Work package 5: Operationalisation and participation in test sites

D5.3: Site specific solutions for accelerating biodiversity protection and restoration in MSP

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ABSTRACT	Deliverable 5.3 showcases and demonstrates the results from the application and operationalization of the ESE Framework tools which supported the development of test site-specific solutions for accelerating biodiversity protection and restoration in MSP under WP5, Task 5.3. The proposed solutions (spatial or strategic) were co-created and co-validated with the MSP4BIO Communities of Practice though a set of iterative interactions with the stakeholders in the test sites. The deliverable consolidates and synthesizes different solutions suitable for each site, such as proposals for new MPAs, enlargement of existing ones, restoration measures, and measures to specific sectors of interest. The main challenges and benefits for implementing the solutions, as well as the potentials and barriers for their uptake and replicability, have been identified, thus contribute to the following up Deliverable 5.4 in WP5.
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Acronyms

ABC	Area-based Conservation
ABMTs	Area-based management tools
BPNS	Belgian part of the North Sea
BSEC	Organization of the Black Sea Economic Cooperation
BSAP	Baltic Sea Action Plan
CC	Climate Change
CEA	Cumulative Effect Assessment
CoPs	Communities of Practice
DSTs	Decision Support Tool
EBM	Ecosystem-Based Management
EEZ	Exclusive Economic Zones
EGD	European Green Deal
EMFF	European Maritime and Fisheries Fund
ESE	Ecological and Socio-Economic
FAO	Food and Agriculture Organization
FRA	Fisheries Restricted Areas
GES	Good Environmental Status
GFCM	General Fisheries Commission for the Mediterranean
HOLAS	Holistic Assessment of Ecosystem Health in the Baltic Sea
ICZM	Integrated coastal zone management
IHO	International Hydrographic Organization
LSI	Land-Sea Interactions
MEOW	Marine Ecoregions of the World
MOEW	Ministry of Environment and Water (Bulgaria)
MPA	Marine Protected Area
MRDPW	Ministry of Regional Development and Public Works (Bulgaria)
MSFD	Marine Strategy Framework Directive
MS	Member States
MSP	Maritime Spatial Planning

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MSP4BIO	Improved Science-Based Maritime Spatial Planning to Safeguard and Restore Biodiversity in a coherent European MPA network
NW-Med	Northwest Mediterranean
OECM	Other Effective Area-based Conservation Measure
OSPAR	Convention for the Protection of the Marine Environment of the North-East Atlantic
OWF	Offshore Wind Farms
PW4B	PlanWise4Blue
PORN	Natural Resources Management Plan
SAC	Special Area's of Conservation
SEA	Strategic Environmental Assessment
SPAs	Special Protection Area's
SPIA	Spatial Pressure and Impact Assessment
UCH	Underwater Cultural Heritage
VME	Vulnerable Marine Ecosystems
WFD	Water Framework Directive

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Executive Summary

This deliverable report consolidates and synthesizes the specific spatial and strategic solutions developed in each of the six MSP4BIO test sites across the five European Sea Basins (Baltic Sea, North Sea, Atlantic Ocean, Mediterranean Sea and Black Sea). As the test sites represent different geographical scales and reflect various socio-economic and environmental challenges, each with distinct needs and management questions, a range of spatial and strategic solutions have been proposed. These include prioritizing new Marine Protected Areas (MPAs), enlarging existing ones, and restoration and/or sector-specific measures. The results from the test sites pinpointed the key areas for suggesting and developing the solutions to inform the implementation and revision of national MSP plans in line with the new environmental targets, such as the EU (European Union) Biodiversity Strategy until 2030, the European Green Deal (EGD), the Nature Restoration Law and the upcoming European Ocean Pact.

The specific solutions were elaborated with the active involvement of the established Communities of Practice (COPs) in each test site through a set of iterative interactions during the project to co-create and validate the development of MSP4BIO tools and by applying a combination of the three modules of the Ecological and Socio-Economic (ESE) Integrated Framework and its Decision Support Tools (DSTs) for better alignment of the MSP and MPAs management.

The primary gaps addressed by the different solutions included challenges in MPAs management such as inadequate or insufficient planning, insufficient monitoring, lack of coherence between the MSP process and MPAs management, limited financial and human resources, fragmented datasets, and insufficient stakeholder engagement. While many benefits and potentials for implementing solutions have been identified, such as enhanced collaboration among MSP and MPA managers, and other stakeholders (CoPs), integration of socio-economic criteria, and improved ecological criteria for MPA prioritization, some key recurring challenges among the sites still remain. These include: data gaps that might lead uncertainty in planning and decision-making, insufficient stakeholder engagement, lack of funding and resources, and lack of coherence among MSP and MPA processes.

The proposed solutions were consulted and validated with the MSP4BIO CoPs (at the 4th and 5th Interactions) to ensure their uptake and adaption in the MSP revisions and MPAs management, as well as on ongoing subnational and transnational processes. Also, the transferability/replicability potentials and barriers/challenges of the results from the ESE applications and the developed solutions were explored to serve as basis for the cross-site analysis and final recommendations on upscaling the results at each sea basin in the following up Deliverable 5.4.

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1 Introduction

The MSP4BIO has an overall aim to support the implementation of the EU Biodiversity Strategy 2030, the CBD Post 2020 Global Biodiversity Framework, as well as the EGD, by mainstreaming biodiversity into planning and policy decisions on different governance levels, and by developing an integrated socio-ecological management of the marine ecosystems.

The EU Member States (MS) are at different levels of maturity when it comes to MSP and the extent to which biodiversity considerations have been integrated in MSP also differs across them. MSP processes are taking place at the national, also at sub-and-supranational levels, at different geographical scales, and focused on different socio-economic and environmental challenges. The six MSP4BIO test sites reflect this diversity to ensure wider applicability and transferability of the tested approaches by planners and those dealing with MPA designation and management across Europe and beyond. While theoretical work has been done on the integration of MSP and MPAs, and research is available especially with regard to ecological knowledge, the operationalization of this integration of MSP and MPAs is still lacking. The development and validation of such integrated approaches is needed to build confidence of planners and regulators/managers to use MSP as a tool that properly addresses the biodiversity objectives.

Different geographical scales have been reflected in the test sites – i.e. local, national, regional and cross-border/transboundary, in order to encompass different environments and address ecosystem`s connectivity in a proper manner (nearshore, offshore, deep-sea). The transnational and cross-border scales are particularly important in assessing connectivity and ensuring coherence. Test site cases were based on the existing challenges and their gaps and needs identified in the initial assessment in the D5.1 (Withouck *et al*., 2023) and are closely linked to the real MSP process. Thus, the six specific test sites served as validation pilots to showcase and operationalize the MSP4BIO ESE Integrated framework by engaging key national and local actors in a co-development approach. The specific concerns/needs of each test site provided the additional topics and management questions to MPAs and MSP for which the ESE framework has been co-created, validated, tested and fine-tuned. More details on the ESE management framework and the included modules/tools and other elements are provided in the Chapter 1.2 below.

1.1 Objectives and context

The main goal of Deliverable 5.3 is to showcase and demonstrate the results from the ESE Framework application and operationalization to support the development of site-specific solutions for accelerating biodiversity protection and restoration in MSP in each of the test sites under the WP5, Task 5.3. The deliverable consolidates and synthesizes a range of different solutions suitable for each site such as proposals for new MPAs, or enlargement of existing ones, restoration measures, and measures to address specific

sectors of interest. The objective has been to develop concrete strategic or spatial planning solutions based on knowledge derived from test sites with the support of ESE DSTs, that would be potentially adapted by the MSP planners and MPA managers.

For the development of site-specific solutions, MSP4BIO incorporated knowledge through the local CoPs, which included MSP local and national planners, MPA managers, sectoral regulators, representatives, and NGOs. CoPs were established and actively engaged from the outset and throughout the project's duration via a series of interactions. Interviews and focus workshops were used to gather local needs, co-develop the ESE framework modules, conduct participatory mapping, co-consult and validate strategic and spatial solutions in the test sites, and discuss their broader applicability.

The MSP4BIO participatory strategy and iterative process of stakeholder involvement in the CoPs are presented and included in D5.1, D5.2 (Matchak *et al*., 2024)[1] and D5.5[2] (in progress). Through participatory processes facilitated by CoPs, stakeholders feedback has been integrated into the management, ensuring the framework's adaptability to local needs. D5.5 will highlight the main lessons learned from the stakeholder process in each of the local contexts considering local cultures, environments, and other specificities.

All test sites elaborated their solutions by applying the ESE management framework, developed in WP4 and adjusted in D5.2 to local needs, which were identified and assessed in D5.1. This process considered prioritized guiding management questions and the adaptation of the three ESE modules (ESE1, ESE2, and ESE3) and their sub-components for testing. The tools to be used were preliminarily prioritized with the stakeholders at the 4th CoPs Interaction, where the initial draft of the ESE framework was demonstrated and validated. Afterwards, the selected tools were operationalized and co-validated in the six test sites with the CoPs to provide solutions to site-specific challenges, including human impacts on vulnerable species and ecosystem services. This approach supports impact reduction and maximizes synergies through nature-inclusive and multi-use options.

The application results from the test sites and solutions, together with identified challenges/barriers and opportunities set up the basis for the work in Task 5.4 and elaboration of the Deliverable 5.4 on final recommendations for transferability and scalability of results. Demonstration sessions will be organised to showcase the solutions to the wider audience with a specific focus on larger user groups - i.e. public and private decision makers and those who are planning to be in these positions in the future i.e. students. Online sessions will be used to demonstrate the scenario visualisation tools and showcase the use of MSP4BIO DSTs.

To reach these objectives D5.3 presents:

1) The methodology for the elaboration of solutions in each test site,
2) The results from the test sites presenting the report on solution following a common fact-sheet,

[1] Test sites methodology including the participation strategy (will be available online by the end of the project)
[2] Report on the participatory process in test sites

3) Overview of the proposed solutions,
4) Identified common challenges and enablers for their practical use and implementation,
5) Key observations and conclusions.

More detailed cross-test site analysis to assess the transferability of results and potentials and barriers for its upscaling will follow up in the D5.4[3].

1.2 MSP4BIO Ecological-Socio-Economic (ESE) Framework

The ESE Framework consists of a methodological guidance that will help prioritizing marine protection in MSP through several steps and integrating ecological, social and economic considerations. The aim of the framework is to identify the management requirements of users by utilizing a set of questions that provides a diverse array of responses. It includes three modules (Fig. 1): ESE1 Ecological Toolkit, ESE2 Socio-economic and governance criteria and ESE3 Trade-offs, all supported by Policy solutions.

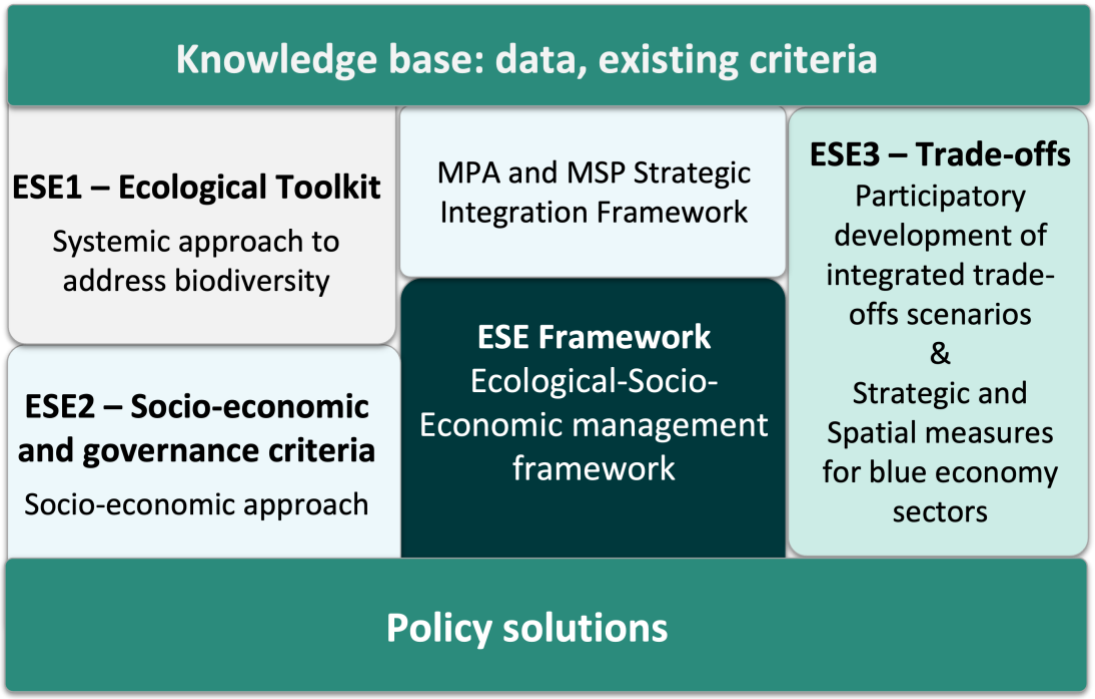

Figure 1 ESE Framework, ESE modules and other components.

In practice, the ESE is developed as a document and web-based step-by-step guidance (https://ese.tools4msp.eu/), that enables users to identify their management needs using

[3] Report on final recommendations, transferability and scale-up of effective biodiversity mainstreaming in MPS. In progress and will be available online by the end of the project.

a portfolio of questions and offers a range of answers to address them. The main users are planners, decision makers, MSP authorities, MPA managers, and all users interested in identifying, prioritizing, designating and managing MPAs. The framework offers multiple solutions, such as Practices, Criteria and Indicators, Data, Methods and Tools, and concrete examples.

The final version of the ESE will be presented in the D4.5[4] ESE Step-by-Step guidance (with test site examples and lessons learned) by the end of the project.

1.3 Introduction of the MSP4BIO test sites

The report focuses on the six test sites across the five European Sea basins, as presented in Figure 2, Table 1.

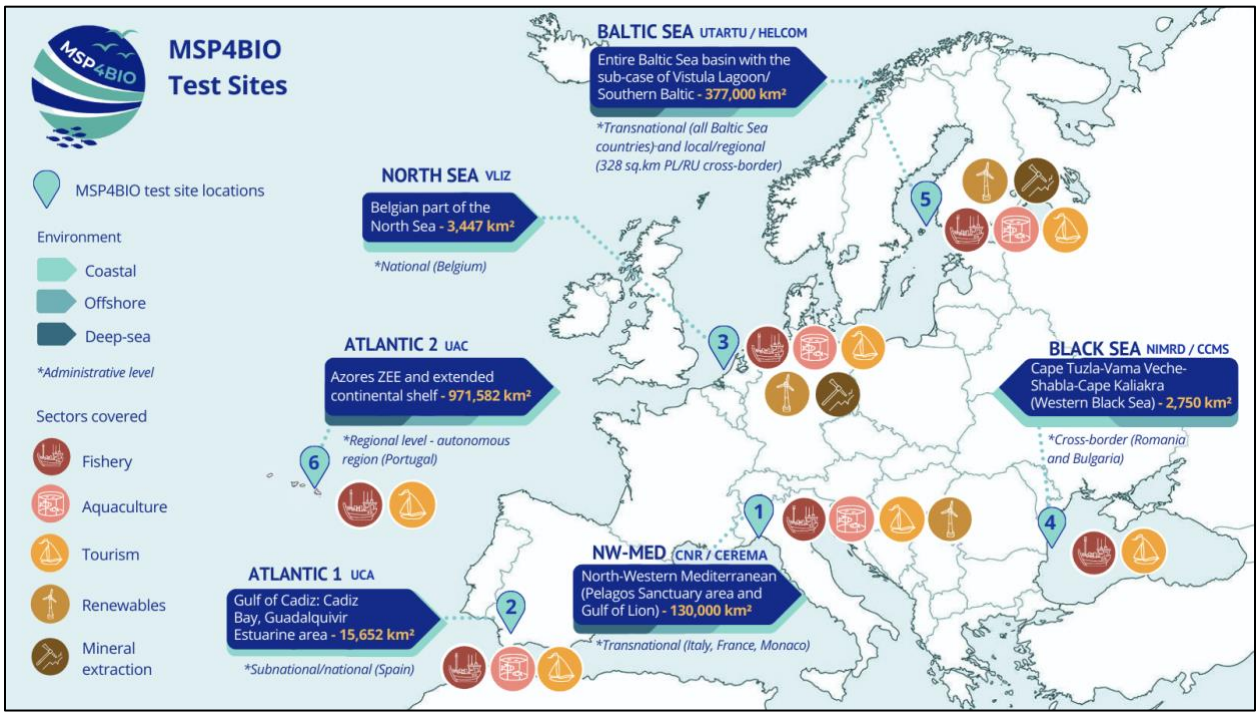

Figure 2 MSP4BIO Test Sites across five EU sea basins.

[4] D4.5 is under progress and will be available online by the end of the project

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Table 1 Overview of the six test sites included in the study, with a description of their ecological and jurisdictional scales as well as the MSP status. (MEOW = Marine Ecoregions of the World). Adapted from D5.1, Withouck et al., (2023) and updated.

Test site	MEOW Province - Ecoregion	Ecological Scale	Jurisdictional scale	MSP status	Relevant sectors
Azores Graciosa Island – Portugal test site	Lusitanian – Azores	Coastal, waters surrounding island (971,582 km^2)	Graciosa internal/territorial waters - Azores internal and territorial waters (Azores autonomous region, Portugal)	MSP adopted	Fisheries, tourism
Cadiz test site: Cadiz Bay (Gulf of Cadiz, Spain)	Lusitanian – South European Atlantic Shelf	Coastal, Bay (Cadiz Bay ≈ 150 km^2, Sudatlantica demarcation = 14,978.3 km^2)	Part of Spanish EEZ and internal waters under regional competence	MSP adopted	Fisheries, aquaculture, tourism
Belgian part of the North Sea test site	Northern European Seas – North Sea	Coastal, Sub-sea basin scale (3,447 km^2)	Belgian EEZ	MSP adopted, new MSP under final stage	Fisheries, aquaculture, tourism, renewables, mineral extraction
Western Black Sea test site (from Cape Tuzla to Cape Kaliakra)	Black Sea – Black Sea	Coastal, Sub-sea basin scale (2,750 km^2)	Subnational & cross-border (Bulgarian and Romanian EEZ)	Bulgaria: MSP adopted Romania: MSP adopted	Fisheries, tourism
Northwest Mediterranean test site	Mediterranean Sea - Western Mediterranean	Coastal/offshore/deep-sea, sub-sea basin scale (130,000 km^2)	Subnational & cross-border (French and Italian EEZ in the Western Mediterranean Sea)	France: MSP adopted Italy: MSP adopted	Fisheries, aquaculture, tourism, renewables
Baltic Sea test site: Insights from Estonia, Sweden, Finland, and Latvia	Northern European Seas – Baltic Sea	Coastal/offshore/deep-sea, sea basin scale (377,000 km²)	Transnational (Estonian, Finnish, Latvian and Swedish EEZ)	Estonia: MSP adopted Finland: MSP adopted Latvia: MSP adopted Sweden: MSP adopted	Fisheries, aquaculture, tourism, renewables, mineral extraction

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2 Methodology and structure

The methodology for this deliverable includes the involvement of the CoPs stakeholders for ESE models/tools co-development and prioritization, followed by solutions validation/co-consultation, and the use of a common template for reporting on solutions.

2.1 Co-creation and co-validation with the MSP4BIO Communities of Practice

The six MSP4BIO specific test sites served as validation pilots to showcase and operationalize the systemic approach and management (integrated ESE framework) by engaging key national and local actors in a co-development approach. As mentioned above, co-development of solutions and uptake of test results has been ensured via multiple interactions with local CoPs including workshops, focus groups, expert meetings, and interviews to discuss and co-create the MSP4BIO tools. The ESE framework co-development started with the prioritization of guiding management questions at each test site at the 2nd CoPs Interaction. At the 3rd CoP Interaction test sites explored participatory mapping survey and trade-offs analysis (using the SeaSketch tool), and following a step-by-step methodology developed in D4.3 (Gutierrez *et al.*, 2024).

The DSTs from the ESE1 Ecological Toolkit (Kotta *et al.,* 2024) to be used were preliminary prioritized with the stakeholders at the 4th CoPs Interaction when the initial draft of ESE was demonstrated and validated. Subsequently, the developed site-specific solutions utilizing the chosen DSTs were demonstrated and collaboratively consulted with the CoPs during the 5th Interaction. Details regarding the 4th and 5th CoP interactions, which aimed to consult and validate the proposed solutions, are provided in the individual test site reports in Chapter 4.

The applied tools in different test sites include: SeaSketch participatory mapping for trade-offs scenarios, (D4.3); PlanWise4Blue (PW4B) and its Cumulative Effect Assessment (CEA) and Area-based Conservation (ABC) Planner tool (D3.4[5]); HELCOM SPIA (Spatial Pressure and Impact assessment) Tool (D3.4). The work included the improvement of scientific understanding, and knowledge gathering, participatory surveying, trade-off analysis, mapping and modelling of the functioning marine ecosystems, assessment of cumulative pressures and the assessment of the plausible risks imposed by human actions on marine ecosystems and the services they provide. The approach involved co-consulting and validating the solutions at the test site level, thereby making the solutions and acquired knowledge ready for practical application.

[5] Ecological toolkit (ESE1) for MPAs prioritization and networking

2.2 Using a common fact-sheet for reports (Annex 1)

To collect comprehensive and comparable information from the site-specific solutions, and to keep a more concise format for the deliverable, a common reporting template, referred to as a "D5.3 MSP4BIO Fact-sheet report template", was designed (Annex 1). The fact-sheets contain, among other elements:

1) main objectives of the test site cases and proposed solutions,

2) gap(s)/challenges and key management questions addressed by the solutions,

3) description of the solutions and which ESE modules and tools were applied and utilized,

4) feedback from the CoPs involved in its creation and validation,

5) governance context and how the solution will facilitate the integration of MSP and MPAs,

6) potential risks and challenges associated with the implementation of the solution,

7) opportunities and enablers for replicability/transferability and scaling up of proposed solutions and testing results to other regions across Europe and beyond, related also to regional strategies.

The application results from the test sites will be incorporated into D5.4 for a detailed cross-site analysis.

3 Overview of the proposed test site solutions

Altogether seven site-specific solutions were proposed and elaborated by the six test sites across the five EU Sea Basins:

- One for the Belgian part of the North Sea.
- One for the entire Baltic Sea.
- Two for the Atlantic Ocean (one for Azores. Portugal and one for Cadiz Bay, Spain).
- One for North-Western Mediterranean Sea (transboundary case including France and Italy).
- Two for the Western Black Sea cross-border test site (one for the Bulgarian part and one for the Romanian part).

All individual reports on the site-specific solutions are presented in Chapter 4 using a common template of fact-sheet report (Annex 1). Some of the reports will be used in the future as the basis for other publications, such as more comprehensive reports on the topic or scientific articles. A brief synthesis outlining the reports fact-sheets is shown in Table 2 as an overview of the types of proposed solutions, gaps they address and combinations of ESE modules and DSTs that were applied and utilized in the process of tools operationalization and production of solutions.

The report fact-sheet also includes relations with the governance framework needed to support the implementation of solutions. In all test sites, the MSP involves a complex interplay of international, regional, and national frameworks. Additionally, MSPs took into consideration important conservation and other relevant frameworks, including the Maritime Strategy Framework Directive (MSFD), the Water Framework Directive (WFD), the Natura 2000, and the Strategic Environmental Assessment (SEA) Directive, among others. MSP and these EU frameworks/directives are naturally interlinked and overlapped from a conceptual point of view but not necessarily effectively and operationally integrated into the real-life MPS processes.

Most of the MSP4BIO spatial and strategic solutions are also related with the cross-border and transboundary cooperation that could be supported by the EU maritime and biodiversity policies, as well as by the existing sea basin and international initiatives. At the national level, solutions should be considered and taken on board by MSP and MPAs competent authorities.

The Baltic Sea test site conducted a detailed analysis of spatial pressures and impacts on MPAs using the HELCOM SPIA tool, to consider environmental pressures and human impacts and identify the most affected ecosystems. The primary objective of the Belgium test site was to implement the ABC Planner tool for prioritizing and optimizing areas for strict conservation, considering important species, as well as the distribution and impacts of human activities and pressures. The Graciosa test site solution emphasized a comprehensive approach that balances economic and environmental objectives to ecosystem management using trade-offs with the aim to expand the existing MPA while safeguarding biodiversity and minimizing conflicts between human activities, such as fishing and tourism. The Cadiz Bay test site underscored the significance of integrating MSP and MPAs to tackle socio-ecosystem challenges. Given the characteristics of the region, the solution focused on alignment of existing tools and addressing policy barriers such as fragmented governance and inadequate funding.

The objectives of the NWMed test site were to inform MPA and MSP processes on the need for protection of two primary environmental features: cetaceans and deep vulnerable marine ecosystems and addressing pressures on these species mainly from maritime traffic and bottom fishing.

The Western Black Sea test site (Bulgaria and Romania) developed solutions to identify potential conflicts from the proposal/scenario to enlarge existing MPAs. These solutions integrated trade-off analysis in MSP, utilizing SeaSketch Participatory Mapping and cumulative impact assessment using the PW4B, with the aim of preserving valuable mobile species (marine mammals). The added value of this site lies in shaping MSP and MPAs processes coherent at both national and cross-border contexts.

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Table 2 Overview of the specific test site solutions.

Gaps addressed / types of solutions	Baltic Sea	Belgian part of the North Sea	Atlantic (Azores)	Atlantic (Cadiz Bay)	Northwest Mediterranean	Western Black Sea (Bulgarian part)	Western Black Sea (Romanian part)
1. Gaps addressed	Lack of coherence between MSP and MPA management, insufficient financial and human resources Fragmented datasets Limited stakeholder engagement	High concentration of activities within a relatively small area, leading to insufficient management of the MPAs, focused on benthic habitats Conservation measures for pelagic habitats are absent and the impacts of climate change are unknown	Challenges in MPAs management, including insufficient monitoring, poorly integrated MSP processes, and low stakeholder confidence	Lack of an adequate framework, public involvement regarding MSP and MPAs management has been poorly implemented Deficiencies in coordination between different institutions for MPA management Cadiz Bay a case of LSI – complex socio-economic ecosystem	Protecting mobile species such as cetaceans is a challenging issue, while the sensitivity of fixed VME species remains poorly understood Lack of observations for VMEs located in deep, difficult-to-explore areas High mobility of cetaceans whose distribution may vary seasonally or interannually	Lack of operational implementation, management plans, or monitoring of MPAs Overlapped human activities and MPAs in the onshore areas Need of enlargement of MPA network and operational integration in MSP	Deficiencies in management plans Gaps of data and scientific information Multiple pressures and impacts Need of better integration of MPAs in MSP
2. Types of proposed site-specific solution	Spatial planning solution: spatial pressure and impact assessment in HELCOM MPAs	Spatial planning solution: identifying conservation zones that can be strictly protected while considering other activities that take place in the BPNS	Spatial planning solution: integrating MPAs with MSP facilitated the analysis of cumulative impacts and trade-offs between conservation goals and socio-economic objectives	Strategic planning solution: development framework: 1) agenda/guidelines and secure funding; 2) coordination mechanisms to develop the agenda/guidelines; 3) mechanism for stakeholder engagement	Strategic planning solution: knowledge priorities, areas at stake and management perspectives for cetacean and VME protection in the NW MED	Spatial planning solution: integration of MPAs and MSP by applying trade-off analysis and cumulative effect assessment	Spatial planning solution: applying cumulative effect assessment
3. Applied ESE modules / DSTs	HELCOM SPIA (Spatial Pressure and Impact assessment) tool (ESE1)	PlanWise4Blue DST and its ABC Planner (ESE1)	Trade-offs Tool / findings from D4.2 and D4.3 (ESE3)	D5.2 and WP6 Policy solutions for Cadiz Bay (ESE2 and ESE3)	ESE1 (Scoping phase) to gather and synthetise adequate ecological knowledge (data and criteria) ESE3 Trade-off: a participatory mapping tool as a DST based on the Geolittoral Cerema's web platform (specific MSP4BIO module has been designed)	PlanWise4Blue DST and its Cumulative Effect Assessment (ESE1) Trade-off analysis and SeaSketch Participatory Mapping (ESE3)	PlanWise4Blue DST and its Cumulative Effect Assessment (ESE1) SeaSketch Participatory Mapping (ESE3)

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4 Results: reports on individual test site solutions

4.1 Report on the solution for the Baltic Sea test site

Title:	Spatial pressure and impact assessment in HELCOM MPAs	**Test site**	Baltic Sea
		Partner (test site leader)	HELCOM
Short summary	The MSP4BIO Baltic Sea test site conducted a detailed analysis of spatial pressures and impacts within HELCOM Marine Protected Areas (MPAs) using the HELCOM SPIA (Spatial Pressure and Impact assessment) tool. This assessment evaluated environmental pressures, ecosystem components, and human impacts inside MPAs to identify the most affected ecosystems and pressures. Key findings revealed bottom-water habitats, grey seals, and harbour porpoises as the most impacted components. Pressures such as hazardous substances, eutrophication, and physical disturbances were identified as the most significant, primarily originating outside MPA boundaries. The study highlighted the need for regional strategies to address these widespread challenges.		
Main focus and objectives of the test site case and the proposed planning solution	The main focus of the Baltic Sea test site was to assess the spatial distribution of cumulative pressures and impacts within HELCOM MPAs using the HELCOM SPIA tool. Objectives included identifying the most impacted ecosystem components, understanding key pressures affecting MPAs, and determining which MPAs are most vulnerable. The proposed planning solution emphasized the need for comprehensive regional strategies to mitigate pressures like hazardous substances and eutrophication, which are largely external to MPAs, while enhancing regulatory measures within MPAs to address direct human activities such as bottom trawling and disturbance from human presence. Expected impacts from the ESE framework validation/application and reflected in the proposed solutions: • Improved alignment between MSP and MPA management processes, enabling planners to account for cumulative pressures and their effects on vulnerable ecosystem components. • Development of arguments to be used in localized measures to address key pressures, such as regulating		

	bottom trawling and managing human disturbance within MPAs. • Co-development of planning solutions that incorporate stakeholder input, increasing buy-in and reducing conflicts between economic activities and conservation measures. • Strengthened cooperation across Baltic Sea countries, ensuring cohesive implementation of MSP and MPA strategies in line with HELCOM and EU directives.
Geographical scope	 *Figure 3 Location of the Baltic Sea test site (Source: World Atlas).* The Baltic Sea, a semi-enclosed inland sea located in Northern Europe, serves as a transboundary sea basin. The sea area is 377,000 km² and stretches from 53°N to 66°N latitude and from 10°E to 30°E longitude. Its clear separation from the open ocean restricts water movement through the Danish Straits. Eight EU coastal countries share the Baltic coast (i.e., Germany, Denmark, Sweden, Finland, Estonia, Latvia, Lithuania and Poland) with Russia. The Baltic is one of the most brackish bodies of water in the world, receiving both ocean and river influx water. The average salinity of the Baltic Sea is around 7%. The Baltic Sea's ecosystem is particularly sensitive, responding quickly to external influences and pressures. Natural occurrences, such as

	environmental factor fluctuations, and anthropogenic effects, such as fisheries, pollution, or industrialization impact the sea measurably. The key characteristics of the test site are: • Transboundary sea basin; • Ecosystem under multiple human-induced pressures; • Need for more designated MPAs to achieve the regional goals; • Need for coordinated plans for human activities.
Describe the gap(s) /challenges and key management questions addressed	It is important to note that the gaps below were identified by the CoP members and may not apply equally to all Baltic Sea countries, as each CoP member highlighted issues and gaps specific to their own country. Since the Baltic Sea test site serves as a regional test site, achieving a fully harmonized approach to addressing these gaps is nearly impossible. Therefore, the issues outlined below should be considered as relevant to at least one or more Baltic Sea countries, rather than being universally applicable across the entire region. The Baltic Sea test site highlighted several critical gaps and challenges in the management of HELCOM MPAs (see Deliverable 5.1) during interactive workshops focusing on MPA-MSP integration. A significant gap lies in the inability of MPAs to control widespread, external pressures such as hazardous substances and eutrophication, primarily driven by land-based activities like industrial discharges and agricultural runoff. Additionally, transboundary pressures, including the introduction of non-indigenous species through shipping and the impact of anthropogenic noise from regional maritime traffic, remain inadequately addressed. These challenges are compounded by insufficient coherence between MSP and MPA management processes, insufficient financial and human resources, fragmented datasets, and limited stakeholder engagement, all of which hinder effective conservation and the achievement of biodiversity objectives. The proposed planning solution aligns with an integrated, transboundary approach: • **Data-Driven Decisions**: Use cumulative impact tools to integrate pressures across scales and prioritize actions for mitigation. • **Cross-Sectoral Coordination**: Foster collaboration among MSP, MPA managers, and land-based sectors like agriculture and industry. • **Capacity Building**: Provide training for MPA managers and

	planners to use spatial tools effectively. Baltic Sea test site CoP interactions identified critical concerns and deficiencies in integrating MSP and MPA management. CoP feedback emphasized the need to incorporate socio-economic and governance indicators, alongside ecosystem services and trade-offs, as part of the MSP4BIO framework under WP4, T4.3. The CoP's engagement through online workshops and interactive platforms (i.e., MIRO) allowed for diverse stakeholder input, which helped streamline collaboration and prioritize questions that addressed these gaps. However, challenges arose in achieving uniform application of the framework across the multinational Baltic Sea region, as national differences in policies and priorities complicated localized tasks such as trade-off management. By this exercise, the main management questions addressed are: - How can we balance economic interests with the need for environmental protection within our MPA? - How to identify and analyze the main conflict areas between human uses and environment? - How to identify and analyze the main conflict areas that may arise if we need to expand MPAs in response to sensitive habitats, ecological connectivity, or other valuable environmental assets.
Description of the site-specific planning solution	**The site-specific planning solution for the Baltic Sea test site focuses on combining local management efforts within HELCOM MPAs with broader regional strategies to address external pressures.** The HELCOM SPIA tool was instrumental in designing this solution by providing a robust framework for assessing the cumulative impacts of human activities on marine ecosystems. The tool enabled the identification of spatial overlaps between pressures and ecological vulnerabilities, thereby supporting prioritization in decision-making processes. As stated in D5.2, the fourth guiding question emphasizes the integration of socio-economic objectives within the framework of MSP and MPAs. This approach primarily seeks to identify and analyze the conflicts that arise between human activities and environmental priorities. These conflicts become particularly evident when expanding MPAs to protect sensitive habitats, ensure ecological connectivity, or safeguard other critical environmental assets. In order to support this issue, T4.3 performed trade-off exercise by using the SeaSketch tool. This exercise supported the test site to identify important human activities in potential MPA expansion areas in Poland, a specific country. In this solution, a region-wide decision support tool application was performed. The planning solution includes the following key components:

Integration of cumulative impact assessments in MSP: Utilizing the HELCOM SPIA tool's outputs, the planning solution emphasizes the identification and prioritization of the most impacted ecosystem components and pressures, such as hazardous substances and eutrophication, to guide conservation actions effectively.

Adaptive management based on data-driven insights: Leveraging the high-resolution spatial data and sensitivity scores from the HELCOM SPIA tool to refine and adapt management actions over time, ensuring that efforts remain aligned with evolving ecological and anthropogenic dynamics.

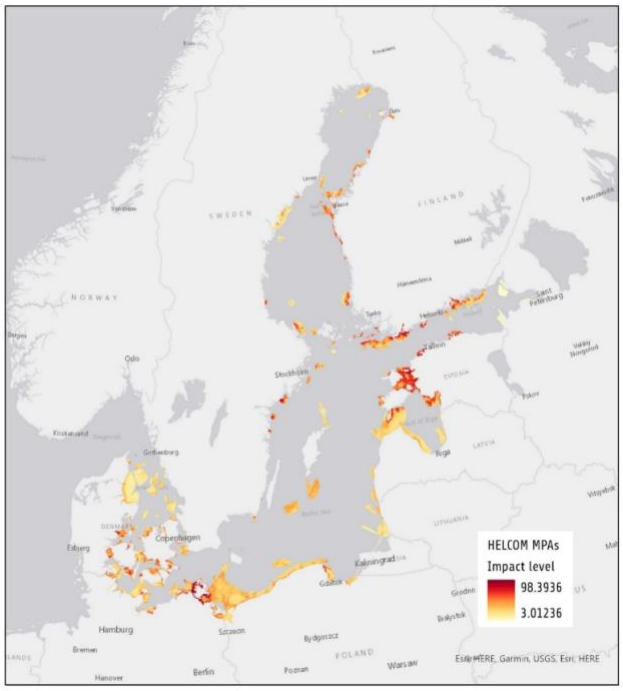


Figure 4 SPIA tool outcome showing the most impacted areas in HELCOM MPAs (red represents high impact and yellow represents the low impact areas).

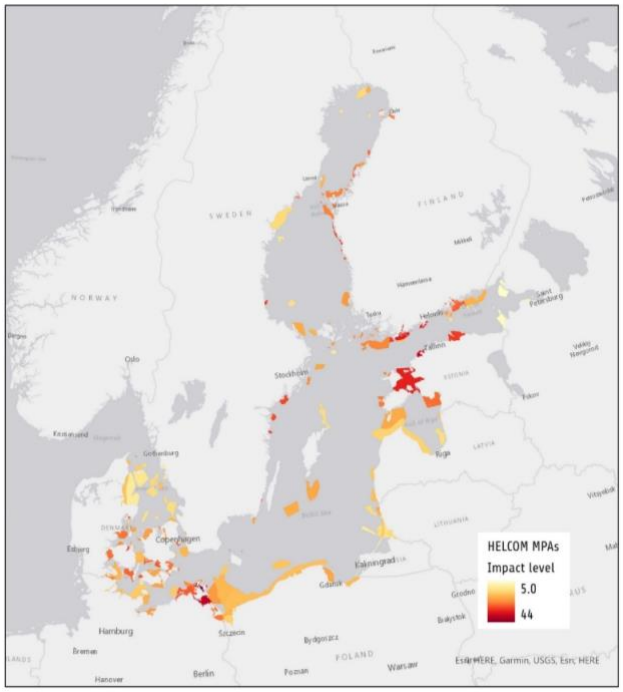


Figure 5 HELCOM MPAs by their mean impact score (red represents high impact and yellow represents low impact areas).

Integration of MPAs in MSP

The proposed planning solution can be integrated into the current stage of the MSP process by aligning it with ongoing efforts to designate and manage MPAs. Key integration steps include:

1. **Incorporating cumulative impact assessments into MSP**: The results from the HELCOM SPIA tool, including the identification of significant pressures and the most impacted ecosystem components, can be used to inform spatial planning decisions. This ensures that MSP processes prioritize areas of high ecological sensitivity when designating MPAs and defining their management measures.
2. **Enhancing cross-sectoral coordination**: The integration of the planning solution into the current stage of the MSP process calls for close collaboration between MSP authorities and MPA managers to align objectives and integrate management strategies. By embedding MPA priorities into the broader MSP framework, sectors such as fisheries, shipping, and offshore energy can be regulated to minimize their impact on MPAs.
3. **Supporting adaptive MPA designation**: The integration of the planning solution into the current stage of the MSP process requires a dynamic approach to MPA designation,

	using spatial impact data to adapt boundaries and management measures to better protect vulnerable areas. This is particularly relevant in addressing transboundary pressures and ensuring connectivity between MPAs. 4. **Embedding training and stakeholder engagement in MSP processes**: Capacity building on cumulative impacts for MSP and MPA stakeholders is crucial for implementing the solution effectively.
Stakeholders (CoP) involved in the site-specific planning solution	The tool outcomes were presented in several HELCOM expert and working group meetings, including the HELCOM-VASAB MSP WG, the BSR MSP Data Expert Sub-Group, and the HELCOM Working Group on Biodiversity, Protection, and Restoration. These groups, comprising experts from Helsinki Convention contracting parties, provided valuable insights into the robustness and applicability of the proposed methodologies. Since the approach had already been approved during the HOLAS 3 (Holistic Assessment of Ecosystem Health in the Baltic Sea) development, the methodology was considered robust and well-founded. Feedback from the CoP members highlighted some concerns regarding the management of MPAs. While MPAs exist, not all of them are supported by management plans. Furthermore, even when management plans are in place, they often do not restrict human activities occurring within these areas, undermining the effectiveness of conservation efforts. The ESE framework was seen as a crucial tool to address gaps in current management practices, particularly in balancing human activity and ecological protection within MPAs.
Governance context	The governance context for the Baltic Sea test site involves a complex interplay of international, regional, and national frameworks. Governance in this region is guided by agreements under the Helsinki Convention, with HELCOM serving as a coordinating body for implementing regional commitments related to the protection of the Baltic Sea. Each Baltic Sea state implements MSP and MPA policies in accordance with Baltic Sea regional commitments, but with variations in national priorities and governance structures. This diversity can lead to differences in approaches to trade-offs and conservation management. The Baltic Sea test site, encompassing the entire sea basin, operates within a complex governance framework that integrates multiple legal and strategic instruments at the European Union and regional levels. These frameworks aim to address the interconnected challenges of biodiversity protection, sustainable

	development, and ecosystem health in this highly sensitive and heavily utilized marine area. - MSP: In the Baltic Sea, MSP is coordinated regionally by the HELCOM-VASAB MSP Working Group, ensuring coherence across national boundaries. - MSFD (implemented by MS, without Baltic Sea regional coordination): In the Baltic Sea, MSFD implementation involves addressing pressures such as eutrophication, pollution, overfishing, and habitat loss. The directive is closely tied to regional HELCOM commitments, particularly the Baltic Sea Action Plan (BSAP), which sets specific targets for biodiversity, eutrophication, hazardous substances, and maritime activities. - WFD (implemented by MS, without Baltic Sea regional coordination): The WFD aims to achieve good ecological and chemical status of all EU waters, including coastal and transitional waters, up to 1 nautical mile from the baseline. For the Baltic Sea, this means addressing land-sea interactions such as agricultural runoff, industrial discharges, and urban wastewater, which are major contributors to eutrophication and pollution. - Baltic Sea Action Plan: The BSAP is a region-specific strategy that complements the MSFD and WFD by setting ambitious targets for the Baltic Sea, such as reducing nutrient loads, creating a network of effectively managed MPAs, and addressing hazardous substances. - EU Biodiversity Strategy 2030 (implemented by MS, without Baltic Sea regional coordination): The strategy's target of protecting 30% of EU waters, with 10% under strict protection, has implications for MPA expansion and improved management within the Baltic Sea.
Possible challenges/risks/barriers and potentials/benefits related to the implementation of the site-specific planning solution	**Transboundary pressures:** A significant challenge is addressing pressures such as eutrophication, hazardous substances, and non-indigenous species, which often originate outside MPA boundaries and require coordinated regional action. The lack of enforceable mechanisms to regulate these transboundary pressures is a key barrier. Suggested measures are: • Establishing a region-wide comprehensive monitoring program with clear enforcement protocols for violations, leveraging HELCOM's existing framework for tracking compliance. • Introducing shared penalties or sanctions for non-compliance with pollution reduction commitments. • Enhancing the coordination between WFD and MSP frameworks to ensure that land-based activities contributing to eutrophication are addressed through national policies.

	• Establishing basin-wide nutrient trading schemes to incentivize reductions in agricultural runoff. **Data Gaps and Uncertainty:** Despite advancements like the HELCOM SPIA tool, data limitations on specific pressures or ecosystem vulnerabilities may lead to uncertainty in decision-making and reduced effectiveness of planning solutions. By leveraging available data and tools like HELCOM SPIA, the solution enables better identification of high-impact areas and prioritizes actions for protection and sustainable use. Enhanced spatial resolution of data can refine zoning within MPAs, ensuring targeted measures for conservation and regulation.
Opportunities and enablers for replicability /transferability and scaling up of proposed solution to other sites and beyond Potential challenges related to applicability of ESE testing results, transferability and scaling up of the planning solution	**Opportunities**: Focusing on specific human activities such as bottom trawling and performing trade-offs with ecosystem service valuations. The proposed solution leverages the ESE framework to address specific human activities, such as bottom trawling, while integrating trade-offs with ecosystem service valuations. This approach provides a structured methodology that can be adapted for other sea basins. The core **opportunities** include: 1. **Methodological adaptability**: While the sensitivity matrix is Baltic Sea-specific, other regions can adapt the methodology by engaging local experts and stakeholders in defining region-specific pressure-ecosystem relationships through targeted workshops and expert consultations. 2. **Cross-regional learning**: The solution promotes knowledge-sharing and capacity-building, allowing other sea basins to replicate the process while tailoring the tools to their ecological, social, and economic contexts. 3. **SPIA tool** can be re-calibrated with data from other regions, enabling scalability and cross-basin comparisons. **Challenges related to the applicability of ESE testing results, transferability, and scaling up of the planning solution:** 1. **Sensitivity matrix specificity**: The current sensitivity matrix is tailored to the Baltic Sea and its unique ecosystem components and pressures. Developing equivalent matrices for other regions requires significant effort in data collection, expert engagement, and workshop facilitation. 2. **Data availability and quality:** Many sea basins lack the high-resolution ecological and socio-economic data needed to replicate the Baltic-specific models, potentially reducing the precision of results in other regions.

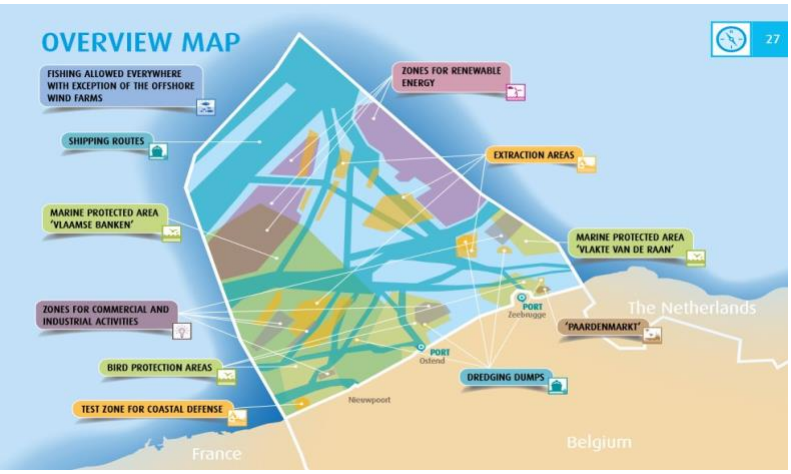
	The process for creating sensitivity matrices and defining pressure-ecosystem relationships is adaptable, allowing other regions to follow a similar approach while incorporating local data and expertise.
Recommendations for uptake and scaling up of the results in the test site to the regional level and relation with the regional strategies	The results of this solution are already on a regional scale; additionally, the outcomes (e.g., impact levels of HELCOM MPAs) can be incorporated into green infrastructure maps, as highlighted in the objectives of the Baltic Sea Regional MSP Road Map. Further, outcomes can be used to expand capacity-building initiatives at the regional level to train stakeholders and MSP practitioners on using tools like SPIA in marine protected areas and applying its results.

4.2 Report on the solution for the North Sea – Belgium test site

Title:	Belgian Part of the North Sea test site	**Test site**	BPNS
		Partner (test site leader)	VLIZ
Short summary	The Belgian Part of the North Sea (BPNS) test site is an area where multiple activities take place in a rather limited space, such as fisheries, nature conservation, tourism, renewables (offshore windfarms), shipping and mineral extraction. A Maritime Spatial Plan (MSP) is thus highly necessary to make sure that economic, social and ecological needs and interests are integrated, and that space is planned and allocated for each activity. Belgium adopted its first legally binding MSP via Royal Decree on 20 March 2014 for the period 2014-2020, thereby becoming a pioneer in Europe. The second MSP (2020 – 2026) was adopted on 22 May 2019 via Royal decree and is currently still in play. Following the new Marine Protection Act, the next MSP will cover an eight-year cycle (2026 – 2034) instead of six years. Public and international consultations have taken place in 2023 and 2024, the finalization of this third MSP is now ongoing and is expected to enter into force in March 2026. Although 36,5% of the BPNS area is currently protected in the second MSP, there is still a significant overlap with human activities within these conservation zones highlighting the strong need for		

	better effective management and monitoring of existing Belgian MPAs. Even though the third MSP is being finalized and set for the next eight years, the BPNS test site aimed to systematically identify and prioritize conservation zones for strict protection, explicitly accounting for the spatial distribution and effects of human activities using the MSP4BIO ESE Framework (particularly the tools introduced in the ESE1 module).
Main focus and objectives of the test site case and the proposed planning solution	The Belgian Part of the North Sea (BPNS) test site is a relatively small area where a lot of activities take place. This requires an extensive MSP, integrating MPAs and socio-economic aspect. The main human activities in the BPNS include: **- Renewable energy** (=Offshore wind farms). Belgian currently has multiple wind farm zones as well as designated zones for new concession zones in the future. These structures impact hydrodynamics, sediment dynamics and species distribution. However, they are also creating artificial hard substrates that attract various marine species, and can potentially be used for aquaculture. **- Shipping and ports:** The Belgian part of the North Sea is heavily trafficked by commercial shipping with major shipping routes and harbors (Zeebrugge, Ostend). **- Fisheries and Aquaculture:** The BPNS is associated with both commercial and small local fisheries. Fishery activities include beam trawling and demersal fishing. Most fishing activities are currently allowed everywhere except within the offshore wind farms. **- Mineral extraction (sand and gravel):** There are designated dredging zones within the BPNS used for construction materials as well as coastal protection. Dredging activities, however, have a big impact on seabed habitats and biodiversity but are valuable against coastal erosion and for building resources. **- Military and recreational activities:** There are designated coastal zones within the BPNS for military exercises. Recreational boating alongside tourism is also a big part of the BPNS and relies on a healthy coastal ecosystem. **- Scientific research:** Scientific research is allowed everywhere within the BPNS. Important habitats: **- Gravel beds and Sandbanks**: Sandbanks, like those formed through aggregations of the sand mason worm (*Laniche*

	conchilega) cover a large part of the BPNS and are critical for biodiversity. Gravel beds, forming hard substrates. However, these habitats are under significant pressure due to human activities and potentially climate change.
	- Artificial reefs: Offshore wind farms provide habitat for macrobenthos and fish and enhance biodiversity through biofouling communities (incl mussels).
	- Potential restoration areas: Efforts have been made, with minimal success so far, to re-establish gravel beds, oyster banks, and reef ecosystems to restore biodiversity and ecosystem services.
	
	Key Species:
	- Marine mammals: Harbour porpoise (*Phocoena Phocoena*) and seals are common in this area. Noise and habitat disturbance affect their distribution.
	- Seabirds: BPNS is crucial for migratory seabirds. Conservation areas for foraging and resting are designated within the BPNS.
	- Fish: There are a number of both demersal and pelagic commercially important species within the BPNS. Conservation efforts have focused on benthic habitats but remain poorly managed. For pelagic habitats, specific conservation efforts are still lacking.
	
	The current nature conservation zones:
	- **Five Natura 2000 MPAs**
	  ○ Habitats Directive Areas: Two Special Area's of Conservation (SAC) – "Vlaamse Banken" and "Vlakte van Raan"
	  ○ Birds Directive Area's: Three Special Protection Area's (SPAs) for Birds
	- **Ramsar Sites**: Zone protected as Wetlands of international importance for Bird species to the Ramsar convention.
	- **Marine reserve "Baai van Heist".**
	
	The main focus of the BPNS test site was to implement the ABC planner tool (Kotta *et al.* 2024) for the prioritization and optimization of areas for conservation taking into account important habitats and species, and the distribution and effects of human activities and pressures in the test site. ABC planner was used to define priority areas to be considered for strict protection to align with the requirements of the EU biodiversity law (10% strict protection). Since the new and third MSP (2026 – 2034) is currently undergoing finalizations, new proposals cannot be integrated anymore. During

	the various interactions with our stakeholders, it was discussed to use the proposed planning solution as a validation step where the resulting zones from the prioritization and optimization analysis can be compared to the proposed MPAs and nature restoration areas for the third MSP.
Geographical scope	 *Figure 6 MSP of the Belgian part of the North Sea (FPS Health, 2020*).

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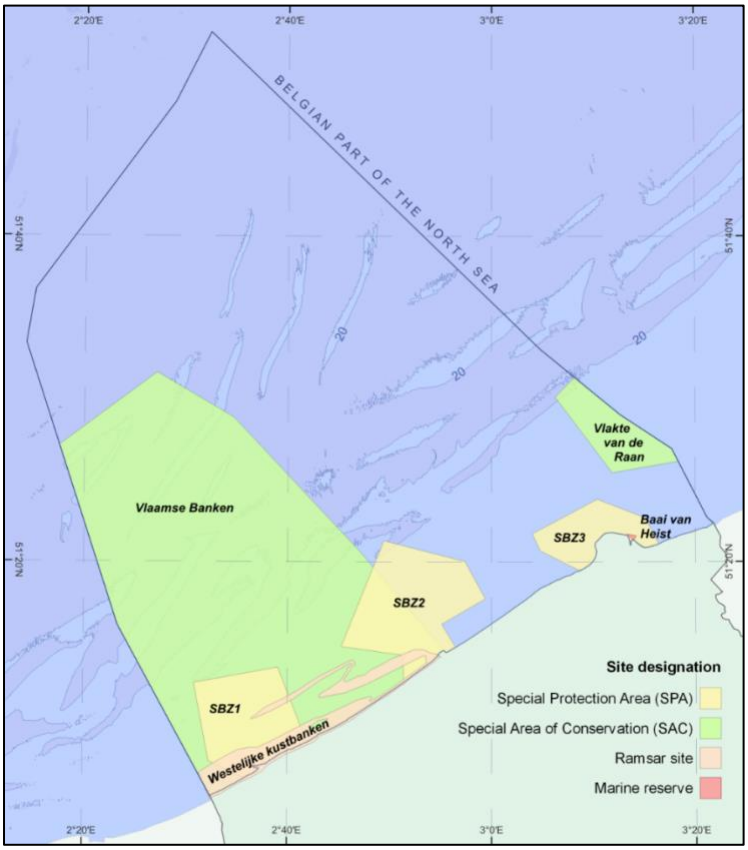

Figure 7 MPAs in the Belgian part of the North Sea (FPS Health, 2020)

Describe the gap(s) /challenges and key management questions addressed	A key issue for the BPNS test site is the high concentration of activities within a relatively small area, which has led to insufficient management of the current MPAs, focused on benthic habitats. Furthermore, conservation measures for pelagic habitats are notably absent and the impacts of climate change in the BPNS are mainly unknown. Through scoping practice from the ESE framework, the following management questions were formulated based on the gaps and challenges identified in D5.1 and D5.2. 1. How to prioritize a location for the designation of an MPA? - Identify 10% of the BPNS area for MPAs that can be strictly protected (following EU Nature Restoration Plan as part of the EU Biodiversity Strategy for 2030) - Identify existing MPAs and critical habitat and species areas - Using the ABC Planner tool to perform an area prioritization and optimization analysis

	2. What are the priority areas for preserving/restoring reef-forming species such as oysters, *Lanice conchilega* or mussels? - Identify the historical sites for gravel beds and oyster reefs - Identify existing MPAs the newly proposed MPAs that were submitted for the third MSP - Use habitat suitability index maps for European flat oyster (Ostrea edulis) The habitat needs for reef forming species have already been studied by scientists and are very well known. The biggest challenge is finding suitable areas that don't overlap with existing uses of marine space, so socio-economic criteria are the determining factors rather than biophysical criteria. 3. How to include spatial protection of pelagic habitats in conservation efforts in the BPNS? - Through the data gathering step it was evident that data availability on pelagic species, such as spawning and nursery grounds, migration, and temporal variation is still largely lacking. - Transboundary collaborations will be critical for pelagic habitat protection. 4. How to include climate change considerations in MPA measures? - The effects of climate change are not sufficiently known in the area. - Regular monitoring is crucial to detect climate effects. - Due to the small area of the BPNS, collaborations at regional scales would be beneficial.
Description of the site-specific planning solution	The site-specific planning solution for the BPNS test site focusses on identifying conservation zones that can be strictly protected while considering the many other activities that take place in the BPNS. By using the ABC Planner tool, an area prioritization and optimization analysis was implemented to identify zones for strict conservation that represent 10% of the BPNS test site. Trade-offs (e.g. fisheries) will be made to ensure strictly protected areas.

Figure 8 shows proposed marine reserves identified by 4Sea coalition (WWF-Belgium, Natuurpunt, Greenpeace Belgium, and Bond Beter Leefmilieu) for the third MSP. These proposed marine reserves were used during the MSP4BIO trade-off workshop. Members of 4Sea coalition were also part of the Belgian MSP4BIO stakeholders (CoPs). The proposed marine reserves were selected based on a set of criteria: (1) zones that have already been granted protection status, (2) Established MPAs, (3) Search zones seafloor

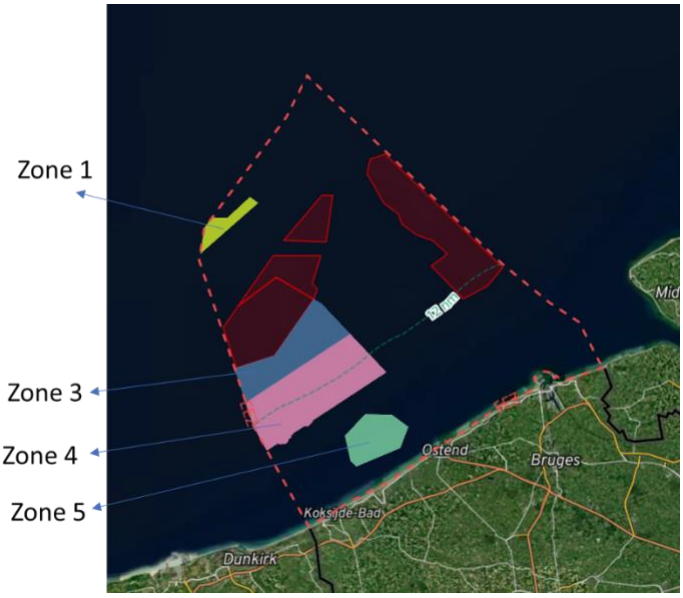

Figure 8 Zones in the BPNS identified by 4Sea coalition as options where a strict marine reserve could be located.

integrity, (4) In zones with high biological value, and (5) In zones with (remnants of) gravel beds.

During the MSP4BIO trade-off workshop, four maritime uses were identified by multiple stakeholders as trade-offs for the proposed marine reserves: maritime traffic, sand and gravel extraction, offshore renewable energy and transmission, and commercial fishing. Using the SeaSketch tool, the potential trade-off zones for maritime use were mapped by the stakeholders (Figure 9).

For the site-specific solution the newly developed MSP4BIO tool ABC planner was used:

In the ABC planner, the existing nature value targets were set to 30% of the total protected nature assets, which resulted in just over 10% of the total Belgian EEZ being protected. To highlight the importance of current nature conservation zones (Natura 2000 MPAs), SAC areas were treated as valuable sandbanks in the ABC planner analyses. Additionally, focus was given to potential marine reserves with a higher degree of connectivity. Based on the trade-

	off analysis and available data, the following human pressures were used in the scenario analysis: offshore renewable energy, maritime traffic, and fishing intensity. Both current and future concession areas for offshore renewable energy were included. Shipping density data was used to identify high-traffic shipping areas (data from 2023 for all vessel types). Since we focused on benthic invertebrates as a natural asset, the most significant fishing-related impacts are likely caused by benthic trawling. Therefore, only benthic trawling areas with more than five hours of activity were included. The distribution and intensity of these human activities was explicitly considered to avoid establishing conservation areas in locations where high pressures would compromise their effective establishment. For biological nature values, the focus was on benthic species. Habitat suitability maps of five key ecological macrobenthic species were used (*Abra alba*, Magelona-Ensis, *Hesionura elongata*, *Nephtys cirrosa*, and *Macoma balthica*). Sandbanks were restricted to binary values (0 for absence and 1 for presence), and all invertebrate data were normalized to a 0-1 scale. These normalized maps were then averaged to produce a single infauna map, ensuring the habitat's value was better integrated into the analyses. Figure 9 shows the first result from the prioritization and optimization analysis using ABC planner. The proposed marine reserves, covering roughly 10% of the BPNS correspond partially to those proposed by the 4Sea Coalition. The smaller most offshore area identified by ABC planner corresponds to zone 1 from the 4Sea Coalition proposal. The biggest area identified with the ABC planner overlaps with the new concession zones. Although this area corresponds to ecologically important habitats, the new concessions zones have been approved and will be implemented during the third MSP for BPNS (2026 -2034). For a second scenario run with ABC planner we could include stricter thresholds on the human uses and trade-offs. The results clearly demonstrate the value of tools like the ABC planner in guiding the designation and optimization of area-based protection measures in regions with a high concentration of human activities.

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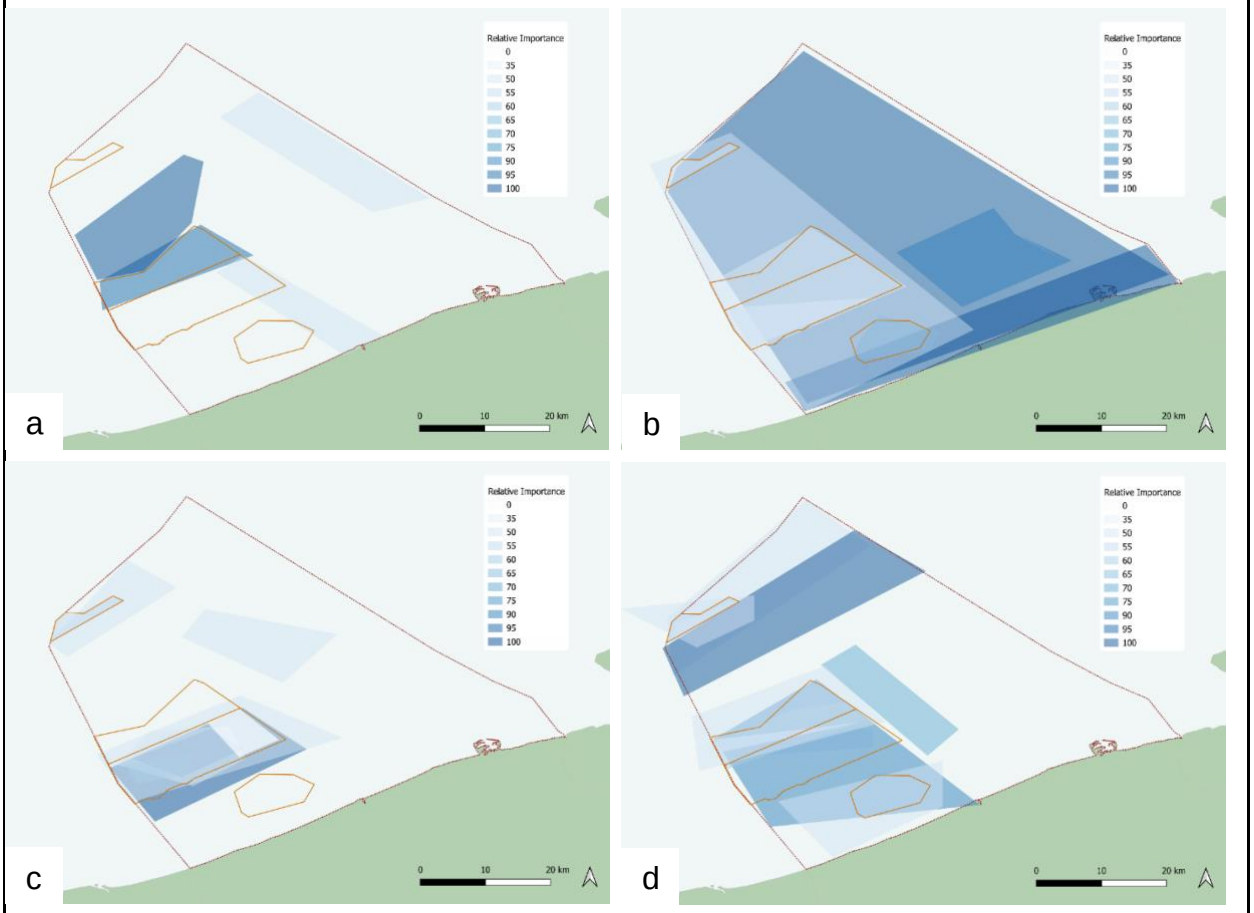
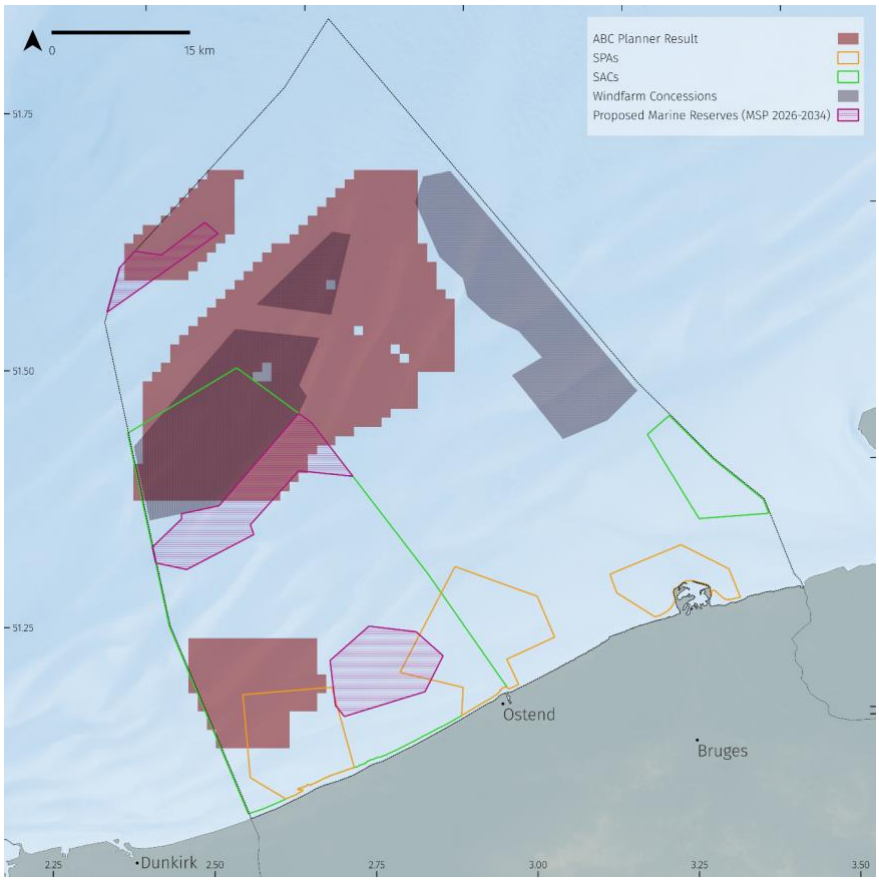


Figure 9 Potential trade-off zones for the proposed marine reserves from 4Sea Coalition, identified using the Seasketc tool. a: Potential conflict areas for offshore renewable energy generation & transmission (n = 4), b: Potential confli areas for commercial fishing (n=9), c: Potential conflict areas for sand and gravel extraction (n=10), and d: Potenti conflict areas for maritime traffic (n=14). n = number of stakeholders that selected potential trade-off zones for eac maritime use.

	 *Figure 10 Map showing the proposed marine reserves identified with the prioritization and optimization analysis using the ABC planner. These proposed areas (dark pink) cover roughly 10% of the BPNS. The current marine protected areas are also indicated on the map in green and yellow, while the new proposed sites for the third MSP (2026 – 2034) are indicated in purple.*
Integration of MPAs in MSP	The site-specific planning solution proposed for the BPNS test site will serve as a validation exercise as new proposals cannot be incorporated into the third MSP anymore. Public and international consultations for the new MSP were conducted in 2023 and 2024. The new MSP is currently in its final stages of development and is scheduled to take effect in March 2026.
Stakeholders (CoP) involved in the site-	For the MSP4BIO CoP in the BPNS we engaged with 17 stakeholder representatives from seven organizations/authorities

specific planning solutions	(government, Scientific advisory body to the government, regional authority, NGO, academia, research, fisheries). The largest groups represented government (seven people from two governmental bodies) and research (seven people from three organizations). The discussions that were held on trade-off scenarios, the ESE framework and site-specific solutions involved key representatives from the government (FPS Public Health, Food Chain Safety and Environment of Belgium), regional authority (Province of West Flanders), NGO (WWF), and research (Fisheries Institute).
Governance context	The coordination of the MSP in Belgium is led by the Belgian minister for the North Sea, while the preparation and implementation of MSP is coordinated by the Marine Environment Service of the Federal Public Health Service (FPS). A Royal Decree of 20 November 2012 also dictates the establishment of an advisory committee for consultations on MSP. This advisory committee consists of all competent Belgian federal and Flemish government services. Before finalizing MSP, public and international (neighbouring and interesting countries) consultations are held giving the opportunity to provide feedback. The final MSP is legally binding via Royal Decree. The current and new MSP also has a good integration with other relevant frameworks, including the MSFD, WFD, Natura 2000, and Strategic Environmental Assessment (SEA) Directive. The MSP process in Belgium has evolved considerably in recent years towards effective collaboration and shared understanding among the diverse representatives. The consultation process was also evaluated and found to be fully transparent by the WWF MSP study (WWF European Policy Office, 2022[1]). However, there are still some important conflicts and challenges to be addressed and improved. Through our stakeholder interactions it was noted that 'participation' could benefit from shifting more towards 'co-creation,' by agreeing on long-term goals rather than each sector defending their own interests. This approach is a challenge since a lot of stakeholders are involved, but having the MSP4BIO ESE framework in place would be a good solution to serve as 'official guidelines' through the MSP process, making sure all the different aspects (economic, social and ecological) are included.
Possible challenges/risks/barriers and potentials/benefits related to the implementation of the site-specific planning	- **Economic interests are prioritised over the achievement of the conservation objectives:** Poor effective management of benthic habitats in current conservation zones leads to the degradation of benthic habitats due to a high level of anthropogenic disturbance (eg. fishing, dredging, aggregate extraction, ...). Need for better and more data support, and focus on the integration of

solution	social and economic aspects in MPAs. Better co-creation in the MSP process is recommended. **- Transboundary collaboration:** Transboundary collaboration and information exchange, MPA management is ongoing but it could be improved and is necessary for MPA connectivity. It remains challenging since each country has its own approach and organisation for MSP, and the legislative frameworks and scientific focus are not always aligned. **- Nature restoration and biodiversity conservation**: Allocating MPA areas for strict protection will benefit and restore biodiversity creating a healthy ecosystem. Nature restoration of reef structures has a higher chance to be successful by fully restricting bottom disturbing activities within these MPAs.
Opportunities and enablers for replicability /transferability and scaling up of proposed solution to other sites and beyond Potential challenges related to applicability of ESE testing results, transferability and scaling up of the planning solution	- Opportunity of the site-specific planning solution would be to research spill-over effect of the new strict MPAs and link it to the possible economic benefits. - For the conservation of pelagic habitats and to study the effects of climate change, the European legal framework of Natura 2000 designations will need to become more flexible and dynamic. - Transboundary collaboration for pelagic habitats is necessary for considering larval dispersal, and food web interactions beyond national approaches.
Recommendations for uptake and scaling up of the results in the test site to the regional level and relation with the regional strategies	Make the MSP4BIO ESE framework into a smart interactive concept that is user-friendly. Provide training to stakeholders on the Framework and use of the DST tools. Seas Conventions, such as OSPAR is a useful framework to investigate climate change at regional scales (data and methods) and to provide a consistent approach across Contracting Parties. Especially for mobile species, large scale analyses and transboundary cooperation will be needed to investigate the effects of climate change.

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4.3 Report on the solution for the Azores Graciosa Island – North-East Atlantic

Title:	Integrated Maritime Spatial Planning for Sustainable Development in Graciosa	**Test site**	Azores
		Partner (test site leader)	UAc
Short summary	The planning solution for the Graciosa test site in the Azores focuses on a comprehensive approach that balances economic and environmental objectives to enhance the management of marine ecosystems. It aims to enlarge the existing Marine Protected Area (MPA) while safeguarding biodiversity, promoting ecological connectivity, and minimizing conflicts between human activities such as fishing and tourism. The solution employs the Ecological and Socio-economic (ESE) framework to engage stakeholders through participatory mapping, facilitating the identification of priority conservation areas and improving overall stakeholder confidence in marine governance. The integration of MSP and MPAs is expected to lead to sustainable resource management, improved biodiversity outcomes, and enhanced community resilience against climate change, aligning with broader regional and European conservation strategies		
Main focus and objectives of the test site case and the proposed planning solution	The Graciosa test site case focuses on developing a comprehensive trade-off approach between economic and environmental objectives, to enhance the management and protection of its valuable marine ecosystems. These, include diverse habitats and species, while accommodating essential human activities such as fishing and tourism. The primary objectives of this case include: identifying potential conflicts arising from the proposal to enlarge an existing MPA IUCN Category VI; promoting ecological connectivity and safeguarding sensitive habitats. Key activities at the site, including coastal fisheries and recreational diving, are balanced against conservation efforts in the existing Natura 2000 area around "Ilhéu da Praia," recognized for its biodiversity. The trade-off process involved engaging stakeholders through participatory mapping exercises and workshops to visualize current ecological and socio-economic conditions and potential future scenarios. The validation and application of the ecological and socio-economic (ESE) framework are expected to facilitate a		

	cohesive integration of MSP and MPAs, addressing identified needs such as improved data collection, stakeholder engagement, and adaptive management strategies. In the short term, this framework will enable stakeholders to collaboratively identify priority areas for conservation while minimizing conflicts between uses, leading to enhanced sustainability of marine resources. In the long term, the successful application of this framework is anticipated to improve biodiversity outcomes, strengthen community resilience against climate change, and foster a sustainable blue economy, thus, ultimately contributing to the overarching goals of the European Biodiversity Strategy and the Convention on Biological Diversity.
Geographical scope	The Azores is an autonomous region of Portugal located in the North Atlantic and composed of nine islands and a rich diversity of habitats. Graciosa Island (Portuguese: *Ilha Graciosa*), also referred to as the White Island, is a volcanic Atlantic Island in the Azores archipelago located around 1630km from the Portugal mainland. The island has an area of 60.65 km2, a length of 10 km and a width of 7 km. Its landscape is dominated by a 1.6-km-wide central caldera (the Caldeira) located in the southeast. Population is above 4 thousand inhabitants. Coastal waters surrounding the island cover 971,582 km2 (EEZ and extended continental shelf). The most important blue economy sectors are fisheries and tourism. The key characteristics of the test site are the following: • Rich habitat diversity – knowledge gaps in offshore and coastal areas; • Need for strategies to enlarge MPA network in coastal areas and for “fully protected areas”; • Regional MSP has been approved.

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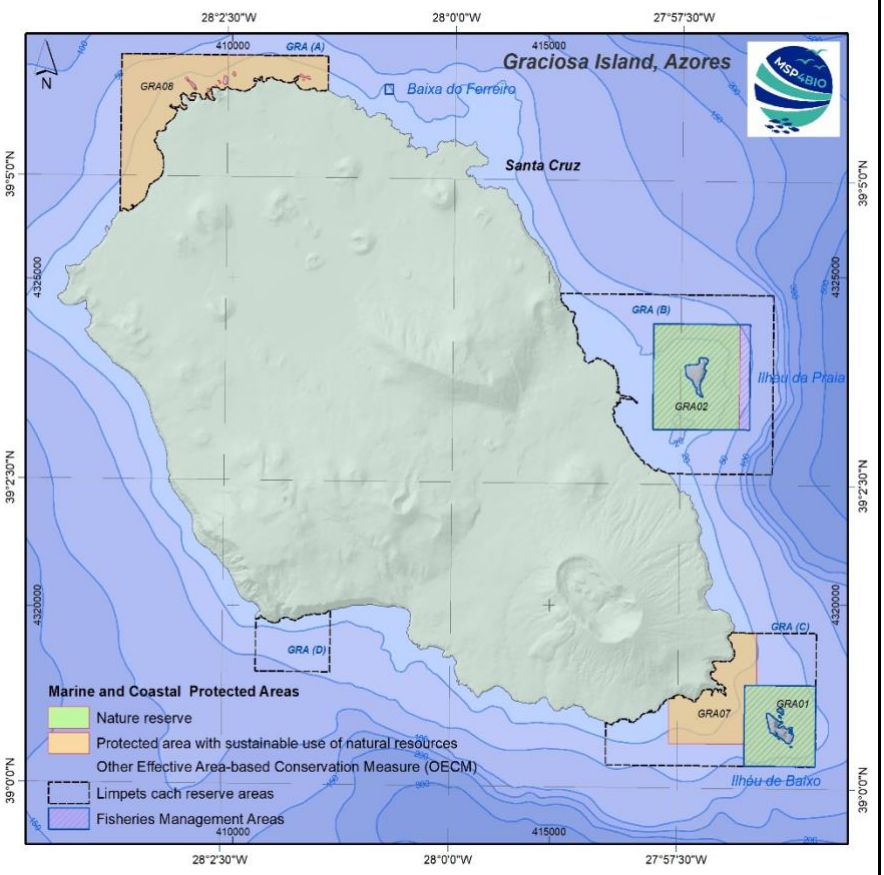
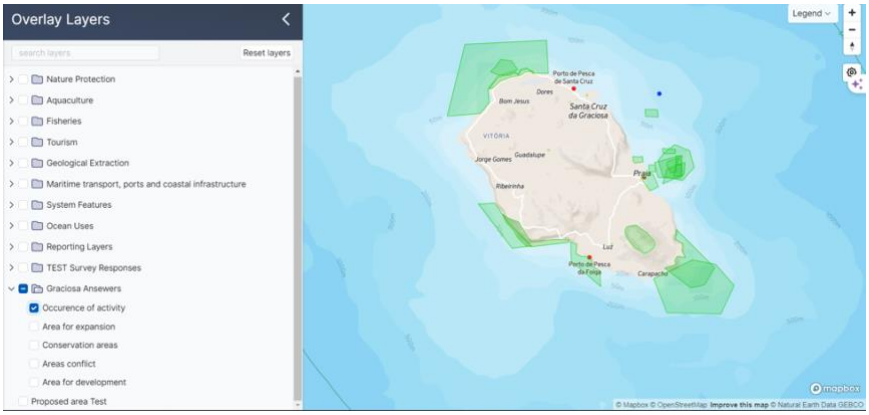


Figure 11 Marine Protected Areas and conservation measures.

Describe the gap(s) /challenges and key management questions addressed	The Graciosa test site faces challenges in MPA management, including insufficient monitoring, poorly integrated MSP processes, and low stakeholder confidence. D5.2 proposed using the ESE framework to improve ecological criteria, address knowledge gaps, and enhance stakeholder engagement. The ESE1 toolkit will be tested at its scoping phase and ESE3 trade-off guidelines aim to align MPA and MSP processes, while acknowledging data limitations and the site's remote location. Expected impacts included improved MPA management, greater stakeholder participation, and enhanced policy integration. The ESE3 was tested and validated within CoP interaction and a proposal for new MPA boundaries will be forward to competent authority.

Description of the site-specific planning solution	The Graciosa site-specific planning solution sought to bridge gaps in MPA management by integrating it with MSP using the Ecological and Socio-economic (ESE) framework. ESE3, which includes the Trade-offs method and incorporates findings from reports D4.2 and D4.3, facilitated the analysis of cumulative impacts and trade-offs between conservation goals and socio-economic objectives, particularly highlighting effective management practices within the tourism and fisheries sectors. Key decision support tools (DSTs), such as participatory mapping, trade-off guidelines, and stakeholder engagement methods, were utilized to collect data on marine activities, habitats, conflict areas, and perceptions of climate change, all of which informed the design of a newly proposed MPA area. The planning process began with engaging stakeholders to identify their primary concerns, ecosystems services combined with criteria (ESE2), followed by mapping exercises that highlighted significant spatial overlaps between existing MPAs and human activities like fishing and tourism. The trade-off results documented in D4.3 provided insights into areas of potential conflict while also identifying opportunities for sustainable resource use, ultimately highlighting priority conservation areas (Gutierrez et al., 2024). The ESE3 methodologies promoted a systematic approach to evaluating trade-offs and enhance collaborative decision-making among stakeholders.
Integration of MPAs in MSP	The proposed solution for the Graciosa test site can effectively be integrated into the current stage of the MSP process thus enhancing the designation and management of MPAs. This integration takes into account biodiversity attributes and ecological connectivity, ensuring that local conditions and specific marine ecosystems were adequately considered in the planning efforts. Addressing findings from D5.1, the test site plan identified and aimed to overcome policy barriers such as gaps in systematic conservation planning, inadequate monitoring, and limited human resources. It also highlighted the need for coherence between area designations, MSP, and other environmental legislation, as well as better integration of socio-economic considerations into MPA management. Furthermore, enhancing stakeholder confidence was crucial; the plan emphasized the importance of improving communication and feedback mechanisms within both MPA and MSP processes. The ongoing BlueAzores project, which is currently reviewing coastal MPAs, will provide an opportunity to advance the proposed MPA in Graciosa that it's totally aligned with Blue Azores. Given that the MSP for the Azores has recently been published and can integrate new MPAs without a need for a revision of the entire plan,

	MSP4BIO solution can be aligned with these developments to ensure that Graciosa's marine ecosystems are effectively protected, while contributing to broader conservation strategies in the region.
Stakeholders (CoP) involved in the site-specific planning solution	The established CoP for the Graciosa Island comprised key stakeholders, including representatives from an environmental NGO, the president of the fisherman's association, two planning authorities (one with a specific focus on MSP and another on MPA), researchers and tourism sector. Each of these actors played a distinct role in the integration of MSP and MPAs, with planning authorities holding significant influence over decision-making and policy implementation. The NGO, fisherman's association president, and tourism sector served mainly in advisory capacities, to ensure that stakeholders concerns were acknowledged and reflected in the planning process including biodiversity. Results from the ESE demonstration and the application of DSTs during the fourth interactions showed a constructive consultation, collaborative and co-validation process. The stakeholders collaboratively identified priority areas for conservation and potential conflicts, leading to actionable recommendations that balanced ecological integrity with socio-economic needs. This engagement enhanced the understanding of local conditions and also fostered a sense of ownership among stakeholders, ultimately paving the way for more effective integration of stakeholder perspectives into MSP and MPA strategies.  *Figure 12 Participatory mapping from a CoP interaction pointing to some of the occurrences of the stakeholder's activities.*
Governance context	Graciosa Island's governance is characterized by a multi-layered system. As an Autonomous Region of Portugal, the Azores operates within the broader Portuguese legal framework but also possesses significant self-governance and legislative powers. The

	MSP was recently approved, indicating a shift toward more formalized spatial planning for marine resources. This MSP will likely integrate existing MPAs and future expansions, but it also needs to better incorporate the MSFD and WFD. The integration between these different directives requires better coordination between the MSP and MPA government entities. The island's MPA network, including the Azores Marine Park and Graciosa Natural Park, currently relies on decrees and regional legislation for its establishment and management. However, there is a significant need to improve the definition of conservation objectives within management plans and to enhance the integration of socio-economic considerations into both MPA management and the upcoming MSP. The implementation of the site-specific planning solutions will therefore require careful consideration of existing legislation at the regional, national, and EU levels, with a strong emphasis on coordination and communication between relevant governmental bodies and stakeholders.
Possible challenges/risks/barriers and potentials/benefits related to the implementation of the site-specific planning solution	Some difficulties were foreseen in the upcoming ESE implementation. The main reason is that the ESE framework, at the time of the 4th CoP meeting, was in its initial development phase, and only a preliminary English version was available. The feedback collected from the CoP highlighted the need for improvements to the user interface, translation into Portuguese (as all participants did not fully understand the original English version), and the integration of additional data layers (e.g., fishing management zones). These issues indicate the need for further development and refinement before widespread implementation. To overcome these difficulties, the project team implemented several strategies. A questionnaire was distributed to gather feedback for improving the tool. The University of the Azores team translated the questionnaire and related materials into Portuguese to enhance accessibility. The CoP members also responded to feedback received via email. These actions show a commitment to address the identified shortcomings and ensure that the ESE framework effectively meets the needs of its users. The ultimate success will depend on continued iterative development based on user feedback and thorough testing to enhance usability and functionality.
Opportunities and enablers for replicability /transferability and scaling up of proposed solution to other sites and beyond	The proposed Graciosa site-specific planning solution presents significant opportunities for replicability and transferability to other marine contexts due to its structured approach that integrates ecological and socio-economic considerations using the ESE framework, mainly ESE3. Furthermore, as the Coastal MPAs are to be reviewed in the short term, this experience can and should be

Potential challenges related to applicability of ESE testing results, transferability and scaling up of the planning solution	replicated in the other 8 islands of the Azores. The methodologies employed, such as participatory mapping, stakeholder engagement and trade-off method through the CoP, can be adapted to various coastal and marine environments, fostering collaborative decision-making. Additionally, the emphasis on balancing conservation goals with local socio-economic activities offers a model for addressing similar challenges in other islands and in other regions. However, potential challenges related to the applicability of ESE testing results include variations in local governance structures, data availability as well as skilled human resources, specific ecological conditions, and stakeholder dynamics, which may affect the harmony of results. Furthermore, scaling up the planning solution requires overcoming barriers such as resource limitations, varying levels of stakeholder engagement, and the need for political commitment to ensure successful integration of MSP and MPA frameworks in diverse contexts. Addressing these challenges is crucial for the effective transferability of the Graciosa model to a broader range of sites and for promoting sustainable marine management practices globally.
Recommendations for uptake and scaling up of the results in the test site to the regional level and relation with the regional strategies	To facilitate the uptake and scaling up of the results from the Graciosa test site to the regional level, it is crucial to align the proposed MSP and MPA strategies with existing regional strategies, such as the Azores' Blue Growth Strategy and the European Biodiversity Strategy. Strengthening collaboration among stakeholders, including local communities, government agencies, and environmental NGOs, will enhance the coherence and effectiveness of marine management efforts. Additionally, capacity-building initiatives should be implemented to empower local stakeholders with the knowledge and tools necessary for effective participation in MSP and MPA processes. Engaging in continuous dialogue with regional policymakers will ensure that the innovative approaches and insights gained from the Graciosa site are reflected in broader governance frameworks. Furthermore, creating a network to share best practices and lessons learned across similar coastal areas can promote wider adoption of successful strategies, ultimately fostering sustainable development and ecological resilience throughout the region.

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4.4 Report on the solution for the Cadiz test site – North-East Atlantic

Title:	Cadiz Bay test site	**Test site**	Cadiz Bay
		Partner (test site leader)	UCA
Short summary	The Cádiz Bay test site highlights the importance of integrating MSP and MPAs to address socio-ecosystem challenges. The MSP4BIO project aims to create a holistic management framework for the bay, addressing governance gaps, enhancing public participation, and fostering collaboration among institutions. Key solutions include developing a shared agenda and guidelines, establishing a "Coast-to-Coast Commission" for coordination, and leveraging the University of Cádiz as a neutral facilitator. Due to the nature of the region, the proposed solutions emphasize land-sea integration, alignment with existing tools, and addressing policy barriers such as fragmented governance and insufficient funding. Biodiversity conservation and connectivity are prioritized by incorporating ecological significance into planning and engaging stakeholders at multiple governance levels. Challenges include weak collaboration, culture, limited public engagement, and bureaucratic obstacles. However, the process developed through MSP4BIO provides a replicable framework that other regions can adapt to create local solutions. By scaling up, enhanced communication and integration between local, regional, and national authorities can strengthen MSP across Spain, fostering sustainable development and biodiversity protection.		
Main focus and objectives of the test site case and the proposed planning solution	The main reasons to focus on this site are: there is a need to approach the area as a true socio-environmental ecosystem and consider land-sea interactions in planning. Human activities are not sufficiently taking into account the protected areas that are in close proximity or even overlapping. Objectives: (1) Improve coherence between MSP, MPAs, MSFD and the related governance in the area (2) Identify needs and propose improvements to the current MPAs (hotspots) in the area considering a holistic integrated approach (social, economic, cultural and ecological). (3) Work with the relevant stakeholders to build confidence in MPA/MSP implementation. This MPA is valuable due to its seafloor covered in seagrasses. Among the various species present, the three distinct species of marine phanerogams are of outmost importance, as they constitute a vital habitat for fish breeding and rearing. These fish, in turn, rely		

on the surrounding fauna that thrives within these aquatic grasslands, thereby attracting a diverse range of aquatic birds.

The area around the Bay of Cádiz combines a wide range of interconnected uses and industries. Notably, it includes busy port operations in Cádiz, extensive industrial facilities in Puerto Real, and a growing tourism sector. This creates a zone of high activity, which surrounds another of exceptional ecological value, leading to various conflicts. The most prominent activities within the MPA encompass industrial port operations, navigation, tourism, and fishing. Additionally, activities like shellfish harvesting and aquaculture are also being developed in nearby areas.

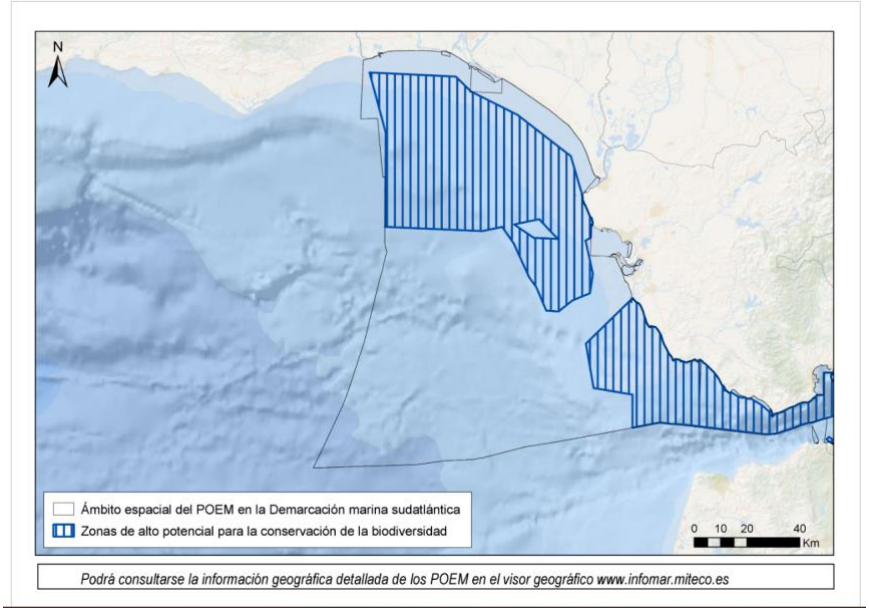

Figure 13 Areas with high potential for conservation of biodiversity in the Spanish South Atlantic Marine Demarcation.

Short-term Impacts

The process developed within MSP4BIO has successfully brought together diverse actors from the marine region, including government representatives, MPA managers, NGOs, and other stakeholders, to discuss their primary needs and challenges. In the short term, these discussions are expected to create momentum and foster collaboration among key stakeholders. This foundation of engagement has the potential to initiate the implementation of proposed suggestions, particularly as it benefits from the involvement of influential entities with the capacity to drive change, such as regional authorities and environmental organizations. However, sustaining this momentum will require ongoing facilitation and support.

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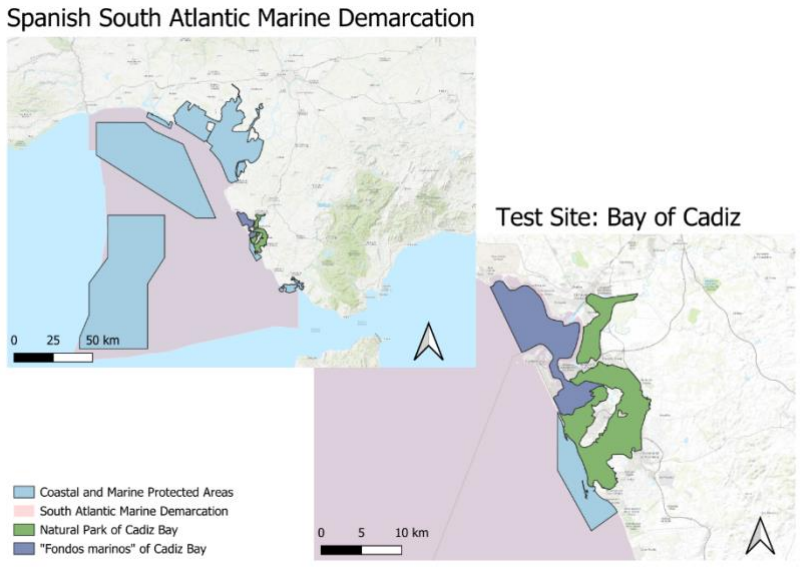
	Long-term Impacts In the long term, the objective is to establish a formalised governance structure, such as a „Coast-to-Coast Committee“ supported by a shared agenda that integrates land-sea management. This structure would enable stakeholders to sustain and advance collaborative management efforts independently, fostering a culture of coordination and resilience. Additionally, integrating MSP and MPAs within this framework is expected to enhance biodiversity conservation, promote sustainable development, and ensure that regional strategies align with broader socio-ecological goals. Achieving these outcomes will require addressing existing governance gaps, improving funding mechanisms, and ensuring the active participation of all relevant sectors.
Geographical scope	The Bay of Cádiz (Bahía de Cádiz) is a body of water in the province of Cádiz, Spain, adjacent to the south-western coast of the Iberian Peninsula. The shores of the Bay of Cádiz include the municipalities of Cádiz, San Fernando, Puerto Real, El Puerto de Santa María, and Rota. The bay forms a natural harbour. The Bahía de Cádiz Natural Park is located on the shores of the Bay of Cádiz. Relevant blue sectors: Fisheries, aquaculture and tourism. The Bay of Cadiz is part of Spanish Atlantic waters named the South Atlantic “Sudatlántica” marine demarcation, -an area of 14,978.3 km^2.  *Figure 14 Bay of Cadiz and its location in the Spanish MSP - South Atlantic Marine Demarcation as well as the protection figures in it* (*Source*: BOE-A-2023-5704)

	Characteristics of the test site are as follows: - Hot spots with special needs for MSP and MPA; - Need for improvement of MSP and stronger consideration of land-sea interactions; - Nearby human activities threaten MPAs.
Describe the gap(s) /challenges and key management questions addressed	Based on the work developed during the MSP4BIO, it was identified for Cadiz Bay test site the following: - Cadiz Bay lacks an adequate management framework, and there are only a few natural parks within it. - The public's involvement in the environmental management of Cadiz Bay, especially regarding MSP and MPAs, has been limited and poorly implemented. - Notable deficiencies exist in the collaboration and coordination between different institutions tasked with managing the protected areas. - Improving the integration of various instruments, plans, measures, and even protected areas within Cadiz Bay is necessary. - Viewing Cadiz Bay as a case of land-sea integration is essential, moving away from sectoral approaches to treat it as a complex socio-economic ecosystem. - Current public participation tools and processes, such as the "Junta Rectora" of the Cadiz Bay Natural Park, are not entirely efficient. They often lack representativeness and do not engage stakeholders effectively. - The dissemination of information is inadequate, leaving many stakeholders insufficiently informed about ongoing processes and developments, which hinders their effective participation. Summarising, the main management question selected for Cádiz Bay test stie is ***How to develop an integrated management framework for the site?*** Therefore, the specific questions that arisen from the CoP interactions where the followings: ➢ ***How to transform participation in cultural behavior?*** ➢ ***How to move from participation to engagement and co-creation, transforming participation in cultural behavior?*** ➢ ***How to create a culture of collaboration among responsible institutions?***
Description of the site-specific planning solution	The primary governance issues identified in the Cádiz Bay test site were not initially included in the Ecological-Socio-Economic (ESE) framework. The support provided by the partners responsible for

	Deliverables D5.2[6], D6.1[7], and D6.2[8] has been instrumental in adapting the framework to address the specific needs of the Cádiz Bay test site and refining the final proposal. This final document builds on collaborative efforts, incorporating the structure outlined in Section 5.2, WP6 draft policy solutions, and valuable suggestions from CoP members to enhance its applicability. To effectively respond to Cadiz Bay specific or "guiding" questions, first it is needed to integrate those questions in a site-based based strategic framework development proposal. Therefore, the overall proposal for Cadiz Bay has been organised around three main ideas: 1) To develop a shared agenda/guidelines to Cadiz Bay and secure funding; 2) To develop proper coordination mechanisms to ensure effective coordination and collaboration in the development of the agreed agenda/guidelines; 3) To develop proper mechanism for stakeholders engagement in the development of Cadiz Bay agenda/guidelines. **1) Define a shared agenda or guidelines (a strategy) to the entire Cadiz Bay as a socio-ecosystem:** - Take advantage of the role of the University as independent actor to lead/speed the process of achieving agreements. - Agree on common intersectoral priorities or goals shared to the Cadiz Bay among sectors, administrations, institutions and other relevant stakeholders. - Agree on the scope of the Cadiz Bay as a socio-ecosystem, taking into account the important land-sea interactions processes taking place in the area and the relevant recent maritime planning tools that impact the Bay (South-Atlantic Demarcation: Marine Spatial Plan and Marine Strategies), for example with the development of offshore windfarms or new MPAs. Practical experiences for inspiration: The ICZM Strategy of the "Mar Menor Sea" coastal lagoon established the need of a Joint Declaration for the lagoon, where common goals were developed to the whole socio-ecosystem. **2) Create a Fund for the Cadiz Bay to develop the previously agreed agenda or guidelines to the Cadiz Bay:** The Fund can provide funding for opportunities of collaboration between different stakeholders in Cadiz Bay according to a collectively agreed agenda or set of guidelines. This fund should be

[6] Test sites methodology including the participation strategy
[7] Report identifying state of the art on key barriers and levers for policy coherence
[8] Future directions for the EU, regional seas and national implementation of the EU Biodiversity Strategy in the coastal and marine regions

	created by the competent authorities to develop the agreed objectives/agenda/guidelines established in the previous step. This fund would demonstrate the political backing of the initiative, thereby providing an incentive for local managers to work without the fear of their efforts being in vain. Practical experiences for inspiration: The ICZM Strategy for the "Mar Menor Sea" coastal lagoon, initially funded by European funds, is designed for long-term management. Consequently, responsible institutions should establish a "Mar Menor" Fund to ensure the Strategy's sustainability in the medium to long term, independent of European funding. **3) Mechanisms to ensure coordination and collaboration:** - Create or reformulate previous existing fora for collaboration and coordination between the Cadiz Bay responsible institutions (vertical & horizontal coordination). - Define an official venue for meetings. - The coordination mechanism should organize meetings periodically to develop the agenda/guidelines of Cadiz Bay. - Increase the quality and ensure proper frequency of meetings to achieve ongoing and meaningful engagement. - Implement structured engagement processes that include representatives from all relevant administrations and sectors within Cadiz Bay. - The minutes of every meeting should be published to ensure transparency. - Ensure instrumental integration to achieve the shared objectives/priorities defined by the agenda/guidelines of the Cadiz Bay. Rationale of the proposal: management problems in the Cadiz Bay usually go beyond the competences of the relevant authorities, so the responses and goals established by the proposed Cadiz Bay agenda/guidelines will also be cross-cutting the administrative borders of the Bay. Practical experiences for inspiration: The Mar Menor ICZM strategy created two coordination bodies for the lagoon. The first was focused on policy-decision making coordination and therefore is composed of high-level managers or politicians. The second has a technical-operative character and is created for coordination among managers of different institutions/administrations acting in the Mar Menor. To improve the coordination with MSP South-Atlantic Demarcation the following is envisaged: - Enlarge the role of existing inter-ministerial committees from merely providing information to actively participating in decision-making and project implementation.

	- Create and empower regional monitoring committees per marine planning area to include representatives from all relevant bodies, granting them greater authority in oversight and decision-making processes. - Identify/create a regional authority/leader within the Autonomous Communities to ensure land-sea coordination in the marine planning areas. - Ensure regular feedback and public consultations per marine demarcation. - Implement regular feedback mechanisms and public consultations to tailor cultural transformations better. Practical steps based on stakeholder input (D5.1): - Transition of these committees from passive information-sharing bodies to active decision-making entities that are directly involved in project execution. - Encourage these committees to include representatives from non-governmental sectors such as private industry, academia, and civil society to bring diverse perspectives and expertise into policy and decision-making processes. - Strengthen the integration of these committees with local government structures to enhance their effectiveness and ensure they are responsive to local needs and conditions. - Implement structured mechanisms for collecting and responding to feedback from various stakeholders, including public consultation portals and regular town hall meetings. Good practices: Guidelines for Planning Marine Coastal Waters and the Adjacent Land Areas at the Local Level - under the EMFF Pan Baltic Scope project.
Integration of MPAs in MSP	The proposed solution emphasizes creating a shared agenda and guidelines for the Cádiz Bay as a socio-ecosystem, incorporating land-sea integration. This includes aligning with existing marine planning tools such as the South-Atlantic Demarcation's Marine Spatial Plan and Marine Strategies. It also proposes leveraging the University of Cádiz's role as an independent facilitator to lead this process. Integration into the MSP plan could be achieved by: • Coordinating across municipalities to establish a unified vision that integrates MPA designation and management efforts and improving/creating a committee to interact with the Regional MSP agency. • Utilizing existing agreements and decrees to ensure alignment with current governance and policy frameworks. Biodiversity attributes and connectivity can be incorporated into MSP by:

	• Recognizing the ecological importance of the inner marine areas and integrating these into the socio-ecosystem-based management approach. • Addressing land-sea interactions, as highlighted in the proposal, to ensure connectivity between terrestrial and marine ecosystems. • Using structured engagement processes to include representatives from diverse sectors and levels of governance (local, regional and national), ensuring that biodiversity goals are supported by local and regional stakeholders. Policy barriers identified are: • Lack of collaborative political culture in the region, limiting coordinated efforts. • Fragmented governance and insufficient cooperation among institutions responsible for protected areas. • Inefficient public participation mechanisms, with stakeholders often being passive observers. • Limited funding mechanisms and challenges in consolidating dispersed resources into a cohesive fund. How the Plan addresses these barriers: • Developing a shared agenda to unify objectives across sectors and involve actively stakeholders. • Creating a dedicated fund for the Cádiz Bay, providing stable resources for implementing agreed-upon objectives. • Proposing a "Coast to Coast Commission" to improve coordination and collaboration across administrative boundaries. • Leveraging the University of Cádiz, for example, as a neutral entity to facilitate agreements and promote effective governance.
Stakeholders (CoP) involved in the site-specific planning solution	Stakeholders have been involved throughout the entire process of MSP4BIO in Cadiz, as the main considerations were based on the feedback of the CoP interactions 3, 4 and 5. **3rd Interaction** (CoP + Stakeholders of Cadiz Bay) - DST – SeaSketch. In this interaction, we engaged in various ways during the workshops, with 45 participants as follows: 1. Stakeholders (16): Environmental Ministry (3); Regional administration (3); local administration (1); Surveillance service (2); Science (4); Company (2); NGO (1). 2. Master students (were trained to pass the SeaSketch survey to the stakeholders): a total of 16.

3. Degree students (8): their function was to take notes and contribute to the debate in the student´s round table of proposals (8).
4. Coordination MSP4BIO team (5).

The Marine Protected Area (MPA) "Fondos marinos de la Bahía de Cádiz" is a nominal designation without effective implementation (paper park). Consequently, the objectives we have for the area are more strategic, focused on establishing a framework, rather than operational. The DST applied intended to:

a. Placing the MPA on the political agenda or, at the very least, on the agenda of territorial actors.

b. Gathering information about the marine area of the Bay of Cádiz, including uses and activities, their locations, areas of significance for various sectors, as well as areas of conflict.

c. Resolving (or try to resolve) the main conflicts identified and proposing measures or lines of action (for addressing tradeoffs).

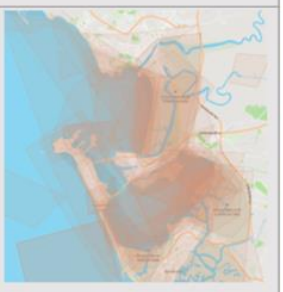
Develop actual scenario	Propose your area	Add inputs about climate
Cadiz example:		
		
Important areas for sectors. In the example it is represented the important areas for recreative fishing	Priority working areas for addressing trade-offs. In the example it is represented the three working areas identified during the workshop	Areas of importance for climate change as perceived by stakeholders
We worked with the current scenario by asking the sectors to identify the areas (up to 3) within the Bay that were most crucial for the development of their activities (they assessed them based on their significance to the sector).	After analysing the data from the conflict areas identified by stakeholders, three priority work areas were identified. All actors discussed these areas in working groups, leading to various proposals. However, reaching consensus was challenging due to the lack of minimum conditions (prerequisites) for working on solutions.	The actors identified the most sensitive areas to climate change in the Bay based on four characteristics: ▪ Vulnerable due to risks to the population ▪ Vulnerable due to risks to infrastructure ▪ Vulnerable because they impact the activities of the sectors operating there ▪ Vulnerable because they affect the conservation of the natural environment in various aspects (impact on habitats or species of interest).

Figure 15 Outcomes of the SeaSketch on the 3rd CoP Interaction in Cadiz Bay (more information is available in Annex 5 of D4.3, Gutierrez et al., 2024).

4th and 5th CoP Interactions – Validation results

The majority of the CoP members highlighted as potential to be developed and implement in Cadiz Bay the following proposals: ***Design a shared agenda/route (a shared strategy) for the Bay of Cádiz as a socio-ecosystem*** and ***Create a Fund for the Bay of Cádiz linked to the development of the agreed agenda/roadmap for the Bay of Cádiz.***

Below, key results from the whiteboard activity are presented. In this activity participants were invited to share their opinions on the proposed ideas, include highlighting those identified as having high potential for application in the Bay, as well as those seen as having low potential or high implementation difficulty. Additionally, participants noted main possible opportunities and barriers.

As supportive measure or potential barrier, stakeholders mentioned the following regarding the topics related to:

1) Design a shared agenda/route (a shared strategy) for the Bay of Cádiz as a socio-ecosystem:

Potential: Establish recognised seals of good practices; Integrate the local, provincial, and regional dimensions into a single platform. **Barrier:** Address the lack of a collaborative political culture in the Bay of Cádiz.

2) Create a Fund for the Bay of Cádiz linked to the development of the agreed agenda/roadmap for the Bay of Cádiz

Potential: A stable fund could be established to support integrated projects, independent of fluctuating financial availability. **Barrier:** The common challenge lies in the difficulty of consolidating scattered funds into a unified pool.

Moreover, CoP members offered additional suggestions and ideas to address the key issues (guiding questions) during the open discussion of each proposal, as presented below:

Propose a joint declaration and leverage existing decrees and commitments.

- The proposal suggests that the Bay of Cádiz municipalities enter into an agreement to bolster local dedication to managing terrestrial and marine zones with a metropolitan perspective. It also includes utilizing current decrees and accords that embody political and social pledges to steer the agenda and synchronize the planned actions.

Establish a financial fund and secure an adequate budget.

- It is recognised that securing funding is essential to take the next steps and bring the proposed initiatives to fruition. The creation of a fund is crucial to motivate municipalities to commit to a unified vision for the bay.

	The University as a facilitator The proposal suggests that the university should serve as a facilitator to identify or create an institution/organization that can lead and manage initiatives on a broader scale. This would enhance coordination among various stakeholders and fortify governance. **Leverage existing agreements as a foundation for a metropolitan pact** **-** Highlight and utilize existing agreements between municipalities to foster broader collaboration, strengthen a shared identity, and propose an integrated plan at a supraregional scale that enhances coordination and effectiveness of actions. - **Establish partial and scalable objectives.** Start with agreements between municipalities and progressively move towards higher levels of collaboration, allowing for achievable milestones and maintaining momentum in advancing the agenda. - **Include the marine area of the inner bay in management plans**. Recognise the ecological and socio-economic importance of the inner marine area of the Bay and consider it in the development agenda for integrated management of the Bay. The outer area of the Bay also presents significant challenges, though these are more related to the port sector. Most CoP members are not in favor of the proposal to 'Create or reformulate a pre-existing forum for collaboration and coordination among institutions/administration.' Moreover, participants identified significant opportunities and barriers where applicable. Concerning the concept of a collaborative forum, stakeholders pointed out a potential obstacle: 'Past attempts at forums have mostly failed.' In the open discussion about establishing appropriate mechanisms for ensuring coordination and collaboration in developing the shared Cadiz Bay agenda/guidelines, CoP members provided further suggestions and ideas to tackle the central issue, as outlined below: - Recognize institutional challenges and create coordination mechanisms. Acknowledge that the absence of a "Bay Commission" and strong institutional mechanisms is a significant obstacle. Propose the creation of a "Coast to Coast Commission" at the provincial level to periodically bring together relevant stakeholders to coordinate efforts and strategies. Define and clarify the role of the Junta de Andalucía in this process and how it can effectively contribute to the development and execution of the agenda. - Review and unify existing instruments and plans. Analyse all current instruments and plans to identify overlaps and areas for cooperation. Present these findings to the relevant authorities to

	improve coordination, avoid duplication, and ensure compliance with approved plans, such as the new Natural Resources Management Plan (PORN). - Include key stakeholders in decision-making processes. Engage entities such as the Port Authority and the Coastal Demarcation, recognizing their importance in bay management and working on their active participation in initiatives to achieve more integrated management. - Engage the private sector by improving legal security for investments and simplifying administrative procedures. Facilitate investment in and restoration of salt flats by providing legal clarity and reducing bureaucracy. Promote agreements between the industrial and environmental sectors to encourage sustainable projects that benefit the Bay. - Collaborate on shared visions of the future and turn initiatives into tangible actions. Determine each stakeholder's goals using scenario planning and strive for alignment to progress collectively. Prevent agreements from being merely theoretical by ensuring they are effectively and clearly implemented for the public, creating straightforward tools and technical solutions that yield immediate positive results. IMPORTANT: Although the proposal addressing the topic Coordination with MSP South-Atlantic Demarcation was presented, CoP members have not developed this issue further. Proposals addressing the guiding questions, ***'How to transform participation into a cultural behavior?' and 'How to move from participation to engagement and co-creation?***' were particularly endorsed by CoP members. Key topics supported include: **reforming and strengthening existing mechanisms, implementing structured participation processes, increasing the frequency and quality of meetings, providing training and education opportunities with general guidelines, expert exchange programs, and co-creation workshops.** Additionally, participants identified main opportunities and barriers for each topic as follows: ***- Reform and strengthen existing mechanisms; Implement structured participation processes; Increase the frequency and quality of meetings.*** **Potential:** Develop a communication action plan regarding the coastal management tools of Andalucía; Promote the citizen science methodology to foster connection, e.g., Coastwatch; In the case of coastal planning (Miteco), the regulation is binding, not indicative; **Barrier:** Past inertia: social participation has been almost nonexistent (merely passive observers).

	- Expert exchange programs: **Potential:** Any successful initiative must be interdisciplinary; **Barrier:** Again, there is a limited culture of collaboration between different sectors. ***- Co-creation workshops:*** **Potential:** Leverage the influence of organized groups to promote active citizen participation; Provide a platform to share different perspectives in previously separate fields. **Barrier:** The novelty of this proposal and the challenge of coordinating diverse competencies.
Governance context	All habitats of Bahía de Cádiz are under some kind of protection, and some areas are protected by more than one type of instrument. The major protection figure in the study area is the Natural Park of Bahía de Cádiz whose administration is done by the Andalucia Autonomous Community. The Park covers the terrestrial part and the salt marshes of the area. It is also overlaid by the following figures of protection: Natural Landscape (Paraje Natural), Natural Monument (Monumento Natural), Special Area for Conservation (SAC), and Special Area for Birds Protection (Zona de Especial Protección para las Aves). In the marine part, there is the Special Area for Conservation named "Fondos Marinos de la Bahía de Cádiz" also managed by Andalusia Autonomous Community. Together these protected areas cover more than 15.000 ha, most of the Bay of Cadiz coastal and marine environment. The "Fondos Marinos de la Bahía de Cádiz" was designated as a protected area based on the Natura 2000 criteria; however, its management plan is used as guidelines. On the other hand, the Natural Park was created in 1989 (Law 2/1989, of July 18) together with other areas in Spain. Most of these areas were also included in the provisional list of Special Protection Areas for Birds, provided for the Directive 79/409/EEC - later replaced by Directive 2009/147/EC of the European Parliament and of the Council of 30 November 2009 on the conservation of wild birds (Birds Directive). In terms of MSFD that was incorporated into Spanish legislation by means of Law 41/2010, of 29 December, on the protection of the marine environment - the MSP is conceived as a tool for the MSFD implementation process. Besides, Marine strategies are adopted and are in their second planning cycle, while MSP was recently approved by the Royal 2023 - Decree 150/2023, of February 28, approving the maritime spatial planning plans for the five Spanish marine demarcations. To implement the site-specific planning solution for Cádiz Bay, the following governance systems and legislative considerations are recommended: - **Harmonization of Existing Instruments:** Review and unify existing tools, plans, and regulations to reduce

	overlaps and enhance compliance, such as aligning with the new Natural Resources Management Plan (PORN). - **Leverage Existing Agreements:** Use existing decrees and commitments to promote collaboration, such as signing a joint declaration among municipalities to strengthen local commitment and adopt a metropolitan vision for the bay. - **Simplify Legal Framework:** Develop technical guidelines and simplify laws to promote sustainable development in areas like salt flats, aquaculture, and marshlands. Address bureaucratic obstacles that hinder effective implementation. - **Land-Sea Integration in Legislation:** Ensure that marine areas, including inner and outer bay zones, are incorporated into local and regional management plans to support biodiversity and socio-economic objectives.
Possible challenges/risks/barriers and potentials/benefits related to the implementation of the site-specific planning solution	The implementation of the site-specific planning solution for Cádiz Bay faces challenges such as fragmented governance, weak institutional collaboration, insufficient public participation, and limited funding. Bureaucratic obstacles and resistance to change further complicate progress. However, it offers significant benefits, including integrated socio-ecosystem management, improved collaboration through a shared agenda, enhanced stakeholder engagement, simplified regulations, and economic opportunities from sustainable activities like aquaculture and salt flat restoration. These measures also promote biodiversity conservation, climate resilience, and long-term socio-economic development.
Opportunities and enablers for replicability /transferability and scaling up of proposed solution to other sites and beyond Potential challenges related to applicability of ESE testing results, transferability and scaling up of the planning solution	The proposed solution for Cadiz Bay is site-specific, tailored to its unique socio-ecosystem challenges. However, the process developed through the MSP4BIO project provides a transferable framework that other regions can use to develop their own draft local solutions. Additionally, the materials produced by the project, including diverse ESE frameworks and policy solutions, offer valuable guidance and tools to support the adaptation and application of these approaches in other contexts. This enables broader replicability and scaling up while addressing challenges such as varying governance systems, stakeholder engagement cultures, and the harmonization of tools and regulations. Applying ESE testing results may still face obstacles like limited data, ecological variability, and institutional capacities, but the project's resources significantly enhance the potential for broader impact.

Recommendations for uptake and scaling up of the results in the test site to the regional level and relation with the regional strategies	To scale up the results from the Cadiz test site to the regional level and beyond, fostering improved communication and coordination between local, regional, and national authorities is essential. The creation of a "Coast-to-Coast Commission" in Cádiz could serve as a model for other maritime demarcations across Spain. Such commissions would support the integration of local competent authorities with regional and national levels, enhancing alignment and cooperation for MSP and MPA design and implementation. This approach aligns seamlessly with the *Estrategia Andaluza de Economía Azul Sostenible* (Andalusian Strategy for Sustainable Blue Economy), which emphasizes sustainable growth in marine and coastal activities while respecting the environmental limits of ecosystems. By embedding the Cadiz framework within this regional strategy, specific synergies can be leveraged: ***Blue Economy Development; Marine Biodiversity Protection; Climate Change Adaptation and Resilience; Fostering Innovation and Knowledge; Promoting Marine Culture and Awareness.*** For example, the "Coast-to-Coast Commission" could foster sustainable economic growth by integrating MSP efforts with the regional strategy's emphasis on sustainable tourism, and innovative business development. Also, by enhancing local community involvement in marine planning and management, the Cadiz model can further the Andalusian strategy's goal of fostering marine culture and boosting sustainable coastal tourism. By aligning the Cadiz framework with Andalusia's *Estrategia de Economía Azul Sostenible (Link)*, the region can scale up test site results while ensuring their consistency with Spain's broader MSP and MPA strategies and the European Blue Growth agenda. This integration would ensure the adaptation of best practices to address specific regional socio-ecosystem needs effectively.

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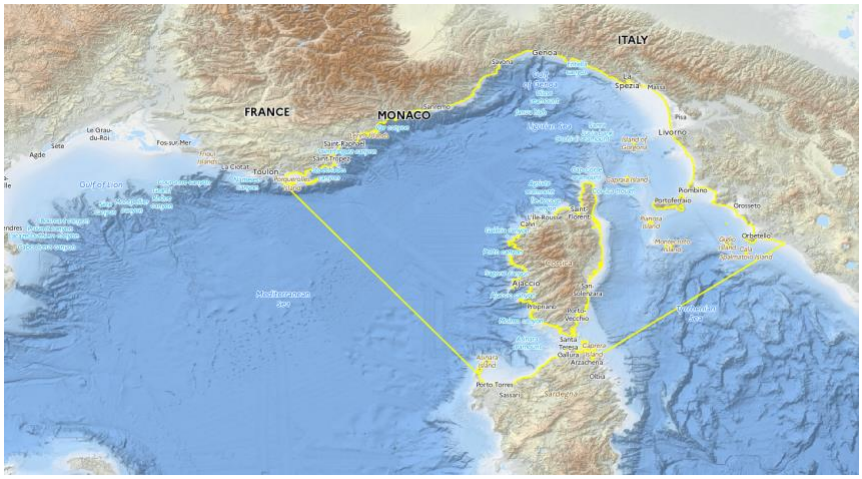
4.5 Report on the solution for the NW-Mediterranean test site (Italy and France)

Title:	Knowledge priorities, areas at stake and management perspectives for cetacean and VMEs protection in the NWMed	**Test site**	NWMed
		Partner (test site leader)	Cerema / CNR
Short summary	The NWMed test site focuses on informing MSP and MPA strategies to enhance conservation efforts for cetaceans and Vulnerable Marine Ecosystems (VMEs). Given the governance complexity across France, Monaco, and Italy, the study prioritizes identifying conservation needs, mapping ecological features, and addressing pressures such as maritime traffic and bottom fishing. The ESE Ecological Toolkit was applied, with a strong emphasis on the Scoping phase, which helps define key management priorities, knowledge gaps, methodologies and stakeholder involvement. As MSP plans are already under development in the test site, the study also explores strategies to enhance protection through Strictly Protected Areas (SPA), sector-based regulations (e.g. Fishing Restricted Area), and cross-border cooperation. Challenges include data gaps, regulatory differences between countries, and balancing conservation with economic activities in a highly fished and touristic area. Ultimately, the findings aim to support MSP and MPA planning by improving ecological knowledge, harmonizing methodologies, and fostering regional collaboration for effective marine conservation. Some further collaborations have been proposed through the MSP4BIO project with the General Fisheries Commission for the Mediterranean (GFCM), demonstrating the interest and inclusion of the study in the local territorial scheme.		
Main focus and objectives of the test site case and the proposed planning solution	In the NWMed sub-basin, France is currently reviewing its MSP plan while Italy has just adopted one. These processes are including MPA designation objectives or at least priority areas for marine conservation. Nevertheless, an extensive MPA network already exists and could follow its own designation agenda. Moreover, the EU biodiversity strategy ask for the strengthening of conservation by designating 10% of Strictly Protected Areas in land and marine national territories. The objectives of this MSP4BIO test site were to inform MPA and/or MSP planning on the main stakes and need for protection of two main environmental features in the area: cetaceans and deep vulnerable marine ecosystems. Concerns about pressures on		

	these species have also to be addressed, coming mainly from maritime traffic and bottom fishing. In the NWMed Test Site a major effort has been put on the Scoping phase, which is the first module of the ESE. The two priorities emerging from CoP interactions were VME and cetaceans. As there are no clear framework of data collection, targets and boundaries necessary to apply the ESE inner methodologies to VME and large uncertainties on cetaceans management due to their high mobility, focusing on the Scoping phase appeared particularly pertinent. The scoping phase serves as a critical step in recognizing all key elements and acts in part as a prioritisation exercise grounded in a realistic context, selecting only those elements that are truly important. This approach helps to accurately define the ecological and management scope and boundaries of the study area (Kotta et al., 2024). Scoping phase also aims to define a list of stakeholders of prior importance in the decision process, which is still lacking, especially for VMEs. Indeed, because of the cost and technical difficulties of collecting data, surveys are only providing the initial data we need to establish an analytical framework and validate it as a management priority. The expected outcomes from the ESE for NWMed test site were to: • guide the framework clarification process by identifying key discussion points, such as the need for risk assessment and the prioritization of critical aspects • support the identification of key actors, contributing to the consolidation of the transnational Strong Protection Zone network in the area (reach the 10% strictly protected areas objective). • homogenize the methodologies between countries. • identify key data necessary to support the planning process.
Geographical scope	The Northwest Mediterranean (NWMed) test site covers a cross-border area shared between three countries, France, Monaco and Italy, extending from the Gulf of Lion in France to the coast of Tuscany in Italy. It covers 130,000 km^2 of sea area, consisting of coastal, offshore and deep-sea parts (internal sea waters, territorial sea waters and EEZ). The test site is at sub-sea basin scale with an important cross-border component (French, Italian and Monégasque EEZs in the Western Mediterranean Sea). It encompasses different spatial scales in terms of MPA management: from the local scale characterising small MPAs to the transnational and cross-border level of the Pelagos Sanctuary and governance complexity. Thus, there is a need to address

	management of the different spatial scales, from the small MPA to the transboundary level.  *Figure 16 NWMed test site area – A focus was particularly done on the Pelagos sanctuary perimeter (in yellow).* The following are key characteristic features of the test site: • Governance complexity as area is shared between 3 countries; • Large spatial scale; • Diversity of marine domains; • Multiplicity of human activities. Key blue sectors in the test site encompass fisheries, aquaculture, tourism, and renewables.
Describe the gap(s) /challenges and key management questions addressed	In the Mediterranean Sea, cetaceans and VME appeared to be of interest by the CoP for their ecological importance, their sensitivity to direct (measurable) human pressures and the fact that they are good example of transboundary cooperation needs. Indeed, cetaceans are highly mobile flagship species which are particularly interesting to test network structure whereas VME as sessile habitat former species could be good indicators of where to put Strong Protection Zone to reach the 10%. The European Union also pointed them as priorities for the next decades in relation to fisheries management (FRA development and especially fishing closure from the 800 to 1000m depth) and deep-sea mining exploration. Assessing the distribution of the two environmental features of interest is challenging due to: (1) the lack of observations for VMEs located in deep, difficult-to-explore areas and (2) the high mobility of cetaceans whose distribution may vary seasonally or interannually. Therefore, one of the main management questions

	concerns the distribution mapping and identification of hotspots. Moreover, as shown in D5.1 about management gaps, although the current MPA coverage is quite high in the region, it's necessary to assess the network's coherence thanks to additional criteria such as functionality, connectivity or resilience to climate change. The other key management question pertains the form of effective protection for cetaceans and, to a lesser extent, VMEs. Protecting mobile species such as cetaceans is a challenging issue, while the sensitivity of fixed VME species remains poorly understood. Reducing pressures on these species involves trade-offs with maritime traffic economic efficiency and bottom trawling fishing. The procedure detailed in the scoping phase of the ESE proved relevant: - in helping to identify sticking points between France and Italy, notably the lack of clear test site boundaries or target species, which are currently being redefined jointly between the countries through a series of interviews and workshops initiated in 2024. - in helping to identify knowledge gaps and separate them into two categories: knowledge gaps that could be bypassed or central to the reflection. This categorization leads to a first screening of methodological feasibility. - proposing and prioritizing some management levers based on the experience of other sites and international recommendations from the FAO. - community building. Based on the scoping phase, the NWMed is now entering into the second phase of the ESE "Data and representation". Some data have already been acquired from the French Office for the Biodiversity (OFB) and other data coming from the GFCM and the DG Mare are still pending due to the change in European standards on data sharing for VMEs. The data will be used to identify the VME hotspot (current data) and eventually develop a Habitat Suitability Model as recommended by the experts and NWMed ESE developers (questions 1-7-50-51 of ESE Framework, (see https://ese.tools4msp.eu). The data screening step will be of prior importance to fill the Feasibility criteria. Once the data have been acquired and their quality assessed, an additional workshop with CoP members and expert is planned to refine the approach to species-specific levels for those species declared to be of priority interest in the interviews, following the iterative process recommended by the ESE. The efficiency of ESE application will highly depend on the capacity to gather the necessary data to move on to the next ESE step.

Description of the site-specific planning solution	Concerning VMEs, the site-specific solution mainly focusses on enhancing our knowledge on species distribution by collecting as much data scattered in different organisms and by evaluating the feasibility and relevance of modelling approaches. In the context of the MSP4BIO project a questionnaire was developed to gather up-to-date expert knowledge to build a common working basis between Italy and France. As a first step, it aims to define and agree on a common working framework between scientists from both countries. These questionnaires were already used as a discussion basis to organize a workshop (October 25th, 2024) dedicated to the creation of a community of stakeholders in favour of VMEs conservation through Strong Protection Zones. One of the first results of this ongoing study is the agreement on the definition of VMEs and on what is considered a "deep" ecosystem (below 200 m). Nevertheless, there is no clear agreement on the list of criteria established by the FAO to define VMEs except those related to Functional role and Sensitivity, at least considering human stressors. There are some issues about finding a common definition and methodology to define the health status of ecosystems, especially for VME, and regarding climate change impacts incidence and monitoring. Regarding VMEs conservation some prioritisation criteria were identified in the literature, such as: Area with high species diversity, Presence of indicators species, Presence of umbrella species, Conservation status, Functional importance. Several other criteria were proposed, such as Economic criteria, Optimization criteria, Connectivity criteria, Stability criteria, Restoration criteria, Pragmatic protection. The new proposed criteria lead to the discussion that for new designation strategies an emphasis should be put on the role of connectivity of populations (sources and sinks) but also on designation objectives (global or per area) as the goal of 10% protection could be mutually reached (coordination at larger scale) or reached per MPA (small-scale). As an example, for connectivity, the importance of protecting both connected and isolated populations was discussed, fostered by studies in the NW-Med of shallower species (i.e. gorgonian) for which a lot of data and modelling works are already available. In the French-Italian transboundary context, the waters around Corsica were found to be crucial for transboundary protection strategies whereas poorly managed with insufficient restrictions. Regarding VME indicators, presence/absence data are fundamental but there is an urgent need to develop VME abundance indicators, which are still lacking and for which it is possible to work at finer scale. It is still difficult for most of the species because of the current level of knowledge, but it should be promoted as it is possible to develop some indicators based on the

	MEDITS surveys. Prediction of abundance is harder to estimate on a basin scale (large scale) but in more local areas and waters, it is easier. It has also been highlighted that the present scarcity of data should be complemented with models. Finally, effectiveness of conservation measures on VMEs was discussed. To prevent from the most important threat which comes from bottom fishing, they should consist in permanent fishing closures, considering the very slow recovery of these species, rather than temporary closures (several months a year). Concerning Cetaceans, although difficult to be assessed, distribution is quite intensively studied so that MSP4BIO couldn't bring added value on this aspect. It has been decided to progress on conservation options that could be foreseen in the context of the NWMed management (MSP implementation, MPA designation, international agreements such as Pelagos sanctuary or the recent Particularly Sensitive Sea Area declaration). **Different kind of approaches could be undertaken regarding cetaceans' conservation**: 1. Measures could be designated to prevent direct impacts on the animals, others could address habitat suitability for cetacean populations (reducing pressures such as noise or pollution and preserving trophic resources). Although both kind of measures are important, there is an urgency to mitigate direct impacts due to the conservation status of cetacean populations. 2. Measures could be site-based to address issues for species at stake in a specific area (e.g., preserving life-cycle essential habitats). Other pressures should better be addressed through sector-based regulations implemented in larger areas. An efficient cetacean conservation strategy must rely on an articulation of these different instruments depending on species, threats and the ability to properly implement and monitor designated measures. Recommendations were made about sectorial regulation approaches and site-based protection designation. Stable distribution areas should be emphasized when thinking about site-based protection. However, changes in long-term trends should also be anticipated, particularly with regards to climate change influence. Other areas of interest, known as functional areas for cetacean populations, could be identified as relevant for site-base protection. Moreover, to protect highly mobile and/or migratory cetacean populations should be large enough to cover animals' movements and to avoid "edge effects". Finally, it should be noticed that site-based regulations and sector-based measures are not mutually exclusive and should be used in a complementary way:

	sector-based global regulations completed by punctual specific measures on specific sites. To address both topics (VMEs and Cetacean), a participatory mapping tool has been set up as a DST. It is based on the Geolittoral Cerema's web platform from which a specific MSP4BIO module has been designed: https://geolittoral-data.cerema.fr/portal/apps/experiencebuilder/experience/?draft=true&id=28fa77d83c284e328913eb9931f50f8c It allows to look at the available data gathered and to suggest areas with regards to their interest for designating new regulations. It remains open to support further discussions. To sum up, the test site solution mainly relies to ESE1 to gather and synthetize adequate ecological knowledge (data and criteria) to support decision making. The ESE Scoping practice focuses on the clarification of the analysis framework based on the most up-to-date knowledge in relation to ongoing conservation initiatives. In the case of the NWMed test site, the up-to-date knowledge was collected through interviews carried out among a panel of scientists in both countries identified as experts and through a workshop organized the 24th of October 2024 (more details in the resume). This work is still ongoing, but these exchanges begin to draw the analytical framework by filling the ESE main elements. The trade-off analysis (ESE3) was addressed globally at the test site scale and is about to be spatialized thanks to the participatory mapping tool (DST). The exercise was focused on the enlargement of the network of Strictly Protected Areas (SPA) within the Pelagos sanctuary by addressing marine mammals' conservation targets, complying with France and Italy's national targets. Trade-offs were identified, primarily conflicts between marine mammal conservation and the continuous development of maritime traffic. To avoid these conflicts, several mitigation measures could be applied, such as traffic deviation or speed limitation. These measures could have a significant economic impact on the sector, and there are few arguments to reduce or compensate for it. Cetacean presence alert broadcasts could be a way to reduce the economic impact by enforcing mitigation measures only when necessary. Fuel consumption reduction due to speed limitation could be an argument, but it is very limited. Additionally, spatial protection and associated measures should be implemented on a transnational scale to be effective. Mitigation should be addressed through international regulations such as PSSAs, which are lengthy and complicated to elaborate and agree upon. Finally, efficiency of conservation measures (ESE3) has been discussed among stakeholders involved in the CoP.

Integration of MPAs in MSP	Concerning the "Strict Protection", it should be noted some variation between approaches undertaken in the different countries and definition set by EU. According to EU (criteria and guidance for protected areas designation – SWD (2022) 23 final), Strictly Protected Areas are "non-intervention areas". Although some non-intrusive activities could be allowed (authorizations must be defined on a case-by-case analysis), it means that only non-extractive uses could occur (i.e., complete ban on fishing activities). However, French and Italian strict protection definitions are more flexibles although they are not fully aligned. According to these definitions, some fishing activities could be allowed if they don't affect significantly the environment and are considered as sustainable (small-scales fisheries for example). Moreover, the nature of protected environmental features should be considered. For example, in an area designated to protect deep habitats, bottom fishing must be banned but not pelagic gears. This fundamental difference in definitions could constitute a policy barrier and should be considered when thinking of cetacean conservation measures in the Mediterranean Sea. In French waters, there is an expectation that strictly protected areas are designated within perimeter already designated under an MPA categories recognised by the French law. The ongoing MSP process considers the already existing MPA network and serve as a support for consultation on strict protection designations, that eventually must be integrated within plans. In Italy, the recently approved MSP plan should serve as a guidance for upcoming protection setting regarding the area recognised of priority importance for nature conservation. It has also been noted that large transboundary MPAs such as Pelagos sanctuary could enhance cooperation (among neighbouring countries and among different stakeholder categories) to reduce pressures on cetaceans: by promoting or facilitating agreements on sector-based regulations or being the starting point for protected areas designation, at local or global scale. We can note that the process that led to the recent PSSA designation was launched thanks to exchange promoted by Pelagos sanctuary.
Stakeholders (CoP) involved in the site-specific planning solution	The CoP set for the NWMed test site gather scientific experts, NGOs, MPA mangers as well as competent authorities in terms of marine conservation and planning. These stakeholders are deeply involved in ongoing management processes and are actively working on these questions. Hence, MSP4BIO contribution was focussed on supporting ongoing processes rather than proposing new management scenarios.

	CoP members were particularly asked to provide their feedback and comments on the proposed perspectives to enhance ecological knowledge (ESE1) and to contribute directly to the participatory mapping tool (during the last interaction and remotely afterward). The main elements discussed during the workshop were selected according to the ESE framework (i.e., redefinition of management objectives, of context scale, of commonly agreed spatial and temporal scale, ecological approach, management tools to be used to reach the management objective, the bio-ecological targets, some criteria to prioritize species for conservation, the macro-criteria and the methodologies to be used to answer the question and the selection of pressures to be included in the analysis process). Most of the elements were agreed between the participants except the bio-ecological priorities for VMEs as there is a great lack of knowledge and because of the difficulty to identify to the species level for some taxa. An approach based on hotspots was promoted and considered as sufficient as prior approach for the main management objective commonly defined (i.e. identifying some areas of prior interest for SPZ creation).
Governance context	Management perspectives looked at by the project should be implemented under both the two national frameworks for MSP and marine conservation and through a further cross border cooperation that could be supported by existing international initiatives such as Pelagos or PSSA. At national level, recommendation should be addressed by authorities in charge of marine conservation (environment ministries in France and Italy) and MSP authorities (environment ministry in France, transport ministry in Italy). On national waters, MPA are considered as the most relevant tool to manage cetaceans and VMEs. This particularly true for VMEs for which strict protection (e.g., Strong Protection zone or fishing restricted zones) is considered sufficient by experts if the duration of the protection is in line with species slow growth (e.g., corals). Beyond national waters, in the NWMed, Fisheries Restricted Areas (FRA) established by the GFCM is considered the most relevant tool for VME protection. More synergies between VME conservation and fish fauna conservation should be included in the thinking process. For cetaceans, the speed limit reduction is highly promoted especially in key life-cycle areas.
Possible challenges/risks/barriers and potentials/benefits related to the implementation of the	Solutions discussed will need to be considered by national relevant administration so there is a risk of being confronted to important trade-offs with maritime sectors (especially marine traffic and industrial fisheries) demands or to a lack of political will. Nevertheless, protecting VME as habitats and cetaceans will be of

site-specific planning solution	prior importance for the maintenance of trophic networks and so, at the end, for fisheries and tourism. Proposed priority areas offer a starting point for upcoming discussion on strict protection designation. Moreover, the transboundary coherence of those is quite new at this step of the process. Usually, cross-border interactions rather happen as a consultation step at the end of the planning process.
Opportunities and enablers for replicability /transferability and scaling up of proposed solution to other sites and beyond Potential challenges related to applicability of ESE testing results, transferability and scaling up of the planning solution	Data collection on VME is not strictly limited to the test site perimeter. This effort could serve conservation approach in a broader area. Moreover, methods to evaluate VME distribution thank to modelling approach could be capitalized and reused elsewhere. In the Med, the access to the Medit database which gather the majority of VME occurrence records is a key enabler to upscale the modelling approach at the basin scale. Other similar databases exist in the other sea basins. Concerning the reflexion on management solutions to address strong conservation expectations. Concept could be shared and considered in any maritime area. However, solutions should be confronted to each local context in terms of environmental regulation. The methodology developed to answer management needs is replicable to other test sites, but the tools used are site-specific because of data availability and the high resolution necessary to answer management needs but could be adapted with a sufficient knowledge of another site.
Recommendations for uptake and scaling up of the results in the test site to the regional level and relation with the regional strategies	ESE methodology has been implemented in a quite complex context in the NWMed (ongoing MSP consultation or MSP plans just adopted, transboundary context, multiple stakes and issues) with the objective to bring an operational support on the current marine policies elaborated and implemented. The participatory mapping tool developed through the project will be maintained after its end to allow stakeholders and scientists to suggest other areas to be protected and to support States' administration in the development of the strict protection network. In particular, the methodology employed in the NWMed was used to cast three possible future scenarios at the regional level and in the transboundary area to consider different assumptions and respond to different objectives, which are: **1. Slow Pace (SP):** the development of the area follows current trends, with a slow development of innovation elements and a limited emphasis on marine ecosystem protection and conservation, which are however consistent with the current policies and regulations; **2. Nature@Work (N@W):** based on the precautionary principle,

	which results in less acceptance of the risk of interaction between activities, and with the aim of reducing/avoiding adverse effects on the marine ecosystem, existing protected natural areas are enlarged, and stringent measures are put in place to protect, conserve and restore valuable and vulnerable marine ecosystems; **3. Blue Development (BD):** due to the rapid development of innovative solutions in blue economy sectors, increased acceptance of the risk of interaction between activities, "building with nature" solutions enable synergistic interaction between blue economy activities and valuable protected habitats. While the "Slow Pace" scenario follows current developments with little ambition toward blue economy sectors or marine environmental protection goals, the "Nature@Work" and "Blue Development" scenarios have more ambitious goals, exploring possible trajectories in which nature protection or blue sectors in their most innovative aspects are more promoted. Preliminary results from this participatory effort are already providing valuable information to the States administrations, for example showing that the 10% target of strict protection can be reached in the area only by the N@W scenario, even though can get close in the BD one. Moreover, the NWMed test site makes the choice to integrate and emphasise Climate Change (CC) aspects in the scoping exercise done in the framework of the MSP4BIO project. CC incidence is not well described nor assessed for both NWMed priority targets (i.e. Marine Mammals and VMEs) due to the impossibility to integrate well science-grounded projections (e.g. biotic velocities) in the project framework. However, the recent and quick development of knowledge about these species will make it possible in the next years. The exercises made by the NWMed during the scoping phase (e.g. Horizon scanning, interviews and workshops, exchanges with policy officers, data acquisition, models planification) made us identify several short-term opportunities such as the recent change in European data sharing policies for the chosen targets leading to the promotion of more collaborative and open-science approaches, the democratisation of ROV campaigns and the spreading of some modelization aspects (e.g. development of climatic velocities models by the CNR, Habitat Suitability Models from MSP4BIODIVERSITY). The NWMed test site has shown a great margin for improvement in the development of collaborative approaches between the French and Italian projects at different scales and in the development of a framework on which including transboundary research outputs and their translation toward national and transnational authorities. These efforts must be initiated through local collaborations between scientists and authorities to bridge the gap between communities

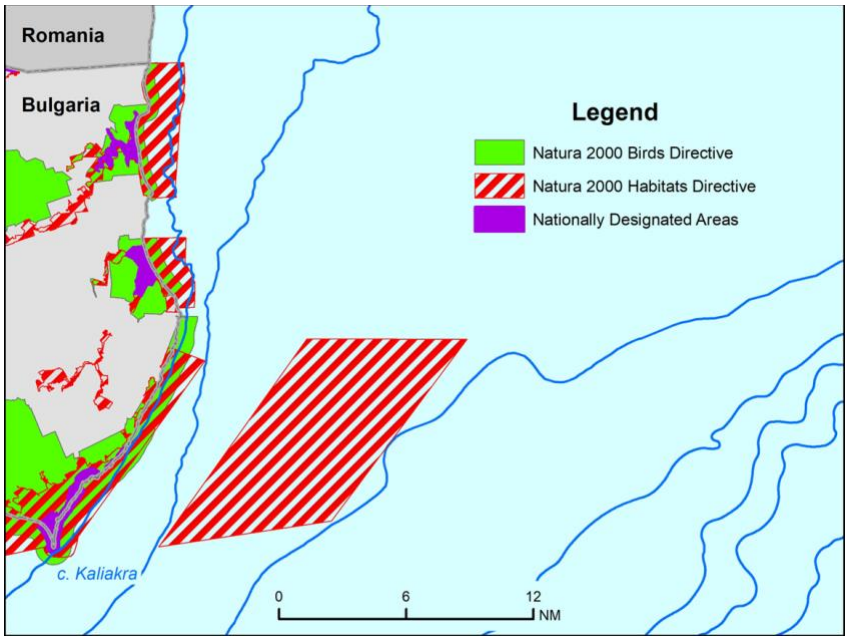
	and disciplines. One of the inputs of the CC guidance of MSP4BIO is the necessity to be proactive and collaborative in the marine management to cope with CC incidence. That is why, the work done by the NWMed test site is of prior importance to make a step forward as it is actually supporting the local community building by connecting the different initiatives identified through workshops and interviews, by proposing both a guidance and a methodology to analyse and synthetise the incoming knowledge and by highlighting some opportunities and gaps that are already used actually to build incoming projects on deep-sea. For example, this project will participate to feed the lack of exploration of part of the test site making the link between previous campaigns in France and in the Tyrrhenian and the Med Sea that will be particularly useful to better assess the connectivity and the deep-sea species dynamics. The work performed by the NWMed test site is so fundamental to ensure a quick and protocoled CC inclusion in the in-development MSP plan in the NWMed and makes the NWMed one of the few test sites turned toward a more climate-smart future. Finally, to make the best use of what has been produced by MSP4BIO, it is also recommended to work with regional and international regulatory organizations such as IHO or GFCM which are relevant to address pressures on cetaceans or on VMEs.

4.6 Report on the solution for the Western Black Sea test site (Bulgarian part)

Title:	Integration of MPAs and MSP by applying trade-off analysis and cumulative effect assessment	**Test site**	Western Black Sea (Bulgarian part)
		Partner (test site leader)	CCMS
Short summary	The Bulgarian test site spatial planning solution focused on the integration of MPAs and MSP by applying trade-off analysis and cumulative effect assessment. It addresses several gaps, the lack of operational management of MPAs, insufficient coherence among MPA designation and MSP process, and the key management question of how to evaluate cumulative impacts and trade-offs in		

	MSP and MPAs. The solution also aimed to identify potential conflicts arising from the proposal to enlarge an existing MPA, facilitate MPAs coherence at national and cross-border contexts, and preserve valuable mobile species (marine mammals). A combination of tools was applied to support the solution: trade-off analysis with SeaSketch Participatory Mapping (ESE3) and CEA Plan4Wise4Blue (ESE1). The focus of testing was on mobile emblematic species, i.e., marine mammals, and existing and future uses that might impact them, such as shipping, fishery, tourism, OWF, and offshore aquaculture. The proposed planning solution was validated with the stakeholders at the 5th CoP Interaction. It can be integrated into the current stage of the MSP process by enhancing institutional and cross-sectoral collaboration, as well as by capacity building on trade-offs and cumulative impacts for MSP and MPA stakeholders, which would be helpful for implementing the solution effectively.
Main focus and objectives of the test site case and the proposed planning solution	The test site includes diverse coastal, onshore and offshore domains, Marine Protected Areas (MPAs) (nationally designated and Natura 2000) and wetlands supporting huge biodiversity, as well as ecosystem services. In total, there are 333.25 km² of MPAs, comprising 11.81% of Bulgaria's MPA network. This site also encompasses one of the most crucial wetlands, serving as a migration corridor for numerous protected birds in Bulgaria and Europe, and hosting one of the rarest ecosystem types with significant national and international conservation value. Beyond its ecological importance, the study area is rich in remains of coastal and underwater cultural heritage. The key species protected in Natura 2000 MPAs are: • Marine mammals: 1351 *Phocoena phocoena* (Common Porpoise); 1349 *Tursiops truncatus* (Bottle-nosed Dolphin); • Fishes: 4125 *Alosa immaculata* (Black Sea herring); 4127 *Alosa tanaica.* The key Natura 2000 MPAs habitats are: • 1110 Sandbanks which are slightly covered by sea water all the time; • 1140 Mudflats and sandflats not covered by seawater at low tide; • 1160 Large shallow inlets and bays; • 1170 Reefs, • 8330 Submerged or partially submerged sea caves. Numerous existing or emerging activities, such as maritime traffic, fishery, offshore wind parks (the area has high potential for offshore wind installations), coastal tourism, scuba diving, kayaking, marine

	aquaculture, military exercises, etc., overlap with the existing and future enlarged MPAs. The main focus and objectives of the Bulgarian Black Sea test site were to: • Identify the conservation priorities to support the expansion/establishment of new and the efficiency of the current network of MPAs; • Harmonise MPAs to integrate in MSP and support a coherent networking to base management actions on prioritisation and ecological criteria; • Shape MSP to sustain and support the evolution of the current conservation plans to have it coherent, efficient and shared (at national and cross-border level). **Expected impacts from the ESE application have been mainly related to:** - Improved local and cross-border ecological and socio-economic criteria for MPAs identification and prioritisation (by applying the adjusted ESE management framework); - Mapping of ecological and socio-economic interactions (pressures, impacts, conflicts/synergies – using trade-off and CEA); - Land-sea interactions and multi-use opportunities have been also considered for coherent implementation; - Mapping of extended or newly established MPAs potential. - Methodological proposal / recommendations for MSP coherence on how to integrate MPAs (at national and cross-border context). **The main objectives of the proposed site-specific solution for the Bulgarian Black Sea test site are:** - To identify potential conflicts arising from the proposal to enlarge an existing MPAs; - To integrate trade-off analysis utilising Sea Sketch Participatory Mapping and Cumulative Effect Assessment (CEA) in MSP by applying one of the developed MSP4BIO ESE1 DSTs – PlanWise4Blue (PW4B); - To promote MPAs coherence at national and cross-border context and preserve the valuable mobile species (marine mammals and fishes).

Geographical scope	 *Figure 17 Location of the Bulgarian Black Sea test site.* The Bulgarian part of the MSP4BIO Western Black Sea test site (cross-border with Romania) is the most northern part of the sea waters of Bulgaria, bordering Romania on the north, Cape Kaliakra on the south, and limits to Contingency zone (24 NM) on the east. Bulgarian Black Sea test site covers 2,035 km², or about 0.5% of the entire Black Sea and 5.6% of the Bulgarian Black Sea waters (Fig. 17).
Describe the gap(s) /challenges and key management questions addressed	Yet, 8% of the Bulgarian sea space is subject to environmental protection, mostly under the Birds and Habitats Directives (Natura 2000). The test site represents one of the best ecologically preserved sea areas, to be proposed for the enlargement of the existing MPAs and to be integrated in the implementation and revision phases of the Bulgarian MSP plan. The test site is also one of the most promising areas for the development of Offshore Wind Farms (OWF). The enhanced protection of ecological features is essential to bolster their resilience against future environmental changes particularly in the Black Sea, where one of the most significant changes in surface seawater temperature has been recorded (CMEMS, 2025).

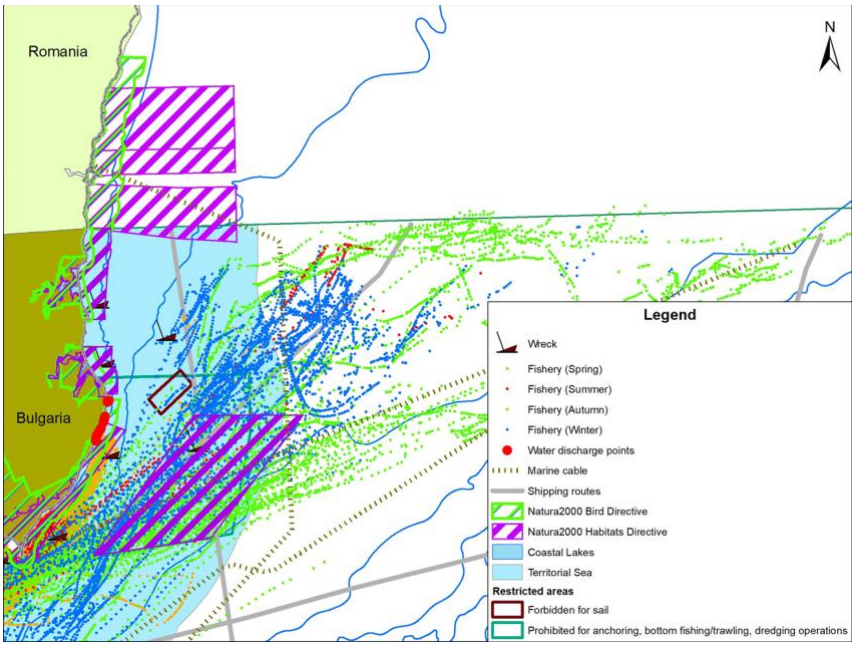


Figure 18 Maritime activities and natural values in the Bulgarian test site.

The current network of MPAs, including nationally designated and Natura 2000 sites, is well established in Bulgaria. However, there has been no operational implementation, management plans, or monitoring to date. The existing protection is deemed insufficient due to the spatial distribution, connectivity, and absence of management plans, as identified during the 1st CoP Interaction for validation of initial analysis and gaps assessment (Withouck et al., 2023). The MPA network still has gaps in valuable/vulnerable biodiversity, ecological corridors, and overall coherence. Offshore habitat protection areas have not been thoroughly explored or designated. The primary challenge lies in ensuring effective management and providing more precise scientific data on species distribution and behaviour. Therefore, an expansion of the existing MPA coverage is necessary.

The key management questions highlighting the main concerns/needs of the test site (prioritized with the stakeholders at the 2nd CoP Interaction and addressed through the ESE framework) were the following:

1) improved integration of social and economic criteria in MPAs identification/ designation;

2) assessing compatibility of maritime uses and MPAs conservation objectives, considering the local context;

3) evaluating cumulative impacts/trade-offs for MSP and MPAs;

4) better integrating the MPAs (extended and new established) in

	the MSP plan/process. During the 4th CoP Interaction in July 2024, the most prioritized and relevant management questions were identified: • ***How to assess compatibility of maritime uses and MPAs conservation objectives, considering the local context?*** • ***How to evaluate cumulative impacts/trade-offs in MSP and MPAs?***
Description of the site-specific planning solution	To answer these prioritized questions, D5.2[9] on adjusted ESE framework proposed utilizing the ESE framework trade-off analysis, the Sea Sketch Participatory Mapping and applying one of the developed MSP4BIO DSTs. For the main management question on assessing cumulative effects, a combination of tools was applied: trade-off analysis with participatory mapping (ESE3) and CEA with Plan4Wise4Blue (ESE1). The focus of the testing was on mobile emblematic species, i.e. marine mammals, and existing and future uses that might impact them i.e. shipping, coastal activities, fishery, tourism, OWF, offshore aquaculture. **1. Testing SeaSketch DST,** including participatory mapping (ESE3) and trade-off exercise were applied and conducted under WP4, Task 4.3, during the 3rd CoP Interaction in November 2023. Trade-offs involving marine conservation, economic, and ecological integrity were discussed, and we explored conflicts of activities and MPAs, as well as compatible areas/uses in the case of extended MPAs and allocation of areas for future OWF development. Climate change issues (using the Sea Sketch tool) and the cross-border context of MPAs coherence and management were also considered. The trade-off guidelines and portfolio of arguments under D4.3 provided a flexible methodology adapted to the local context of the test site. The majority of maritime activities are concentrated onshore, presenting the challenge of limited sea space for existing and emerging sectors to meet the targets of the European Green Deal (EGD) regarding climate change adaptation and the EU Biodiversity Strategy (e.g., development of offshore wind farms and 30% protected areas). The Bulgarian Maritime Spatial Plan integrates marine protection, still the two processes remain separate, necessitating better integration of MPAs into the MSP (Withouck *et al.,* 2023). Additionally, socio-economic criteria should be considered in the designation process of MPAs. In this context, the following elements from the portfolio of arguments were utilised for discussions with the CoP members:

[1] Test sites methodology including the participation strategy, will be available online at the end of the project

- **Trade-off between marine conservation and economic development.** MPAs overlap with fishery, raising concerns as it is a traditional livelihood sector. Shipping also intersects with MPAs, necessitating an offshore shift of the traffic separation system, and impacting marine mammals. Military trainings create conflicts with all economic sectors and MPAs, particularly affecting coastal and maritime tourism, shipping, and marine protection. Expanding or designating new MPAs could restrict economic opportunities for fisheries and tourism sectors. Conversely, an extended network of MPAs could enhance the value of tourism-related businesses, especially those relying on Underwater Cultural Heritage (UCH) activities like scuba diving, by attracting more visitors and fostering multi-use developments, (Stancheva *et al*., 2022).

- **Trade-off between ecological integrity and human uses:** CoP members argued on the need to find a balance between ecosystem conservation and human uses. Human activities such as agriculture, illegal bottom trawling, urbanization, and maritime defence impact the natural environment, leading to habitat destruction and biodiversity loss.

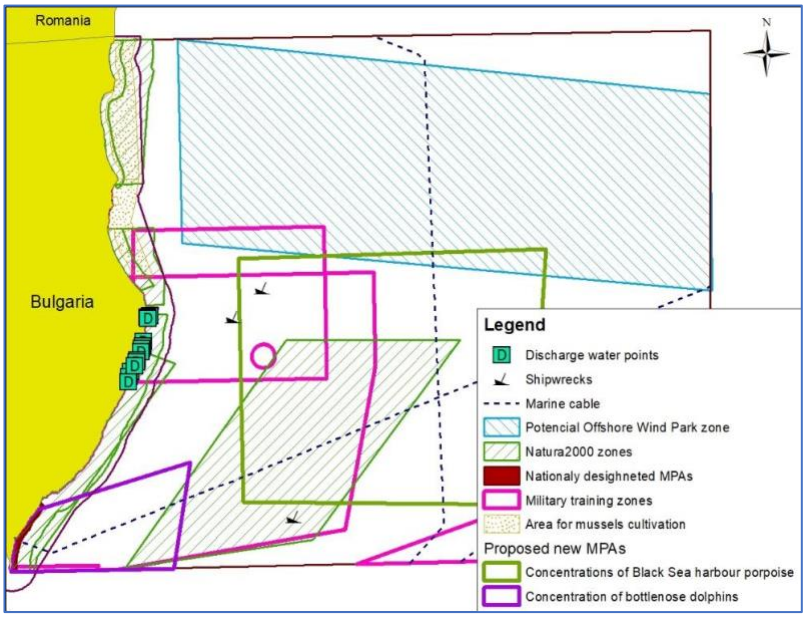


Figure 19 Map resulting of Sea Sketch participatory mapping for proposed new MPAs co-created at the 3rd CoP Interaction.

Synergies co-identified in the participatory mapping survey are shown on Fig.20.

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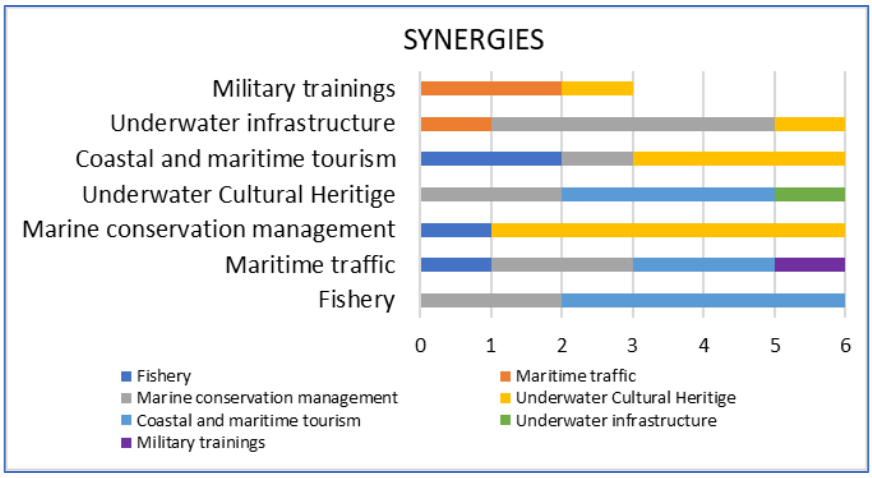

Figure 20 Identified synergies among uses and marine protection.

Fishery sector has synergies with coastal and maritime tourism, as well as with marine conservation management (MPAs). The UCH cooperates with MPAs, coastal and maritime tourism, and underwater infrastructure. The participants indicated that coastal and maritime tourism has synergies with fisheries, MPAs, and UCH. Military training does not have synergies with other uses or protection, but some participants noted a few, such as maritime transport and UCH. Conflicts co-identified in the participatory mapping survey are shown on Fig. 21.

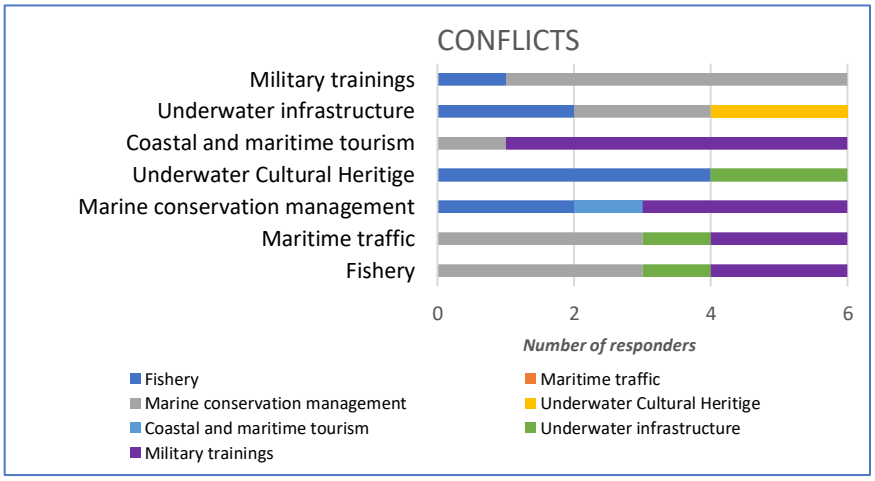

Figure 21 Identified conflicts among uses and marine protection.

The fishery and maritime traffic sector conflict with MPAs as well as with UCH and coastal and maritime tourism. Majority participants indicated that the most conflict sea uses are: i) between coastal and

	maritime tourism and military training; and ii) marine conservation management (MPAs) and military training. The underwater infrastructure conflicts with fishery, with marine conservation management (damages to the sea bottom and disturbance of species during installations), as well as with UCH. Recommendations by CoP members highlighted integrating socio-economic and ecological criteria, systematic planning, and addressing knowledge gaps, particularly regarding marine mammals and climate change in the Black Sea. The most rapidly emerging sector is OWF development, as the test site has the highest potential. The argument that developing OWF is a priority to increase green energy production in accordance with the European Green Deal (EGD) objectives was highlighted by all participants. It was also argued this sector would interfere with conservation actions, affecting MPAs and especially the migration of birds in the test site. **2. Integration of CEA in MSP by utilising PlanWise4Blue (ESE1):** PW4B comprises a combination of tools, such as CEA, designed to provide insights into various ecological and environmental aspects that are crucial for MSP and sustainable development. It provides user-friendly solutions for the assessment of the cumulative impacts of human activities on diverse natural values and resources. **Three scenarios were explored with CEA,** for the three vulnerable mobile species, mammals: *Delphinus delphis, Phocoena phocoeana and Tursiops truncatus:* **- Present (Scenario 0):** corresponds to current human use conditions (military areas, shipping). **- Scenario 1:** cumulative effects of wind farms, aquaculture, representing a future state (planned aquaculture and OWF), while maintaining current shipping and military zones. **- Scenario 2:** Reflects a scenario in which all human uses remain the same, except shipping intensity is doubled in the same areas. The information available for fishing is limited and incorporating MPAs into CEA requires careful consideration. MPAs are zones where most of key human activities are restricted or prohibited, so their inclusion would not typically occur within the CEA itself but rather in subsequent integrative analyses as measures to prevent or reduce impacts. These analyses would integrate CEA results with conservation tools (e.g., MPAs) and other dimensions within a broader MSP framework. It is essential to have a clear understanding of the specific objectives of the conservation measures and, in particular, a semi-quantitative or quantitative assessment of its actual effects on the target species. This is an

interesting consideration for a future exercise.

Due the coarse resolution of the spatial data for three marine mammals and because they are mobile species, the CEA application goes beyond the test site scope and was extended to the Exclusive Economic Zone (EEZ) of Bulgaria and Romania.

In summary, three outputs were obtained (Fig.22, Fig. 23 and Fig. 24). The maps present the results for the alternative scenarios for the three marine mammal species considered.

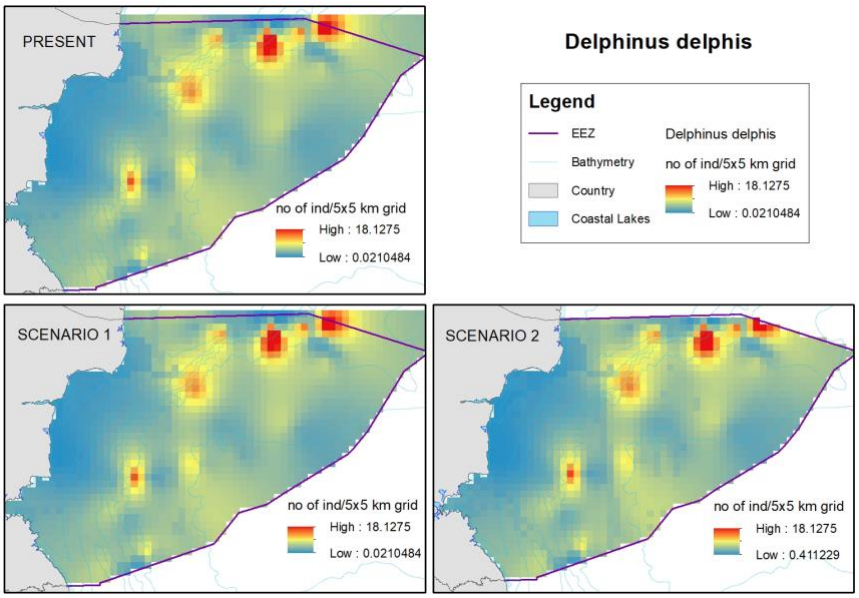

Figure 22 Present Scenario 0 of CEA for Delphinus delphis.

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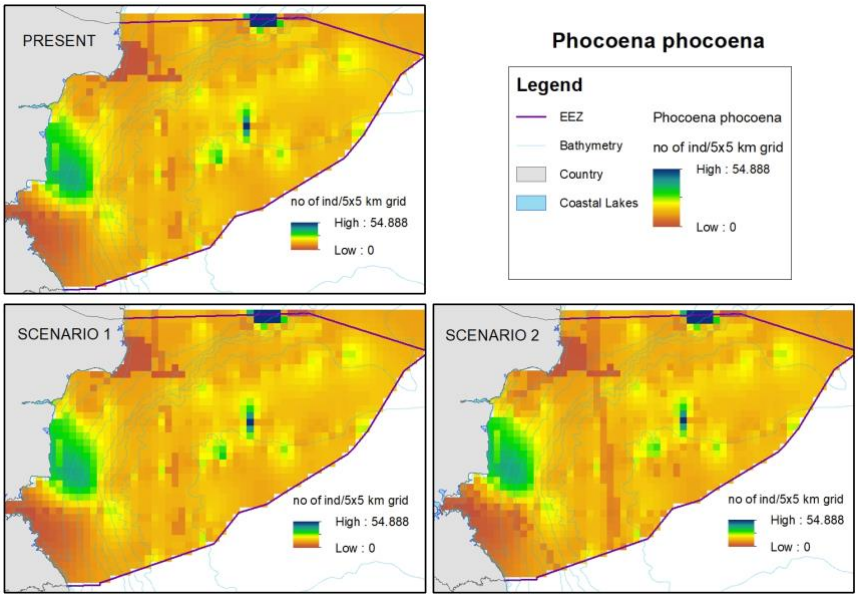


Figure 23 Scenario 1 of CEA for Phocoena phocoeana.

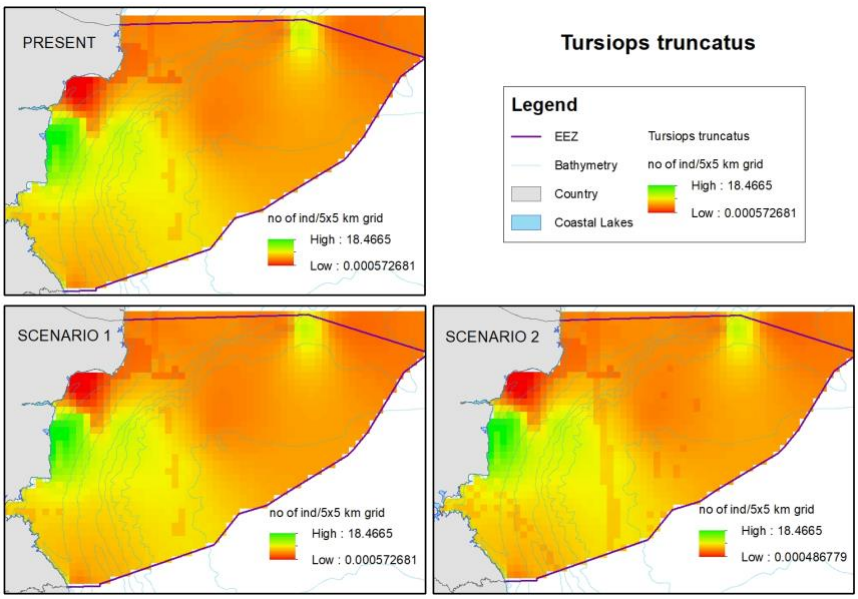


Figure 24 Scenario 2 of CEA for Tursiops truncatus.

All three outputs provide a clear gradient of conditions, including the current situation, the inclusion of planned activities, and their intensification, providing informative alternatives for planning actions.

	Recommendations for shaping MSP coherent with MPAs at national and cross-border scale (based on Ramieri *et al*., 2024**):** 1. Apply a bottom-up approach in MSP to support the development of multi-use, e.g. by using a Community of Practice-based approach, to bring together all stakeholder categories. This requires a multi-step process towards operationalisation of the multi-use from planning to implementation, as well as economic, social, technological, financial, and legislation implications. 2. Multi-use combinations for sustainable aquaculture and fishery should be promoted through MSP, e.g. through co-use with OWE developments. This requires proper feasibility studies and environmental assessments. 3. MSP should take an integrative role in supporting the extension or prioritisation of new MPAs to reach the EU Biodiversity Strategy targets. 4. MSP should be coherent with management measures for protected areas - as defined in the plans specifically set for MPAs, Natura 2000 sites, etc. and to include measures to control pressures in MPAs. 5. MSP should support achieving and maintaining Good Environmental Status (GES) of EU marine waters, as defined under the MSFD, as well as identify and foster actions for marine restoration in line with the EU Restoration Law. 6. MSP should be climate smart and rooted in ecosystem- and science-based principles for sustainable management of the marine environment. 7. MSP should support maintaining environmental pressures within the carrying capacity of marine ecosystems while safeguarding their natural functions. This requires early and thorough assessments of both single and cumulative impacts, and the development of alternative planning solutions to minimise such pressures. 8. MSP should address the impacts of climate change, focusing on enhancing the resilience of marine ecosystems, habitats, and species, while also considering the transboundary dimension and need for cooperation at the sea-basin level. 9. To have the maximum impact of operationalizing Land-Sea Interactions (LSI), MSP plan should be aligned with municipal and sectoral planning, MSFD and WFD objectives, marine nature conservation strategies and policies, licensing regimes, and other sector-based instruments. The multi-level governance framework on LSI also includes cross-border and even transboundary considerations (Stancheva *et al*., 2025). 10. Data harmonisation in MSP and MPAs also needs to be strengthened in cross-border contexts based on project and

	transboundary work already ongoing. 11. MSP should contribute to enhancing regional cooperation on biodiversity conservation, for instance by focusing on cross-border protection needs by thematic cross-border/sea basin projects and established Black Sea CoP. 12. MSP should support the establishment of a coherent network of protected areas at sea and across the land-sea interface, as well as considering blue corridors and connectivity.
Integration of MPAs in MSP	The proposed planning solution can be integrated into the current stage of the MSP process by following measures: **1. Enhancing institutional and cross-sectoral collaboration:** Given the novelty of the MSP in Bulgaria, the MSP and designation of MPAs (which has been implemented longer than MSP) are not linked. The establishment, designation, and management of MPAs is a separate process from MSP and is regulated by environmental legislation. The future enlargement of MPAs within the MSP will be addressed upon the legal adoption of new MPAs. While the designation of MPAs is outside the scope of MSP, the plan provides political support for achieving the 2030 targets of the EU Biodiversity Strategy, to extend EU sea protection to 30%, with 10% under strict protection by 2030. By embedding biodiversity priorities into the MSP framework, sectors such as fishery, shipping, and offshore energy can be regulated to minimize their impact on MPAs. **2. Applying trade-offs in MSP for MPAs prioritisation and designation (using SeaScketch and participatory mapping):** Bulgarian MSP plan includes multifunctional zones for compatible uses but does not reflect the issues of potential trade-offs when extended or newly established MPAs should be integrated. The trade-off results provide insights on potential conflicts while also identifying opportunities for highlighting priority conservation areas. **3. Supporting adaptive MPAs designation and coherence**: Integration of trade-offs and CEA in MSP encourages a dynamic approach to MPA designation, through which static spatial conservation measures can remain functional and support ecological resilience in the face of climate change impacts. This is particularly relevant in addressing transboundary/cross-border pressures and ensuring connectivity between MPAs. The uptake of adaptive MPAs designation is foundational to the uptake of climate-adaptive management and a key strength of this management principle is its utility within data-poor management contexts. **4**. **Integrating Cumulative Effect Assessment (CEA) in MSP**: The use of tools such as PW4B is key for supporting spatial planning by quantifying the spatially explicitly cumulative human

	impacts on key ecosystem features. It assists in considering trade-offs between alternative management strategies and scenarios in support of joint decision-making. The CEA supports planning of sea activities to minimise adverse environmental effects, to advise effective mitigation strategy and ultimately to attain sustainable planning solutions. **4**. **Capacity building and training in trade-offs and CEA for MSP and MPA management**: Capacity building on trade-ffs and cumulative impacts for MSP and MPA stakeholders would be helpful for implementing the solution effectively. SeaSketch participatory tool helped discussions on the spatial scale (local and cross-border) need for the enlargement of the MPAs network and their improved integration in MSP. The use of SeaSketch is highly valuable for both area diagnostics and allocations. For the implementation and revision phase of Bulgarian MSP, the SeaSketch / trade-off survey and discussions are very timely and helpful.
Stakeholders (CoP) involved in the site-specific planning solution	Originally 18 stakeholders' representatives were invited to join the CoP in Bulgaria. They have represented various institutions and various governance levels from ministries and administrations responsible for MSP and for MPAs management, up to environmental NGOs, local fishers' associations and maritime museum. The competent MSP and MPAs authorities are involved in the Bulgarian Black Sea CoP. At the 4th CoP Interaction, conducted in July 2024 for demonstration and validation of the initial draft of ESE management framework, the CCMS team presented the MSP4BIO developments and DSTs, as well as demonstrated the online version of the ESE Platform. To engage a broader stakeholder community beyond the CoP, participants from Bulgaria, Romania, the United Kingdom and Belgium, along with key actors from the Black Sea region, attended the meeting and actively contributed to the discussion. At the 5th CoP Interaction for consultation and co-validation of the proposed site-specific solution, conducted January 2025, mostly the key CoP members, including MSP authorities and MPAs managers, governance, environmental organization, business (aquaculture) and representative of FAMENET (Fisheries and Aquaculture Monitoring, Evaluation and Local Support Network). All expressed their interest in adopting the solution and utilising the applied tools in MSP and marine conservation. They also expressed a request for more frequent communication regarding the current results and deliverables of MSP4BIO. Based on the feedback, it was clarified that the development of one single sea plan for the management of MPAs is under way. There

	is a need for spatial planning of MPAs, more restoration measures and activities, and considering trade-offs for avoiding spatial conflicts. Additionally, there is a need for more EU-funded projects, especially at the regional level, for harmonization of data and methodologies with more practical results to complement the national initiatives for MPAs, deployment, and uptake of the results. An update and revision of the MSP Plan is envisaged to be conducted until next 2026 year. The planners find the solution and the results feasible and important for integration into the revision of the Plan. Applying the trade-offs and CEA would be undertaken in the practical use of this revision of the MSP Plan.
Governance context	The Competent MSP Authority is the Bulgarian Ministry of Regional Development and Public Works (MRDPW). The Competent MPAs Authority in Bulgaria is the Ministry of Environment and Water (MOEW), which governs the designation and management of the Natura 2000 and national MPAs in Bulgaria and the implementation of MPAs management measures. Both competent authorities have been involved in the Bulgarian CoP and actively involved in the co-creation and co-validation of the specific solution. The MSPlan provides a strong governance framework supporting the implementation of the proposed solution through the integration of the EU and national legislative frameworks and strategies. The plan was approved in May 202, and the first revision is now anticipated to accommodate the new EGD targets. The MPAs and MSP processes are still not well linked (MPAs establishment, designation and management is a separate process from MSP and is regulated/guided by environmental legislation (Protected Areas Act, 1998 and Biodiversity Act, 2002). The need for better coherence between the MPA network and spatial planning was also highlighted by the respondents in all interactions with CoP members. On the other hand, the policies in the area concerning MPAs were considered to be adequately reflected ad integrated in the MSP.
Possible challenges/risks/barriers and potentials/benefits related to the implementation of the site-specific planning solution	**Challenges/barriers:** - Spatial overlapping with emerging human activities in the offshore areas such as OWF and aquaculture, and potential conflicts with marine conservation. A national project has been initiated for the enlargement of mammals MPAs, primarily in the offshore area (EEZ), as the onshore areas are crowded with human activities and there are many conflicts. However, there is still a lack of strict protection and even a definition of strict protection in national legislation. Proposals have been made for the extension of the mammal MPAs network, and data used for the tool application are crucial for obtaining more precise results.

	- There is a need for strong motivation and justification for the enlargement of MPAs at a cross-border level and clear evidence on what should be protected. - Out of date legislation; lack of management MPAs plans. Currently, there is a development of a single sea plan for the management of MPAs. - Operational implementation of multi-use and trade-offs in MSP, considering all stakeholder interests is still a challenge. Multi-use is considered a possible way forward, but the practical implementation of space and resource sharing could be challenging or even impossible when activities interfere with one another. Further work is needed on the full operationalisation of multi-use (Arki *et al.,* 2024). - Data gaps and accuracy availability for CEA application, as it is a data demanding tool. The most evident information gap is the general lack of spatial data on nature assets (species and habitats) and ecosystem processes at a resolution suitable to support MSP. - There is still lack of sufficient digital knowledge and mapping skills to properly implement Sea Sketch. - A set of scenarios and ecological and socio-economic criteria are required to define the complex multi-criteria framework to employ the trade-off analysis in MSP for MPA prioritization. **Benefits**: - Trade off analysis and the interaction with the stakeholders to participate – engage all categories. - Conducting SeaSketch participatory mapping survey for trade-off analysis was a great platform that led to important discussions and opportunity to capture different feedbaFck on certain trade-offs by the CoP members. Participatory mapping surveys are also another way to obtain more data and inputs for the test site and scenario for MPAs enlargement The survey also helps to support better collaboration between MSP and MPA managers and other stakeholders (CoP). - The use of Sea Sketch tool is highly valuable for both area diagnostics and allocations. The tool provides a platform for systematically planning new uses and activities that may potentially develop and can be used to incorporate transboundary and cross-border information and data on sea activities, ecological features and MPAs. - In evaluating the cumulative effects of human activities on marine ecosystems, PW4B's CEA serves as a key tool. Compared to other CEA tools, it surpasses traditional assessments by utilising the latest scientific knowledge to comprehensively assess the impacts of human activities on natural values (Kotta *et al.,* 2020; Kotta *et*

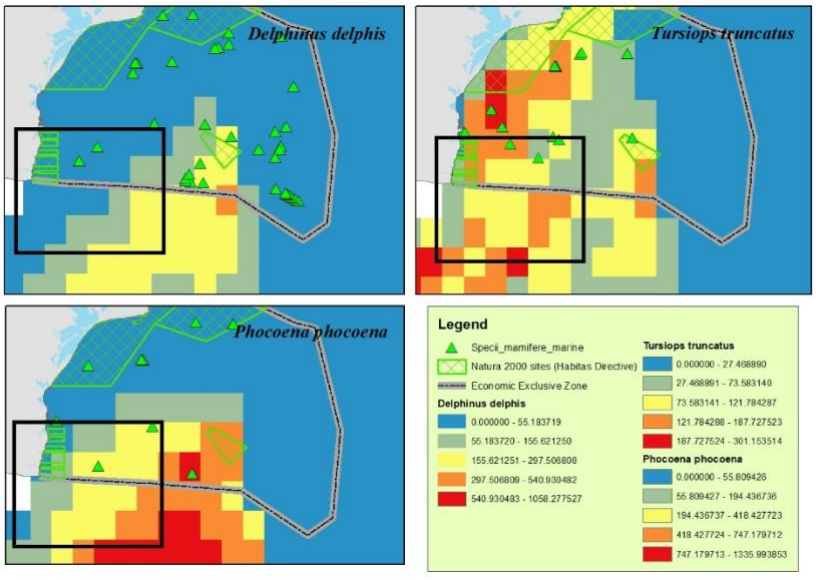
	al., 2024). - Data resolution limitations can be easily alleviated as CEA assessments can readily incorporate new knowledge and data as they become available. Moreover, the CEA matrix can be used to inform managers of current knowledge gaps, enabling them to address these limitations more effectively.
Opportunities and enablers for replicability /transferability and scaling up of proposed solution to other sites and beyond Potential challenges related to applicability of ESE testing results, transferability and scaling up of the planning solution	**Enablers**: The proposed site-specific planning solution, based on trade-off analysis, presents significant opportunities for replicability and transferability to other test sites and beyond. This is due to its structured approach that encompass ecological and socio-economic considerations using the integrated ESE framework, particularly the ESE1 and the ESE3.The methodologies employed, such as participatory mapping, stakeholder engagement and trade-off method through the CoP, can be adapted to various coastal and marine environments, fostering collaborative decision-making and planning. Trade-off analysis is helpful to bring together diverse quantitative and qualitative information and data for MSP and MPA management to rank development scenarios based on stakeholder's perception and values. The Sea Sketch tool can be used to incorporate transboundary and cross-border information, and data on sea activities, ecological features and MPAs at the Black Sea regional level. The PW4B model offers numerous advantages for its users. First, it is open source and therefore publicly accessible. Second, it integrates key economic sectors with various natural assets and their ecosystem services, facilitating the quantification of CEA assessments. The values of ecosystem services encompass provisioning, regulating, and maintenance services. Third, the tool is versatile, allowing users to select input data on pressures and natural assets, both actual and theoretical. While PW4B currently focuses on the Baltic Sea, the tool can be easily adapted to other regions if the necessary data is available, as was demonstrated in the present application. Recent developments within the MSP4BIO project have significantly enhanced selected DSTs or produce new ones, providing a diverse set of solutions of universal application for CEA, prioritization and optimization of area-based conservation measures, and climate change analysis (Kotta *et al.,* 2024).

	Challenges: Potential challenges related to the applicability of ESE testing results are data availability as well as lack of sufficient digital knowledge and mapping skills. Scarcity of trained human resources within the official institutions to use the SeaSketch and CEA tools. Furthermore, scaling up the planning solution requires overcoming barriers such as the political framework and inconsistent support of MSP efforts, insufficient knowledge on social dimensions, insufficient stakeholder engagement in the diversity of stakeholder's groups or in their contribution to the planning process from the initial steps, political commitment to ensure successful integration of MSP and MPA frameworks in national and cross-border contexts.
Recommendations for uptake and scaling up of the results in the test site to the regional level and relation with the regional strategies.	1. To facilitate the uptake and scaling up of the results from the Black Sea test site to the regional level, it is crucial to align the proposed MSP and MPA management integration with existing regional strategies, such as the Black Sea Convention and the Common Maritime Agenda, as well as with the European Biodiversity Strategy and EGD, involving also the non-EU countries. 2. Capacity-building initiatives should be implemented to empower local stakeholders with the knowledge and tools necessary for effective participation in MSP and MPA processes. Engaging in continuous dialogue with regional key actors, such as Black Sea Commission and the BSEC will ensure that the innovative approaches and insights gained from the test sites are reflected in broader governance frameworks. 3. The trade-off approach could be utilised to enhance and facilitate the wider stakeholder involvement in the MPA/MSP decision-making at national level and develop consensus-based approaches to MPAs management and coherence at cross-border and transboundary regional level. 4. Establishing a regional Black Sea Community of Practice (CoP) by creating a network to share best practices and lessons learned across similar coastal and marine areas can promote wider adoption of successful strategies ultimately fostering sustainable development and ecological resilience throughout the region. 5. The MSP4BIO cross-border site developed a solution to integrate MSP and MPAs, to support coherent networking, shape MSP to sustain and evolve current conservation plans to be coherent, efficient, and shared at both national and cross-border levels. 6. Strengthened integration between MSP and MSFD (and related national Programs of Measures) through a common regional

	approach was also considered highly relevant by the CoP members. 7. Transboundary collaboration should be strengthened to involve also the non-EU countries; this could act as a flywheel for more funding opportunities, EU-funded projects, and regional initiatives on the MSP-EGD nexus, including its linkages with MPA planning and management (Ramieri *et al.,* 2024).

4.7 Report on the solution for the Western Black Sea test site (Romanian part)

Title:	Applying cumulative effect assessment	**Test site**	Western Black Sea (Romanian part)
		Partner (test site leader)	NIMRD
Short summary	The Romanian part of the Western Black Sea PS is a developed sector with both environmental and socio-economic uses, experiencing increasing land-based and marine pressures mainly due to population growth, urbanization, tourism and leisure activities, industry, transportation, and fishing. The need for space in marine areas generates multiple conflicts, such as those between environmental protection and fishery/aquaculture, fishery/aquaculture and maritime transportation, and touristic and leisure activities and infrastructures overlapping MPAs or fishing grounds. Following the CoP members' consultations, the specific gaps and needs for the test site were formulated, resulting in key guiding management questions concerning the compatibility of maritime uses and MPAs conservation objectives, and the need to assess cumulative impacts. The planning solutions identified include: **1. Participatory mapping** (using SeaSketch and ArcGIS), and stakeholder engagement methods. These were used to collect data on marine activities, areas of interest for habitats with high ecological value and species (such as marine mammals), conflicts and synergies, and future uses of marine space.		

	2. Cumulative Impact Assessment: Using the PlanWise4Blue (PW4B) CEA tool to quantitatively assess the individual and combined impacts of human activities on natural values. The DST was applied to evaluate effects under present (considering selected human activities) and future conditions. The future conditions included one scenario with planned activities like aquaculture and wind farms, and another scenario assuming the intensification of some activities identified during the consultation process.
Main focus and objectives of the test site case and the proposed planning solution	The Romanian part of Wester Black Sea Pilot Site located between Tuzla Cape and Vama Veche from the shore to 50-60 m depth cover approx. 2300 km^2. The landscape consists of low-lying shores (sand barriers, pocket beaches) and relatively higher shores (cliffs up to 30 m). Typological point of view includes both natural shore (beaches and cliffs and "built" shoreline - ports, protective hydraulic structures). The test site area includes very divers underwater landscapes and biodiversity hot – spots, habitats (some subtypes with very high conservation value) and species of European interest: rocky habitats with *Cystoseira barbata*, *Pholas dactylus* or *Corallina officinalis*, biogenic reefs with *Mytilus galloprovincialis*, *Zostera nolti* meadows, essential habitat for fish, marine mammals -*Tursiops truncatus ponticus, Phocoena phocoena relicta*, Black Sea endemic species - *Alosa immaculata (*Pontic shad*)*, *Alosa tanaica (*Black Sea shad*)*, also sturgeon species.  *Figure 25 Marine mammals (population estimation), data source: CeNoBS project.*

In term of biodiversity, the current protection is appropriate (more than 50-60% of the study area is part of an MPA, the designation being based on ecological criteria with emphasis on uniqueness or rarity of ecosystems, diversity and representativeness of habitats, occurrence of threatened species and habitats and preserved naturalness, aiming the biodiversity conservation and maintenance of vital ecological processes.

The test site area is heavily anthropized – urbanization, harbor activities, industry, and tourism. The main activities are related to maritime transport (Mangalia Port – commercial, touristic, and military), tourism activities and infrastructures, fishing activities, extraction of hydrocarbons (submerged gas pipe).

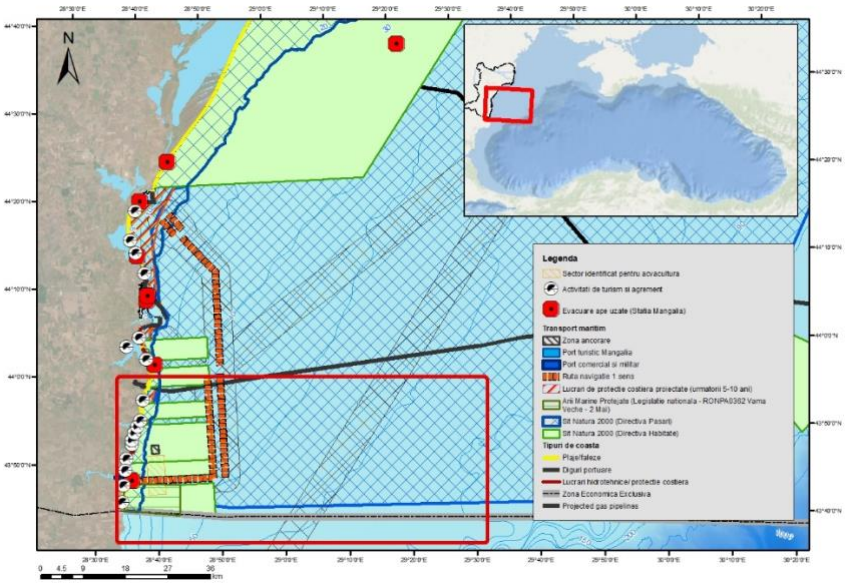
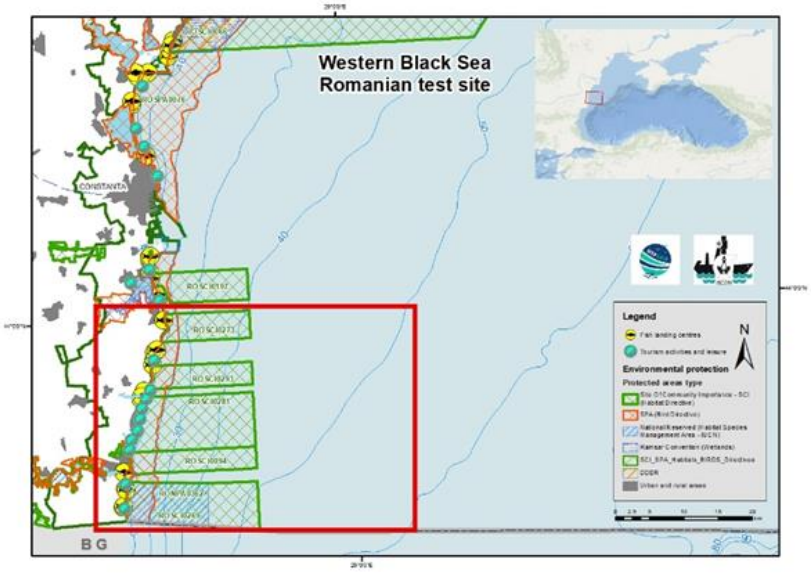


Figure 26 Spatial distribution of human activities.

The preliminary objectives and goals of the test site were:

- Identify the conservation priorities to support the expansion/establishment of new and the efficiency of the current network of MPAs;
- Shape MSP to sustain and support the evolution of the current conservation plans to have it coherent, efficient and shared (at national and cross-border level).
- Harmonise MPAs to integrate in MSP and support a coherent networking (including identification of new ABMTs)

	to base management actions on prioritisation and ecological criteria; An expected ESE impact is a better aligning MSP with the nature protection processes and initiatives. ESE should help in better managing the MPA sites, in particular in integrating socio-economic criteria into MPAs and providing more profound information on the protected species, their spatial requirements and possible adjustments of MPAs locations due to climate change (scientific underpinning of the MPA processes).
Geographical scope	 *Figure 27 Location of Western Black Sea test site (Romania).*
Describe the gap(s) /challenges and key management questions addressed	The main gap in Romania is the lack of management plans and/or regulations or not updated for MPAs expanded/designated after 2010. Out of the total of 5 Marine Protected Areas in the pilot site, 4 of them have Management Plans (not updated since 2010-2011 for SCIs and 2013 for SPA), but only for limited areas (covering 15-20% of the total MPAs). Of the 5 Natura 2000 sites under Habitat Directive in the study area, only 2 have approved regulation documents. MPAs doesn't have established monitoring programs, even it is provided as a measure in the existing management plans. Another identified issue was the lack of custodians - currently in Romania, the management of MPAs is under Ministry of Environment, Water and Forest through National Agency for Natural Protected Areas. The lack of effective custody (only formal from National Agency for Natural Protected Areas) has led to limited or no operational management (without monitoring programs and

	without control of activities in the MPA areas)." Even though the criteria for designating MPAs in Romania are adequate, there are significant gaps in scientific information and data regarding the current diversity of marine species and habitats, their spatial distribution, ecological connectivity, and the impacts of climate change on species, habitats, and ecosystem services. Regarding the coherence between MPAs in MSP processes, although marine protected areas are identified as having a "key" role in protecting coastal and marine ecosystems in MSP, the plan does not allocate space exclusively for marine protected areas. Another key issue is the need for a better understanding of multiple pressures and impacts, as the PS area is important for human activities such as tourism, fishing, and marine transport. The pilot site area is heavily anthropized, with urbanization, harbor activities, industry, and tourism being affected by human pressure from economic activities and population concentration in the area. One of the main activities in the area is navigation, with the presence of Mangalia Port – commercial, touristic, and military – the third most important port after Constanta and Midia. The political context in the Black Sea has led to an increase in both the intensity of commercial transport and the intensification of military training in the area, negatively impacting marine ecosystems. The southern part of the Romanian coast is an important tourist area, but it is also strongly affected by the erosion of tourist beaches. In response, several coastal protection works have been scheduled, including hard coastal protection infrastructures such as dikes, submerged wave breakers, and beach nourishment. Some of these works overlap with Natura 2000 sites and habitats of community interest with high ecological value. The key guidance management questions are: • How to assess compatibility of maritime uses and MPAs conservation objectives, considering the local context? • How to evaluate cumulative impacts/trade-offs in MSP and MPAs?
Description of the site-specific planning solution	The planning solution includes: 1. **Participatory mapping** (using **SeaSketch** and **ArcGIS**), trade-off guidelines, and stakeholder engagement methods. These were used to collect data on marine activities, areas of interest for habitats with high ecological value and species (such as marine mammals), conflicts and synergies, future uses of marine space, and perceptions of climate change. The main goals for the Romanian part of the test site were:

- To identify the conflicts and synergies between various human uses and activities in the marine space within the pilot site.
- To identify areas where marine habitats with very high ecological and conservation value can be protected, and how the establishment of "strict protection" (without any human activities) can interfere with current uses and activities.
- To evaluate whether the development of Blue Economy activities (aquaculture, offshore wind farms, tourism) can create conflicts with current uses.
- To determine stakeholders' perceptions of climate change and how they should adapt to it. To identify where and if it would be convenient to create a transboundary marine protected area for marine mamals.

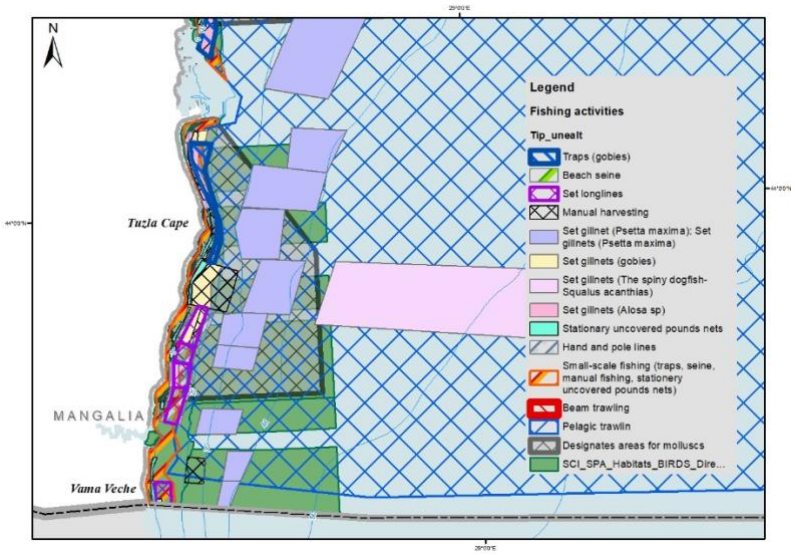


Figure 28 Location of fishing tools collected during stakeholder consultations.

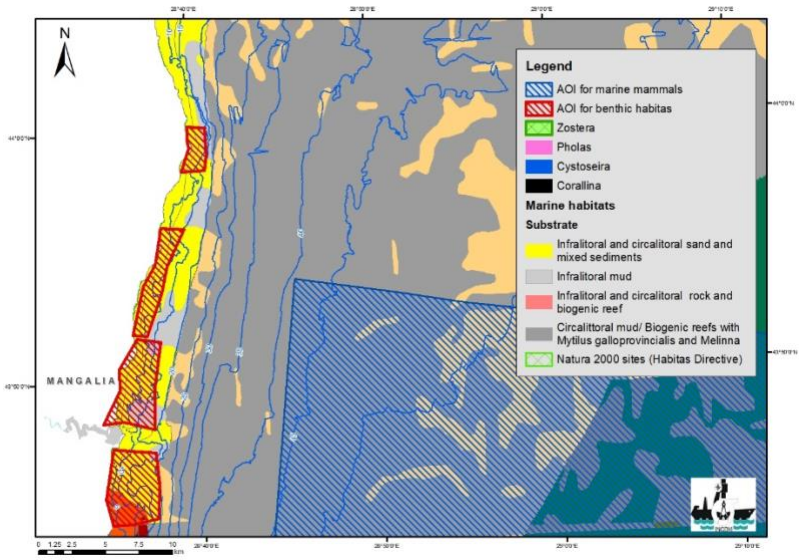


Figure 29 Proposed areas with high ecological and conservation value.

The identified ***conflicts*** generally refer to:

- Marine Protected Areas and other activities – coastal protection works, tourism, fishing, transport, military activities, hydrocarbon extraction.

- *fishing activities and MPAs* – the using of fishing tools that can impacts the seabed integrity, extraction of marine protected species, mollusc harvesting and marine mammals' bycatch.

- conflicts between maritime transport and MPA's which is largely connecting with pollution, marine litter, and invasive species introduction.

- conflicts between military training and MPAs (but not many information available)

Future uses of marine space within test site:

- **Aquaculture** (as an emerging Blue Economy activity) – allocation of areas suitable to carry out mariculture activities were being investigated (In 2024, Romania started the tender procedure for the lease of areas for aquaculture to economic operators).

2. **Cumulative Effect Assessment (CEA)**: Using the PW4B CEA tool - to quantitatively assess the individual and combined impacts of human activities on natural values.

To implement the selected DTS the first step was to conduct a detailed inventory of human activities (based on participatory mapping process) and pressures in the TS area, along with available spatial data. Based on common issues identified in

	Romania and Bulgaria and the data availability, the planning solution assesses the cumulative effects on three marine mammals in three scenarios: • **Present (Scenario 0)**: current cumulative effects of military zones and shipping under current conditions on three mammal species. • **Scenario 1**: This scenario analyses the cumulative effects of wind farms, aquaculture, military areas, and shipping on three mammal species, representing a future state that includes planned aquaculture while maintaining current shipping and military zones. • **Scenario 2**: Reflects a scenario in which all human uses remain the same, except shipping intensity is doubled in the same areas. Two species of marine mammals (*Tursiops truncatus ponticus*, *Phocoena phocoena relicta*) included in Annex II of the Habitat Directive (species of community interest whose conservation requires the designation of special areas of conservation) and one species (Delphinus delphis) included only in Annex IV (species of community interest in need of strict protection) were considered. The spatial analysis was based on the "Number of individuals and distribution of cetaceans in the Black Sea from 2019 surveys" (CeNoBS project) dataset, with a resolution of 5 x 5 km grid. Considering the selected ecosystem component (marine mammals being highly mobile species), the assessment was not limited to the Western Black Sea test site but was extended to the Exclusive Economic Zones of Romania and Bulgaria.

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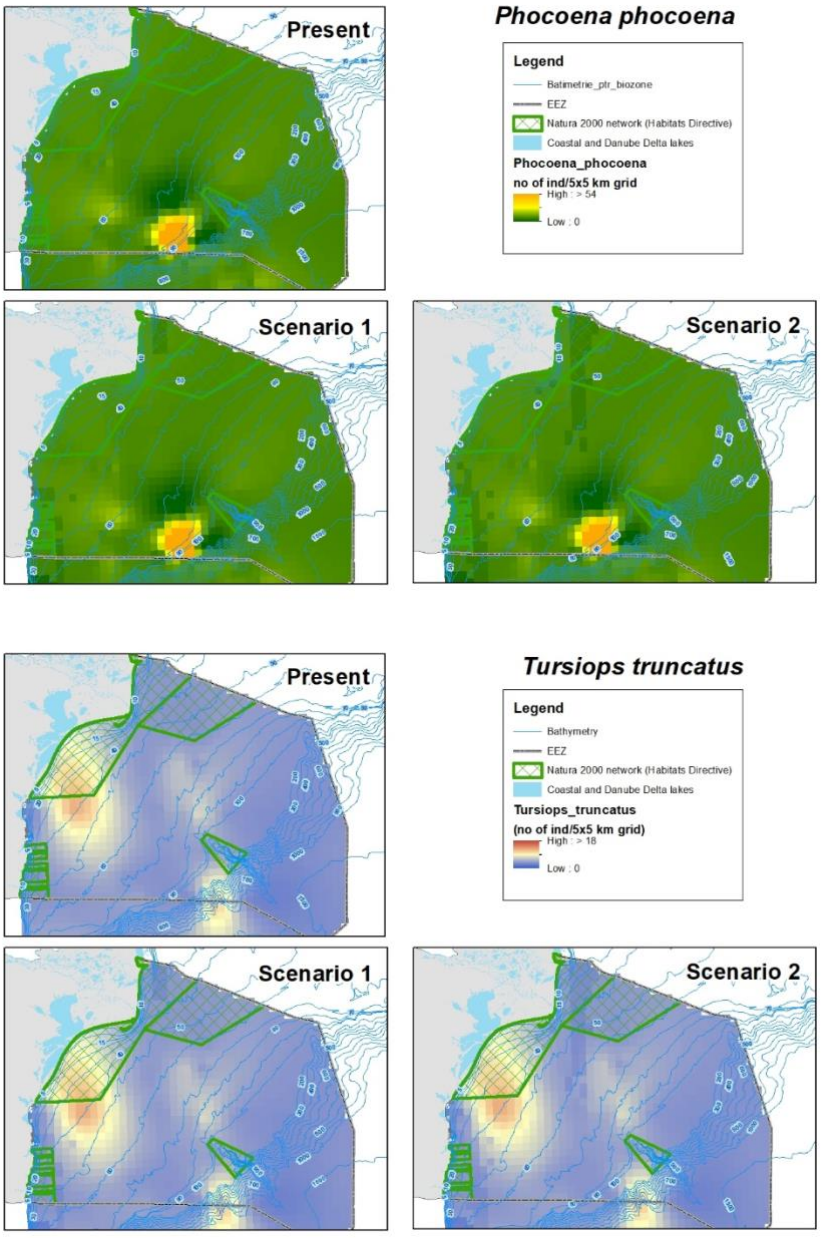

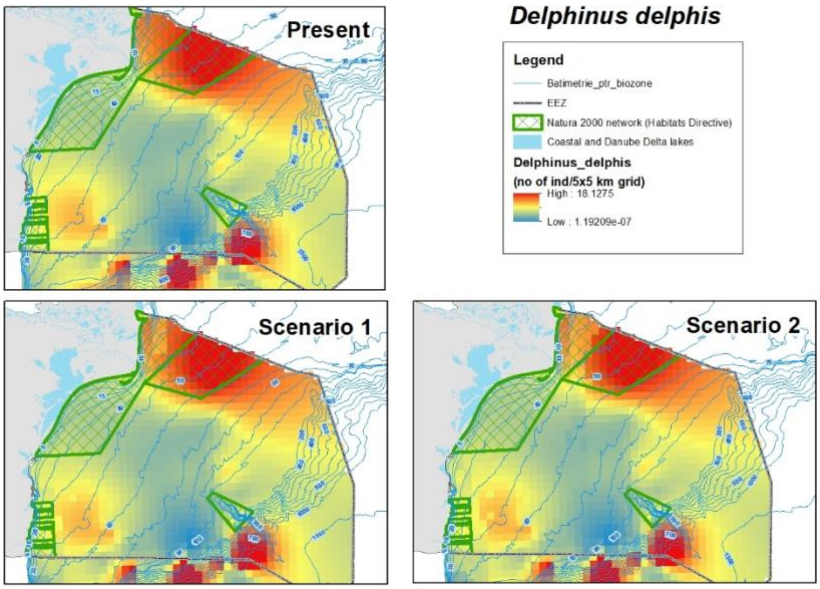

Figure 30 Application of CEA tool (data source: CeNoBS project, NIMRD database).

Integration of MPAs in MSP	The participatory mapping process identified the conflicts and synergies between the various utilities and activities in marine space in the pilot site, indicating also areas where marine habitats very high ecological and conservation value and emblematic species can be protected. The proposed planning solution can be integrated in MPAs and MSP processes: **The results of participatory mapping process (**for example collection of data and information **-** some spatial data for ex. "location of fishing tools" and "captured species, spatial data for mammals occurrence and distribution within test site) or identified conflicts and future uses of marine space were considered in the selection and application of planning specific for the test site. **Cumulative Impact/Effects Assessments**: The results from the PlanWise4Blue (PW4B) CEA tool, including the identification and mapping of human activities and pressures, ecosystems components and vulnerabilities, cumulative impacts can be used both in MPAs designation and management and MSP processes. - Potential areas of development/ future "scenarios" into MPAs: identifying how these uses may impact ecosystems components The policy barriers refer in general to a poor definition of MPA's objectives and specific protection measures, including restrictions of certain activities, lack of regulatory instruments and enforcement mechanism.

	The MSP plan in Romania, does not regulate any interdictions and special regulations for the use of maritime space, it is not introducing new regulations, and no specific areas are designated for maritime uses. The plan identifies Marine Protected Areas as a key element of strategies dedicated to the protection of coastal and marine ecosystems and consider that the national MPAs network should include adequate surface to fulfil the assigned protection connected by "ecological corridors" that ensure natural conditions for movement, reproduction and refuge of marine fauna species. However, the MSP plan does not allocate space exclusively for marine protected areas, it is only specified that in the next period the protected natural areas must expand, to reach an extension of at least 30% of the marine area, respectively 10% with strict protection. The identified solutions include: - Revise MPAs objectives adapted to specific ecological needs - MPA management plans and effective custody - Implement regular monitoring and evaluation of MPA performance to adapt management strategies based on new data and changing conditions - Revise the MPA plan to consider a better ecosystem approach (including a better integration of conservation objectives) - Better collaboration between interested parties: decisions concerning the use of maritime space should be taken in collaboration with interested parties, including central and local public administration authorities and institutions, the business environment, the academic environment, civil society, and the general public. - Engage a wide range of stakeholders, including local communities, industry representatives, scientists, and NGOs, in the decision-making process
Stakeholders (CoP) involved in the site-specific planning solution	The CoP for the Romanian part of Western Black Sea test site comprised key stakeholders, including representatives of national authorities: - Ministry of Environment, Water and Forestry (in charge with the implementation of MSFD and Habitat Directive, having responsibility also on MSP Directive) - Maritime transport (representant of Maritime Transportation Authority) - fishing and aquaculture (National Agency for Fishery and Aquaculture - the main actor in developing the national strategy and specific regulations in the field of fishing and aquaculture, having

	the responsibility for defining and implementing the policy related to the conservation and management of living aquatic resources in natural fish habitats. - environmental NGO (focused on the conservation of biodiversity and the rational use of resources in general, and specifically on marine mammals in the Black Sea. The NGO representative provided useful spatial data about the marine mammals' distribution in the Black Sea based on the CeNoBS project) - Scientists (representative of the Maritime Hydrographic Office, the national authority in the field of maritime hydrography activities, navigation safety, and the management of the national maritime hydrographic information system). Apart from the mentioned members, representatives of local fisheries were consulted. Spatial data, such as the "location of fishing tools" and "captured species," were collected during the monitoring program under Article 17 of the Habitat Directive (2019-2023). Additionally, NIMRD researchers, who are directly involved in the implementation of European Directives and Strategies or conducting research in the fields related to the project objectives (marine biodiversity, fishery and aquaculture, MPA, MSP, ICZM, and GIS), were consulted during the project. The 4th CoP Interaction was held through an online workshop aimed at presenting and validating the draft of the MSP4BIO Ecological and Socio-Economic (ESE) Framework. The workshop was organized by CCSM and addressed to a large group including CoP members, MSP and MPA authorities. During the workshop, the modules and components of the ESE were presented in detail, emphasizing practices to be followed, applied criteria, operational approaches needed to be implemented (DSTs), supporting measures, and policy solutions. The missing CoP members from Romania were approached directly during other meetings/events (for example, the MARBLUE conference held in Constanta in October) or by phone. The 5th CoP meeting was held for Romania in December 2024 toghether with "Challenges and opportunities for protection of the Black Sea ecosystem" workshop (held under "Black Sea Smart Marine Environmental Outcome System" - Interreg NEXT Black Sea Basin project) for a larger number of stakeholders. The project objectives, ESE Platform, Web-GIS story map, and the CEA concept were presented during the workshop. The application of CEA within the test site was positively perceived by the CoP members. Opportunities/ transferability and scaling up of proposed solution to other sites or national level were identified by CoP members (e.g. opportunities of using the CEA tool at the national level to implement European Directives (MSFD and Habitats Directive) and strategies (EU Biodiversity Strategy for

	2030) and support national reporting obligations (6 years report on art. 8, 9 and 10 for MSFD or reporting under art. 17 Habitats Directive).
Governance context	**- Comprehensive Legal Framework** through a clear **National Legislation**: Develop national laws that provide a clear mandate for the establishment, management, and protection within MPAs. **- Specific regulation for MPAs** Define specific protection measures for MPAs, including restrictions on certain activities (e.g., fishing, drilling, maritime transport, military trainings) and guidelines for sustainable use **- Enforcement Mechanisms**: Establish strong enforcement mechanisms to ensure compliance with MPA regulations, including penalties for violations **- Allocate specific budget** within national and local government budgets for MPA management and conservation efforts and for creating and updating management plans for MPAs **- Stakeholder Engagement**: Engage a wide range of stakeholders, including local communities, industry representatives, scientists, and NGOs, in the decision-making process; Establish mechanisms for stakeholders to provide feedback and contribute to adaptive management practices **- Adaptive Management**: **continuous monitoring**: Implement regular monitoring and evaluation of MPA performance to adapt management strategies based on new data and changing conditions **- Alignment of MSP plan with EU Biodiversity Strategy** for 2030
Possible challenges/risks/barriers and potentials/benefits related to the implementation of the site-specific planning solution	**Benefits:** - Contributes to a better understanding of the cumulative impact of human activities on the occurrence and spatial distribution of marine mammals; - Supports coherent conservation priorities and objectives within Marine Protected Areas. - Supports the establishment and management of protected areas for cetaceans, corresponding to areas that serve as habitats and/or provide important food resources. To date, no areas for the protection of dolphin species have been demarcated in the Black Sea, especially feeding habitats (except for those within protected areas where marine mammals benefit from a protection regime) and main migration routes. - Supports the establishment of a coherent and representative network of MPAs in Romania and Bulgaria, particularly a transboundary marine protected area for marine mammals. - Raises awareness at national and local levels about the impact of

	human activities exerting multiple pressures on marine mammal populations and their habitats, especially maritime traffic and military activities, which could intensify in the current political context of the Black Sea. - Contributes to the national monitoring program of species and habitats (particularly marine mammals) under the project "Completing the level of knowledge of biodiversity by implementing the system for monitoring the conservation status of species and habitats of community interest in Romania and reporting under Article 17 of the Habitats Directive 92/43/EEC," 2025-2027. - Contributes to the national report under Article 17 of the Habitats Directive concerning the conservation status of marine mammals, expected to be submitted in 2025. **Challenges/ risk/ barriers:** **-** Lack of data on human activities and specific pressures and marine mammal's species distribution and their vulnerabilities. - No management plans for MPAs out of the total of 6 Marine Protected Areas in the pilot site, 4 of them have Management Plans, not updated in the last 15 years and only for limited areas). - No really conservation objectives and measures for marine mammals at national level. - Lack of MPAs custody and operational management (no monitoring system in place or controlling instruments) - Ambiguous legislation concerning the conduct of certain activities (e.g. fishing and military training) within MPAs, both with significant impact on marine mammals. - Lack of stakeholder knowledge about the impact of their activities (e.g. fishing, tourism and logging) on marine mammals; lack of consultation between national and local authorities, leading to conflicts with other uses of the marine space (such as fishing, navigation, tourism, etc.).
Opportunities and enablers for replicability /transferability and scaling up of proposed solution to other sites and beyond. Potential challenges related to applicability of ESE testing results, transferability and scaling up of the planning solution.	**Opportunities of using the CEA tool at the national level to implement European Directives and strategies and support national reporting obligations:** • Sustaining the recommendations of the EU Biodiversity Strategy for 2030 and the objectives of the 2021-2024 Governance Program for Biodiversity and Protected Areas. In the next period, the network of protected natural areas must be expanded to cover at least 30% of the marine area, with 10% being strictly protected areas. In Romania, CEA tools can be used to identify potential non-intervention areas needed for the national study "Identification of potential non-intervention areas (strict protection) in

	terrestrial and marine natural habitats in view of the implementation of the European Biodiversity Strategy for the period 2021-2030," started in 2023. This study will form the basis for the designation of strictly protected areas, including within MPAs. • Supporting the development and implementation of Management Plans for Natura 2000 sites and Action Plans for species (including MPAs and marine species), expected to start in 2025 (Priority 2 - "Environmental protection by conserving biodiversity, ensuring air quality and remediation of contaminated sites," within the national "Sustainable Development Programme 2021-2027"). This addresses the limited resources for ensuring adequate management and measures for the protection and restoration of nature (Council Directive 92/43/EEC of 21 May 1992 on the conservation of natural habitats and of wild fauna and flora, and Directive 79/409 of 1979 amended by 2009/147/EC of the European Parliament and of the Council of 30 November 2009 on the conservation of wild birds, both with subsequent amendments and supplements). • Contributing to the Romanian National report (for the 2019-2024 cycle, expected to be reported in 2025) on the conservation status of species and habitats under Article 17 (particularly for marine species and habitats) through the assessment of cumulative effects of pressures on overall conservation status. • Contributing to the MSFD Romanian National report (initial assessment, good environmental status, environmental targets), particularly D6 – Seabed integrity (Criterion D6C5, which assesses the benthic habitat condition extent of combined adverse effects from multiple anthropogenic pressures). **Focusing on the assessment of cumulative effects of human activities and pressures on different ecosystem components:** • Bottom trawling and its impacts on benthic habitats and species – bottom trawling is the main fishing activity in Romanian waters (90% of the total catches are Rapana venosa, carried out with beam trawls and taking place in the perimeter delimited by the isobaths of 5-7 m and 30 m depth, from Constanța to Sfântu Gheorghe). The total area affected is approximately 1400-1500 km², partially overlapping with the Natura 2000 site ROSCI0066 – Danube Delta marine area. • Impact of the extraction of non-living resources (oil and gas, including infrastructure) on marine ecosystems. Future uses

	of marine space include the extraction of hydrocarbons in the XIX Neptun perimeter located in the offshore area (200-1000 m depth), currently under implementation, which includes the placement of a pipeline to the designated location on the shore (Cape Tuzla area). • Impacts and synergies with aquaculture (as an emerging Blue Economy activity in Romania). In 2024, the national authority in charge of marine water management designated areas for aquaculture and started the tender procedure for their lease to economic operators. **Potential challenges:** • Environmental (spatial distribution of species, high-resolution benthic habitats mapping) and socio-economic data (including spatial data) are not available. • Lack of collaboration between MSP and MPA authorities to integrate economic development strategies and conservation objectives. Existing economic activities within MPAs (or in the immediate vicinity) such as fisheries, maritime transportation, tourism/leisure, and emerging sectors such as offshore energy or aquaculture can be regulated to minimize their impact on ecosystem components.
Recommendations for uptake and scaling up of the results in the test site to the regional level and relation with the regional strategies.	The results of PW4B CEA tool should be included in the process of designation of new MPAs or the establishment of a strictly protected areas. Scale up the use of CEA and ecosystem-based planning into national MSP process and economic development strategies.

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5 Key observations and conclusions

5.1 Commonalities identified across test sites

As highlighted, the six MSP4BIO test sites are in different phases of the MSP cycle and the MPA management cycle, therefore the developed solutions addressed a diversity of specific local needs and gaps in each of the localities. However, similarities in current challenges and potentials for implementing the solutions, replicability of solutions to other sites and beyond, links with real MSP and MPAs processes, integration of solutions and results in MSP and MPAs, and uptake of results at national level were identified across the sites. The recurring issues and features are synthesized below in Table 3.

One of the primary challenges in implementing solutions stem from the lack of high-resolution spatial data for marine species and habitats. These data limitations regarding specific pressures or ecosystem vulnerabilities can lead to uncertainty in decision-making and reduce the effectiveness of planning solutions. Improving spatial resolution of data can enhance zoning within MPAs, ensuring measures for conservation and regulation. Significant challenges are related also to: fragmented governance, weak institutional collaboration, insufficient public participation and stakeholder engagement, and limited funding, lack of political will for the integration of MSP and MPAs, as well as limitations of digital skills and capacity in planners and managers. Economic interests are often prioritized over objectives, making it difficult to balance blue economy sectors with biodiversity protection. Furthermore, there is still no common definition of strict protection applied across EU.

On the other hand, several common benefits and enablers for implementing the solutions were pointed in the test sites, such as identification and prioritization of MPAs with ecological and socio-economic criteria, improved collaboration between MSP and MPA managers and other stakeholders (CoPs), trade-offs analysis and participatory mapping survey providing a great platform for discussions and feedbacks by all stakeholders. Important enablers include also enhanced engagement as starting point for upcoming discussions and further steps on strict protection.

One of the pointed common approaches for integrating MSP and MPAs is enhancing institutional and cross-sectoral coherence and collaboration, as in most test sites, the MPAs designation is still a separate process from MSP. Integrating applied DSTs such as PlanWise4Blue, HELCOM SPIA, and ABC Planner, along with trade-offs and participatory mapping surveys, would help improve the alignment of planning and conservation priorities, as well as embed training and capacity building in MSP and MPA management.

Potentials for results uptake at local and national levels have been ensured through the local CoPs in the test sites and validation of solutions at the 5th CoP Interactions, by the expressed interest from most of the stakeholders to adapt and utilize the solutions and apply the ESE tools.

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Table 3 Identified challenges and potentials for solutions implementation and integration of MSP and MPAs.

Key common challenges/barriers	**Key common benefits/potentials**	**Integration of MSP and MPAs/Link with real MSP and MPAs processes**	**Uptake of solutions results at local/national level**
- Data gaps/resolution limitations and uncertainty in planning and decision-making - Insufficient transboundary collaboration for MSP coherence and MPAs connectivity - Fragmented governance, weak institutional collaboration, insufficient public participation, and limited funding - Lack of political will for MSP and MPAs integration - Lack of trade-offs/ multi-use tools in MSP/balancing MPAs and Blue economy sectors - Lack of strict protection (and common definition)	- Identification and prioritisation of MPAs with ecological and socio-economic criteria - Improved collaboration between MSP and MPA managers and other stakeholders (CoP) - Trade off analysis and Participatory Mapping - Enhanced stakeholder engagement - Starting point for upcoming discussions and steps on strict protection designation	- Enhancing institutional and cross-sectoral collaboration - Applying trade-offs in MSP for MPAs prioritisation and designation - Integrating Cumulative Effect Assessment (CEA) in MSP - Structured engagement processes with representatives from diverse sectors and level of governance (local, national and regional) - Serve as validation exercise for the real MSP - Embedding training and capacity building in MSP and MPA processes	- Uptake of results at national level has been ensured via the MSP4BIO CoPs - ESE framework is seen as a crucial tool to address gaps in current management practices, in balancing human activities and ecological protection within MPAs - Stakeholders identified priority areas for conservation and potential conflicts, resulting in actionable recommendations to balance ecological integrity-economic needs - Expressed CoPs interest in adapting the solutions and utilizing the applied tools in MSP and marine conservation - Integrate DSTs results in ongoing national and subnational processes

5.2 Conclusions and feeding test site results in the Deliverable 5.4

The results from the testing process of the MSP4BIO ESE framework revealed that the adjusted ESE modules, combined/flanked with the selected DSTs are capable to produce spatially and strategically explicit outputs. It has to be noted that none of the tools could individually address all ecological and environmental dimensions. This implies the need for the integration of different tools to ensure they provide more robust and ecologically meaningful insights essential for formulating adaptive management strategies in both MPA and MSP processes. And this is the added value of the MSP4BIO ESE framework.

By incorporating various ESE modules and tools into the different stages of MSP - from planning to implementation, revision and monitoring, MSP planners and MPA managers can better address ecological and environmental considerations leading to more effective and sustainable marine resource management (Kotta *et al.,* 2024). Thus, the applied approach would not only enhance marine ecosystems resilience, but would also support the objectives of different countries, considering their specific MSP maturity levels and environmental targets. Additionally, the ESE online platform facilitates the transfer of results to a broader user base, while the visualization tools provide two-way communication, ensuring comprehensive feedback on the produced scenarios and solutions.

The established MSP4BIO CoPs ensured the uptake and capitalization of results from the beginning of the project, thus supporting national processes with improved science-based and data-driven MSP to achieve the EU Biodiversity targets for 30% protection and 10% strict protection of marine space. Target groups of the MSP4BIO (MSPlanners, MPA managers, environmental authorities), as well as stakeholders, and decision-makers are potential users of the project's results, ranging from competent authorities to blue economy sectoral representatives, environmental organizations and MSP and MPAs practitioners and experts. The capacity building and participatory processes actively engaging the MSP4BIO CoPs, acting also as multipliers, will facilitate connections with other stakeholders and institutions both nationally and regionally, surpassing the project's scope.

To ensure wider uptake of solutions resulting from the MSP4BIO project a comprehensive knowledge transfer and campaign have been rolled out. Key actors have been equipped with the right skills, knowledge, and understanding of the project results to achieve real change. The objective was to facilitate and maximize the uptake of the project results. It demands the buy-in of planners, MPA managers, and other concerned stakeholders, that have been involved in the MSP4BIO CoPs.

With the ESE application results and specific solutions developed by the MSP4BIO test site partners now available, we must evaluate their ambition, transferability, and scalability beyond local levels. Each test site identified specific needs to be addressed, based on the results from the initial gaps assessment (D5.1), prioritization of key management questions, selection of tools for application, and consideration of potential solutions for implementation. Furthermore, the transferability of knowledge from one test

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site to another, as well the exchange of experiences and mutual learning, has been taken into account. The outputs produced could encourage and inspire other coastal and marine areas to similar actions towards better alignment of MSP and MPAs by enhancing ecological criteria and incorporating socio-economic dimensions in MPA prioritization.

More detailed cross-site analysis of the results obtained in the test sites will be conducted in the following D5.4 to assess transferability/ upscaling of the results and to formulate final recommendations for upscaling. The recommendations will be presented for each of the European Sea Basins highlighting key challenges, opportunities, and enabling conditions necessary for success, to provide the basis for scaling up across Europe.

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Annex 1: D5.3 MSP4BIO Fact-sheet report template

Title:		**Test site**	
		Partner (test site leader)	
Short summary			
Main focus and objectives of the test site case and the proposed planning solution	Here preliminary defined objectives and goals of the test site should be described, highlighting also the main uses/activities, MPAs and valuable habitats and species, MSP process and plan stage (maps should be included). Describe the expected impacts from ESE framework validation/application, considering also the integration of MSP and MPAs (what might be the connection/relation between the identified needs and expectations) in a short and long-term.		
Geographical scope	Provide a map of the test site		
Describe the gap(s) /challenges and key management questions addressed	Based on D5.1 results for identified gaps, key guiding management questions, adjustments from D5.2, scoping phase (D3.4 ESE1 Ecological Toolkit) and how the proposed specific planning solution aims to cover them. Refer shortly to the results from the trade-offs analysis (D4.2 and 4.3).		
Description of the site-specific planning solution	Describe your planning solution in more details, also describe the ESE modules and methods (DSTs) and steps you used to design the solution (and prioritised DST with the CoPs) and make references to trade-off results related to the planning solution (D4.3).		
Integration of MPAs in MSP	Describe how the proposed specific solution can be integrated in the current stage of the MSP plan considering the MPA designation and management process. How biodiversity attributes and connectivity can be considered in MSP depending on the local conditions. Describe the policy barriers that need to be overcome to improve integration and how test site plan addresses these barriers (inputs from WP5, D5.1; WP3, WP4, Task 4.4 and WP6).		
Stakeholders (CoP) involved in the site-specific planning solution	Description/details on established CoP, describe the main actors, their roles, power and mandates/responsibilities for MSP and MPAs integration. Describe the results from ESE demonstration and DSTs application in the co-consultation and co-validation with your CoP (results from the 4th and 5th interactions).		
Governance context	Describe what type of governance system and legislation should be considered		

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	to implement the site-specific planning solution.
Possible challenges/risks/barriers and potentials/benefits related to the implementation of the site-specific planning solution	
Opportunities and enablers for replicability /transferability and scaling up of proposed solution to other sites and beyond. Potential challenges related to applicability of ESE testing results, transferability and scaling up of the planning solution	
Recommendations for uptake and scaling up of the results in the test site to the regional level and relation with the regional strategies	