds, anchoring management systems, etc.) to be considered by management plans for mitigating impacts caused by the recreational boating and anchoring sector.
- Promote the integration of all recreational boating activities within a mitigation plan that seeks to reduce pressures and impacts on ecosystems.
- Promote the implementation of acoustic monitoring systems in areas with a high presence of cetaceans. These systems simultaneously detect the presence of cetaceans and vessels in real-time and issue a radio alert to vessels in the area. The pilot system implemented in the protected marine area of Porto Fino (Genoa, Italy) is cited as an example.³
- Establish dissemination and awareness-raising measures in companies that market whale-watching trips. These measures may include information and awareness-raising campaigns on the ecological and heritage values of cetacean and/or marine phanerogam species, and the dissemination of good practices for their conservation.
- Establish maximum cruising speeds for inter-island passenger and freight transport routes within marine areas protected by the presence of cetaceans.

CONCLUSIONS ON PROPOSED METHODOLOGIES FOR THE DELIMITATION OF ANCHORING AREAS FOR BOATS AND CETACEAN SIGHTINGS IN THE CANARIES

One area for improvement in the MSPs regarding the environmental integration of nautical-recreational and whale-watching activities is the lack of information and concrete zoning measures for anchoring and whale-watching.

As an improvement to this information gap, two **methodologies** are proposed to **delimit anchoring areas for boats and cetacean sighting areas in the Canary Islands marine demarcation**. The aim of both methodologies is that they can serve as a basis for evidence-based maritime spatial planning. The proposed methodologies are as follows:

Methodology for the elaboration of anchorage maps of vessels

In general terms, the tasks of the proposed methodology consist of the following steps:

- 1. Identification of preferential areas for anchoring:** it is proposed to identify the current areas with the greatest preference for anchoring vessels, both in the port area and in external areas. The steps in the identification of these areas would consist of:
 - a. Analysis of existing data: from sources such as port authorities, anchorage records of vessels in ports, or visual campaigns. Here, a relevant source is the spatial data concerning the Pleasure Craftlayer within the catalogue of maritime activities available on EMODnet, which shows the main recreational anchorage areas of the Canary Islands.
 - b. Consultation with experts and local communities: Dialogue with relevant stakeholders, such as maritime tourism operators, local fishermen, and other sea users, to identify areas traditionally used for anchoring.
 - c. Assessment of key criteria: To identify suitable areas for anchoring, key criteria such as depth, seabed substrate type, or leeward areas of protection from prevailing winds must be assessed.

³Brunoldi M, Bozzini G, Casale A, Corvisiero P, Grosso D, Magnoli N, *et al.* (2016) A Permanent Automated Real-Time Passive Acoustic Monitoring System for Bottlenose Dolphin Conservation in the Mediterranean Sea. PLoS ONE 11(1): e0145362. doi:10.1371/journal.pone.0145362

- d. Mapping of preferential areas: with all the information collected, the preferential areas for anchoring are mapped, differentiating between traditional anchoring areas and potential new areas.
- 2. Identification of sensitive areas:** identification of particularly sensitive areas, such as coral areas or seagrass beds. The following steps are considered:
 - a. Review of scientific studies and databases: compilation of scientific information on sensitive marine areas and updated spatial information on the distribution of these marine habitats.
 - b. Assessment of factors such as the sensitivity and resilience of these benthic communities to anchoring pressure, as well as their ecological values that could be affected, such as their ability to provide breeding, nursery and feeding habitat for marine fauna, carbon sequestration, primary production or sediment stabilisation and coastal protection.
 - c. Consultation with marine conservation experts and establish working groups to assess the environmental factors mentioned in the previous point, gather the best available information to understand the ecological values and evaluate appropriate protection measures.
 - d. Generation of environmental vulnerability maps: elaboration of maps or cartographies showing the areas of greatest vulnerability resulting from the spatial and temporal overlap of activities susceptible to anchoring and the distribution of habitats identified as sensitive to the impacts of vessel anchoring.
 - 3. Final design of spatial and temporal zoning:** based on the areas of greatest vulnerability, i.e. areas with sensitive benthic communities in preferred locations for anchoring, anchoring zones are delimited, identifying those areas of restricted use where anchoring is prohibited or limited to certain areas and periods of the year. In this final stage, the following phases are envisaged:
 - a. Evaluation of the data used to identify the areas most vulnerable to anchoring identified in the previous phases and analysis of the resulting cartography.
 - b. Proposal of zoning criteria, considering factors such as sensitive habitats or times of the year when vulnerability is greater, and restrictions derived from existing regulations.
 - c. Consultation with stakeholders, including port authorities, fishermen, or maritime tourism companies.
 - d. Final definition of the resulting zoning, as well as the management provisions, criteria and measures necessary for its integration with the rest of the zones defined by the MSP, as well as indicators to evaluate its effectiveness.
 - e. Implementation and monitoring to evaluate the restrictions' effectiveness and make necessary adjustments based on the results obtained.

The summary of the proposed methodology is presented in schematic form in the figure below:

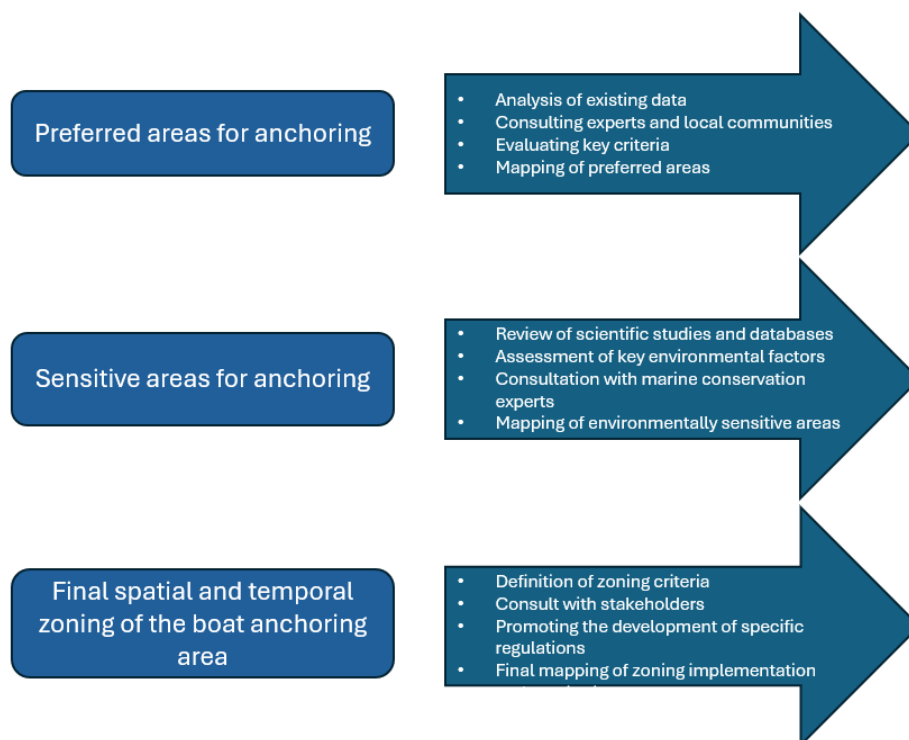


Figure 1. Proposed methodological scheme for the zoning of anchorage areas

Methodology for the production of cetacean sightings maps

The tasks for the delimitation of cetacean sighting areas as a basis for marine spatial management based on verified information are:

1. **AIS data collection:** AIS data will be collected from all tourist vessels operating in the identified marine areas of interest. The obligation to have such an AIS system is proposed to be established as a mandatory requirement for obtaining or maintaining the status of the authorised undertaking.
2. **AIS data analysis:** analysis of the movement patterns of tourist vessels.
3. **Species distribution model.** It is necessary to consider here that cetaceans are highly mobile pelagic species, which means their spatial distribution is not necessarily dependent on the points where they are sighted. The use of AIS data from tourist vessels alone could lead to significant biases. Thus, it will be necessary to incorporate sighting data from both whale-watching companies and citizen science, and specific monitoring campaigns, such as those carried out by the MISTIC SEAS II project. An example of such mapping can be found in Herrera *et al.* (2021),⁴ as well as data provided by the Government of the Canary Islands and already used in the study of the risk of collision with cetaceans carried out for the diagnosis of the Canary Islands marine demarcation of the MSPs.
4. **Ecological models carried out with specific programmes,** such as Ecopath and Ecosim (and Ecospace), that model the biomass distribution of the different functional groups according to their habitat affinity and environmental variables, such as depth or temperature. Examples of such models for the Canary Islands are provided by Couce *et al.* (2021),⁵ whose spatial information can be freely downloaded from the ULPGC Geoportal.⁶ However, these models extrapolate the biomass values of the species of

⁴ Distribution of Cetaceans in the Canary Islands (Northeast Atlantic Ocean): Implications for the Natura 2000 Network and Future Conservation Measures <https://www.frontiersin.org/journals/marine-science/articles/10.3389/fmars.2021.669790/full>

⁵ Simulating trophic impacts of fishing scenarios on two oceanic islands using Ecopath with Ecosim <https://www.sciencedirect.com/science/article/abs/pii/S0141113621000970?via=ihub>

⁶ http://www.geoportal.ulpgc.es/geonetwork/srv/spa/catalog.search#/metadata/ES_ECOAQUA_MSPMD_WMS10579-20200225

fishery interest to the rest of the functional groups. They must be considered together with their limitations.

5. **Consult with companies and scientific experts:** consult with four companies operating in the area and experts specialising in marine wildlife.
6. **Delimitation of potential sighting areas:** based on the information listed above, **potential sighting areas** would be delimited.

CASE STUDY ON OFFSHORE WIND ENERGY: CONCLUSIONS AND RECOMMENDATIONS

CONCLUSIONS ON THE CONTRIBUTIONS OF MARITIME SPATIAL PLANNING TO THE ACHIEVEMENT OF THE ENVIRONMENTAL OBJECTIVES OF THE OFFSHORE WIND SECTOR IN THE CANARY MARINE DEMARCATION

The structure of the MSPs has attempted to integrate the environmental objectives of the offshore wind sector in the Canary Islands based on several sector-specific objectives, criteria and measures. The MSPs include two sectoral management objectives for the offshore wind sector, which are specified as follows:

- R.1. Identify the areas with the greatest potential for offshore wind energy development in each marine demarcation.
- R.2. Ensure that the spatial location of areas of greatest potential for offshore wind energy development does not compromise ecosystem connectivity, especially migratory species corridors.

In addition to these objectives, criteria for the sustainable coexistence of different uses, activities and interests of a horizontal nature and another set of criteria of a sectoral nature are established. The sectoral criteria that may affect the offshore wind sector in some way include:

- l. Activities related to the testing and experimentation of renewable energy extraction infrastructures in the pre-commercial or innovation phase, whether wind energy or other marine energy, may be located at any point in the maritime space, always respecting the sectoral and environmental regulations in force, as well as the coexistence criteria established in this plan. Notwithstanding the above, wherever possible, these infrastructures shall preferably be installed in R&D&I priority use areas or areas of high R&D&I potential if an R&D&I area is eventually deployed there.
- o. The installation of linear underwater infrastructures (telecommunication or electricity cables, pipelines, etc.) shall be avoided in areas where marine angiosperms or other benthic species included in the LESPRE or the CEEA are present. All this taking into account that Law 42/2007 of 13 December 2007, which prohibits causing damage to these species.

Likewise, in section 4.5 of Section 4.5 of Block IV of the MSPs, the plans establish a series of criteria for the High-Potential Areas for Offshore Wind Farms related to numerous aspects of their interaction with the environment and other sectors.

Finally, the MSPs establish a series of measures to be addressed during the validity of the plans, which affect the different management objectives proposed and which, in the specific case of marine renewable energies, are defined as follows:

- ER1. Analysis and modelling of the landscape impact of offshore wind energy infrastructures in Spanish waters.

- ER2. Analysis of the fisheries sector potentially affected by offshore wind energy development in the areas proposed in the MSPs.
- ER3. Analysis of the potential effects of offshore wind farms on marine ecosystems.

In terms of the specific structure, the MSPs make two significant contributions to the offshore wind sector: they identify High-Potential Areas for Offshore Wind Farms (HPAOWFs) as potential areas for developing offshore wind energy in the future, consider the existence of offshore evacuation infrastructures, and analyse land-sea interactions.

The methodology for the definition of the High-Potential Areas for Offshore Wind Farms contemplated in the MSPs has followed a step-by-step process divided into 4 stages:

- Identification of areas where the wind resource could be exploited.
- Elimination of areas of high ecological value that may be more vulnerable to this activity: use of “traffic light” methodology based on the interaction with areas of biodiversity interest from which increasingly restrictive areas for offshore wind farms are defined: red zones (prohibition), yellow zones (restriction) and green zones (free of restrictions and/or prohibitions).
- Analysis of interactions with other uses and activities.
- Incorporation of Strategic Environmental Assessment considerations and public information periods (SEA).

Offshore wind is a paradigmatic case of a space-demanding activity in the marine environment. However, due to its associated infrastructures (e.g., electrical substations or evacuation lines), it is also on land. In this regard, the HPAOWFs have considered the availability of an evacuation structure on land as far as possible.

The Maritime Spatial Plan of the Canary Islands marine demarcation identifies four types of land-sea (and sea-land) interactions caused by offshore wind energy:

- Increased demand for land-based infrastructure due to the growth of certain activities in the maritime domain.
- Coastal uses (residential or tourism) affected by the adjacent seascape.
- Cultural heritage on the coastline, which requires protection of the adjacent seascape.
- Increased risk of coastal pollution due to accidental events arising from certain activities linked to offshore wind farms.

In addition to the points above, the MSPs should help ensure that the offshore wind sector complies with all environmental obligations required of it. In this respect, they offer:

- **Information:** the offshore wind sector has all the information generated in the framework of the preparation of the Marine Strategies and the MSPs. Information sources also include those generated by Maritime Spatial Planning projects, such as PLASMAR (2017-202; MAC/1. 1ª/030)⁷ and the PLASMAR+ project (MAC2/1. 1ª/347).⁹ In addition, the offshore wind sector can provide environmental information collected as the different phases of the projects are developed, for example, in the preparation of Environmental Impact Assessments (EIA) or Environmental Monitoring Plans (EMP).
- **Compatibility with environmental regulations:** the environmental assessment of the MSPs (strategic environmental assessment) offers the offshore wind sector a first filter on the compatibility of wind turbine installation areas with areas considered of interest for biodiversity, including protected marine areas, through the analysis of interactions proposed by the “traffic light” methodology, which allows incompatible areas (red) to be ruled out on the basis of criteria such as the presence of protected natural areas and those with restrictions (yellow) or free of restrictions (green) to be identified. In

⁷ PLASMAR Consortium, 2020. PLASMAR Project: Setting the bases for Sustainable Maritime Spatial Planning in Macaronesia

addition, the plans include the measure “ER3: Analysis of the potential effects of offshore wind farms on marine ecosystems”.

- **Landscape integration:** the analysis of land-sea interactions of the MSPs has enabled the identification of coastal areas in the Canary Islands (Table 2) that are more vulnerable to offshore wind due to their recreational and residential tourist use or the presence of protected landscapes. This analysis provides the offshore wind sector with a first filter to meet the landscape integration criteria. In addition to what is already included in the MSPs, a set of sectoral measures are offered for future consideration in relation to landscape, such as the measure “ER1: Analysis and modelling of the landscape impact of offshore wind energy infrastructures in Spanish waters”.

Table 2.- Summary of the existing sea-land interactions in the Canary Islands marine demarcation related to the uses of the coastline: MSP of the Canary Islands Marine Demarcation)

Location	Land-based activities	Activities at sea	NO.
Las Palmas de Gran Canaria	Coastal municipality with the largest population on the island of Gran Canaria. Protected Landscape: La Isleta (mainly on the western façade)	Eastern part of the island: Port of Las Palmas, with large cranes and several oil platforms moored or anchored continuously over time. In addition to this, there is also cruise ship traffic. Of the municipality's 69 km coastline, 44 km are artificial.	1
Santa Cruz de Tenerife	The most populated coastal municipality on the island of Tenerife	Of the municipality's 77 km coastline, 30.5 km are artificial. Port of Santa Cruz, with oil rigs berthed apart from the ships in the harbour. Refinery with its own port and monobuoy.	2
San Bartolomé de Tirajana (Gran Canaria)	Coastal municipality with the highest number of overnight stays on the island	This municipality has several harbours, a breakwater field and a rocky area.	3
Adeje (Tenerife)	Coastal municipality with the highest number of overnight stays on the island	In the south of the municipality, there is a stretch of stiffened coastline with free-standing dyke fields and several harbours.	4
Arona (Tenerife)	Coastal town with a high number of overnight stays	In this municipality, there are breakwaters, free-standing docks and harbours.	5
Yaiza (Lanzarote)	Coastal municipality with the highest number of overnight stays on the island	In the municipality, there are ports, breakwaters and free docks.	6

- **Contribute to the fulfilment of the BEA foreseen by the MS:** one of the contributions of the MSPs to the fulfilment of the environmental objectives by offshore wind energy is its commitment to guarantee Good Environmental Status in the five marine demarcations, including the Canary Islands. In this sense, the commitment of the MSPs implies the commitment of offshore wind to comply with all environmental requirements that guarantee this BEA.

- **Framework for new methodologies for environmental assessment:** both the Marine Strategies and the MSPs have led to the analysis of new approaches or methodologies for assessing the environmental impact of offshore wind at a regional scale (Canary Islands). Although they are outside the process of marine spatial planning as such of the MSPs, they are valuable in improving the knowledge applicable at a regional scale, both for promoters and public administrations. Some works can be cited, such as Abramic *et al.* 2021⁸ and Abramic *et al.* 2022 or Martín-Betancor *et al.* 2024. These works provide the offshore wind sector with a checklist of elements to consider in assessing offshore wind projects (e.g. INDIMAR tool) that considers all key ecological information to be considered during the development of Environmental Impact Assessments (EIA). Here, it is recommended that these EIA processes be used to require developers to fill existing information gaps, such as the characterisation of benthic communities from 50 metres depth in High Potential Areas for Offshore Wind Farms, to establish a kind of before-after-control-impact monitoring strategy. This would help establish key environmental parameters prior to the construction and operation of the wind farm installation to establish baseline conditions. These could then be compared with the criteria and descriptors of good environmental status studied during the operational phase, which would allow the detection of environmental disturbances and the measurement of current impact.

CONCLUSIONS ON THE LIMITATIONS OF MARITIME SPATIAL PLANNING WITH REGARD TO THE OFFSHORE WIND SECTOR IN THE CANARY ISLANDS

The limitations identified in the report on the case study of offshore wind energy in the Canary Islands are as follows:

- Lack of information at the regional level on the occupation of space by nautical-recreational activities, although boating will be prohibited and limited in MRIs.
- The lack of information on the spatial and temporal distribution of the Spanish fishing sector (especially for smaller gears) constitutes an important information gap to make the sector compatible with the development of offshore wind energy.
- The lack of information at the regional scale of high-resolution ecological data represents an information gap at the marine spatial planning level, which hinders the further development of methodologies for assessing the impacts of offshore wind on key elements of the marine environment, especially the distribution of potentially sensitive benthic habitats from 50 metres depth, cetaceans, turtles, seabirds and bats.
- Lack of information on the specific impacts of offshore wind on pressure descriptors in the marine environment, such as underwater noise or economic sectors such as fisheries.
- Lack of a specific methodology for the assessment of conflicts at the regional level between existing uses and activities in each marine demarcation.
- Lack of sectoral targets that seek integration of activities with offshore wind, e.g. multi-purpose offshore wind platforms and offshore aquaculture.
- Need for greater integration of landscape value or landscape variable in the definition of High Potential Offshore Areas for Wind Farms (HPAOWF).
- Lack of a platform for the exchange of information between the offshore wind sector, the administration and research organisations to enable a feedback loop in R&D&I and environmental information.
- Administrative process that hinders the processing of offshore wind projects due to dispersed legal provisions that require many authorisations from different bodies.

⁸ A. Abramic, A. García Mendoza, R. Haroun, Introducing offshore wind energy in the sea space: Canary Islands case study developed under Maritime Spatial Planning principles, Renewable and Sustainable Energy Reviews, Volume 145, 2021, 111119, ISSN 1364-0321, <https://doi.org/10.1016/j.rser.2021.111119>.

- Limitations on flexibility in the modification of the MSPs restricted to the 6-year cycles currently foreseen.
- Lack of criteria aimed at prioritising certain uses or activities in areas of interaction with offshore wind energy development over others, which would allow for the adoption of compensation schemes for interference between activities.

RECOMMENDATIONS FOR A BETTER INTEGRATION IN MSP OF THE OBLIGATIONS DERIVED FROM THE ENVIRONMENTAL REGULATIONS FOR THE OFFSHORE WIND SECTOR IN THE CANARY ISLANDS

The recommendations to be explored for better integration in the MSPs of the obligations arising from environmental regulations for the offshore wind sector in the Canary Islands are environmental regulations for the offshore wind sector in the Canary Islands are:

- Integration of regional-scale spatial information on recreational activities, fisheries, and high-resolution ecological data from research organisations or the private sector.
- Establishment of permanent consultation processes with the sectors, and especially the fishing sector, to carry out adaptive management of HPAOWFs.
- Promotion of research projects on underwater noise generated by wind energy in areas of priority use for research, development and innovation (R&D&I).
- Development of methodologies for regional-scale analysis of conflicts between offshore wind and other uses and activities in the marine environment.
- Promotion of research projects on multi-use offshore wind and offshore aquaculture platforms in areas of priority use for research, development and innovation (R&D&I).



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