



Accord Pelagos relatif à la création en Méditerranée  
d'un Sanctuaire pour les mammifères marins

Accordo Pelagos relativo alla creazione nel Mediterraneo  
di un Santuario per i mammiferi marini

**Final Report of the Pelagos Agreement-funded project**

# **SUSTAINABLE PORTS IN PELAGOS SANCTUARY CONSULTANCY CALL 5**

**March 2025**

**2023 Call for Technical and Scientific Consultancy of the Pelagos Agreement**

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## 2023 CALL FOR TECHNICAL AND SCIENTIFIC CONSULTANCY OF THE PELAGOS AGREEMENT

Final Report

March 2025

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## 1. INTRODUCTION

Call 5 - Sustainable ports in Pelagos Sanctuary (hereinafter, referred to as “Call 5” or “the Call”) is focused on the topic of sustainable ports in Pelagos Sanctuary and, in particular, in the assessment of the potential impact of port-related activities on marine mammals and their habitat. The final objective of the consultancy is to identify recommendations that should lead to the mitigation of port-related activities, and to better target specific actions to support good practices in sustainable port activities within the Pelagos Sanctuary. The work carried out resulted in the development of a roadmap for the implementation of the recommendations to raise awareness on good practices for sustainable port activities, in order to protect marine mammals and their habitats.

The working group appointed for Call 5 under contracts No. 2023-10a, 10b and 10c, consists of three experts with complementary skills, namely in alphabetical order:

- Francesco Maria di Majo, lawyer specialized in Ports and Shipping Law, Renewable energy and Environmental Law, former President (2016-2020) of the Port System Authority of Civitavecchia and former Vice President of Medports.
- Caterina Lanfredi, marine biologist, PhD in Environmental engineering, engaged in the field of cetacean conservation, particularly in the Pelagos Sanctuary area, for over 20 years;



- Cristiana Roppo, lawyer with a Master's degree in Environmental Law, with special reference to the Pelagos Agreement and cetacean conservation, "cultore della materia" in Environmental Law at La Sapienza University of Rome, Faculty of Mathematical, Physical and Natural Sciences, with over ten years' experience in supporting conservation projects;

Call 5 is willing to contribute to the actions "Coexistence between marine mammals and uses of the sea" of the Management Plan and relevant Action Plan 2022-2027 (adopted through Resolution 8.1, COP8 - Rome, 15-16 December 2021), as well as some of the activities foreseen in the 2022-2023 Plan of Work (adopted through Resolution 8.2, COP8 - Rome, 15-16 December 2021). The outcomes can also contribute to the preparation of the Quality Status Report (2026-2027), with special regard to following activities: assessment of the impact of tourism activities (bathing and boating) including related pollution (E-22b) and Pelagos against pollution and EcoPorts (H-271a).

In the light of the documents approved by the management bodies of several SPAMIs and taken into account the main barriers to the effective management of MPAs as identified in the COP 22 to the Barcelona Convention and its Protocols, the good practices should ultimately lead to the harmonisation of the laws and regulations of the Pelagos Agreement Contracting Parties (hereinafter, also referred to as "Contracting Parties") (Vezzani S., 2021).

Given the growing trend towards recreational boating, which is also leading to an intensified development of marinas in the Mediterranean (Madon *et al.*, 2023, Venturini *et al.*, 2016), and the prominent role played by the commercial ports of the area in the economy - to the extent that the Italian Government is currently carrying out major infrastructure works to support the increase in container and cruise traffic by allowing ships over 350 m in length to use these ports<sup>1</sup> - it is essential to raise awareness and to define an effective strategy aimed, in particular, at protecting cetaceans and their habitats from all the threats caused by human activities. In this sense, the sustainable management of port activities can play a strategic role in the process of mitigating their potential impact on marine mammals and their habitat, by acting as a catalyst for virtuous actions and by promoting linkages and cooperation between stakeholders.

With this in mind, the work consisted of a step-by-step analysis leading to the presentation of seven technical Deliverables (see Table 1 for reference),

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<sup>1</sup> Reference is made to works of strategic importance, such as the construction of the new mega breakwater/dam in Genoa and the mega dock in the port of Livorno. See Deliverable 4, Paragraph 5.3 Considerations on commercial ports, for details.

together with the Administrative reports required under Annex 1 of the contracts.

**Table 1.** List of the technical Deliverables presented by Call 5, with reference to the Paragraph of this Final Technical Report where Materials and Methods, and Results are reported.

<b>Deliverable #</b>	<b>Title of the Deliverable</b>	<b>Materials and Methods</b>	<b>Results</b>
Deliverable 1a	Selection of likely impacts/activities affecting cetaceans and their habitats	<b>2.2</b>	<b>3.2</b>
Deliverable 1b	Inventory of ports and (at least) major marinas and assessment of levels of activities that might lead to impacts, where possible, in different seasons and over time	<b>2.1</b>	<b>3.1</b>
Deliverable 1c	Classify types of ports/marinas in a context of risk assessment framework	<b>2.4</b>	<b>3.2</b>
Deliverable 2	Preliminary short technical report		
Deliverable 3	Review of existing guidelines, good practices, charters for sustainable ports	<b>2.3</b>	<b>3.2</b>
Deliverable 4	Develop priority recommendations with a view to facilitate the adoption by the Pelagos Agreement of tailored guidelines/Charters for sustainable ports and marinas	<b>4.</b>	
Deliverable 5	Roadmap for the implementation of the recommendations to raise awareness among port authorities, shipping companies, tourism organisations and recreational boaters on good practices in sustainable port activities	<b>5.</b>	

Recognising that we should balance multiple priorities and interests through meaningful dialogue, shared aspirations and collective accountability, during the Call the consultants conducted a series of activities and meeting with stakeholders and the public, with the ultimate goal to jointly identify possible

areas of intervention and bring together all relevant interests, combining multiple efforts and leveraging shared resources to achieve tangible results.

## 1.1 Background

The expansion and intensity of the anthropogenic activities, including coastal developments, generate multiple pressures on the marine environment, which directly and indirectly can impact marine biodiversity (Maxwell *et al.*, 2013). Coastal infrastructure can change environmental stability and hydrodynamics, contributing to erosion, eutrophication, and shifts in ecological dynamics (Agarwala & Saengsupavanich, 2023). Moreover, unplanned urban and industrial infrastructure development increases sewage and marine debris across estuarine and coastal areas, while deforestation and erosion can facilitate the runoff of chemical pollutants from multiple land activities (Domit *et al.*, 2022).

In the actual interconnected economy, ports play an essential role, with 80% of goods transported by merchant ships (Kalouptsidi, 2021). The growing trend in recreational boats is also resulting in an increase in the development of marinas (Madon *et al.*, 2023) in the Mediterranean Sea, as it is one of the most popular nautical tourism destinations in the world (Venturini *et al.*, 2016). Port development and its related intense, regular activities, such as dredging, heavy marine traffic, and infrastructure for port expansion, can generate pollution due to the introduction of noise, chemicals, oil, litter and untreated human waste (Agarwala & Saengsupavanich, 2023). In addition, port development can cause habitat degradation and non-native species introduction through ballast water or biofouling, which in turn can affect biodiversity and habitat productivity (Airoldi and Beck, 2007, Domit *et al.*, 2022, Hawkins *et al.*, 2017).

In this framework, there is an increasing concern about the potential impact that port development and its activities may have on marine mammals populations and their habitat. The effects of port-related activities on wildlife populations are largely unknown. Very limited studies have been conducted so far on the impact of port activities on marine mammals. Most of the available knowledge is focused on the impact of marine traffic on cetaceans particularly the risk of collision of large whales (fin and sperm whales) with large vessels (ferry and cargo ship) (ACCOBAMS 2021, Frantzis *et al.*, 2019, Panigada *et al.* 2006, Pirotta *et al.*, 2021, Schoeman *et al.*, 2020, Weinrich *et al.* 2006) and the noise introduced into the marine environment during navigation or offshore activities development (*i.e.*, maritime traffic, renewable energy developments, seismic surveys, naval exercises) (ACCOBAMS 2016, Erbe *et al.*, 2019, Kavanagh *et al.*, 2019, Southall *et al.*, 2007; Southall *et al.*, 2019, Ainslie *et al.*, 2022, Hannay *et al.*, 2023).

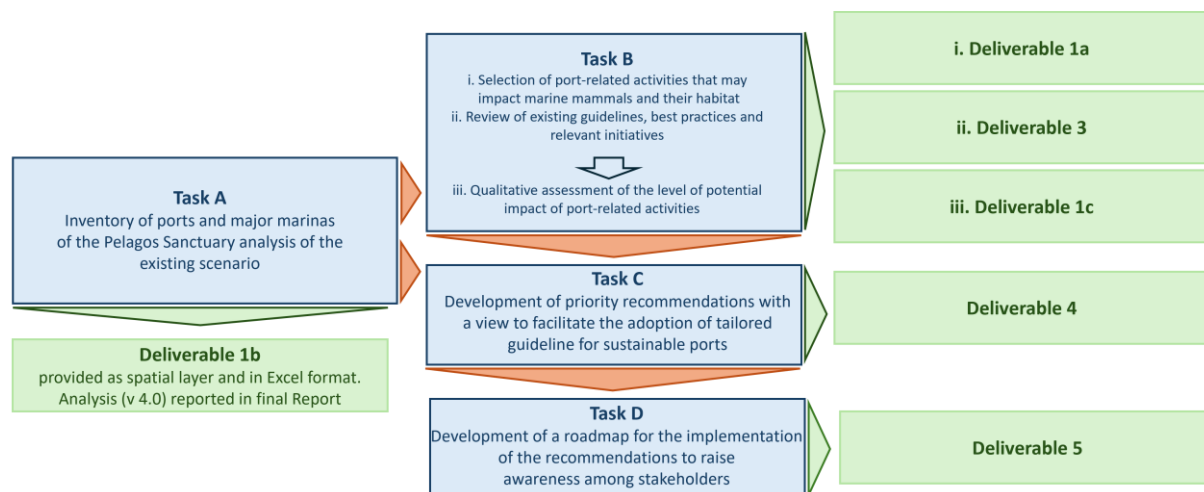


With specific regards to port-related activities, the potential concerns range from the noise introduced into the environment, to the release of toxic compounds and, in general, the modification of the habitat (Agarwala & Saengsupavanich, 2023).

## 2. MATERIALS AND METHODS

The call was intended as a step-by-step analysis that included the following tasks, with the presentation of dedicated Deliverables (see Figure 1):

- A. the preparation of an Inventory of ports and major marinas of the Pelagos Sanctuary (Deliverable 1b);
- B. the selection of port-related activities that may have a direct or indirect impact on marine mammals and their habitat (Deliverable 1a), the review of existing guidelines, best practices and relevant initiatives currently implemented by ports (Deliverable 3) and the assessment of the level of potential impact of port-related activities (Deliverable 1c)
- C. the development of priority recommendations with a view to facilitate the adoption by the Pelagos Agreement of tailored guidelines/charters for sustainable ports (Deliverable 4);
- D. the provision of a roadmap for the implementation of the recommendations to raise awareness among stakeholders (Deliverable 5).



**Figure 1.** Diagram showing the steps of the analysis and the corresponding deliverables.

With reference to each of the tasks A and B (and related Deliverables), please find below a brief description of the materials and methods used, while the outcomes are summarised in the Chapter 3 - Results.

The last two - C and D – that draw the conclusions based on the work conducted in the previous ones, are described in Chapter 4 - Recommendation and Chapter 5 – Roadmap for the implementation of the Recommendations of this documents.

## 2.1 Inventory of Ports

The first phase of the consultancy focuses on gathering data to develop an Inventory of Ports (IoP) that provides a quantitative indication of the port's presence within the Pelagos Sanctuary area, since a comprehensive list was not available. This first step was essential to characterize of the existing scenario in area.

The Inventory of Ports (IoP) was developed by consulting different data sources, such as the list of major ports available on the official government sources of the three Contracting States, such as:

- [OpenData portal of Italian Ministry of Infrastructure and Transportation - Ministero delle Infrastrutture e dei Trasporti](#) (updated 2022);
- Port System Authorities' Masterplans (such as [Masterplan dei porti toscani - Regione Toscana](#));
- EUROSTAT database and the EU georeferenced Sources European Marine Observation and Data Network ([EMODnet/Human activities data/Main Ports](#)).

Due to the limited number of ports listed in above mention sources and the paucity of information available, the list was then integrated by:

- consulting the Italian and French pilot books (*i.e.*, [pagineazzurre](#), [plan pratiques des ports](#));
- accessing directly to the dedicated port webpages (*i.e.*, Monaco ports [Société d'Exploitation des Ports de Monaco - Porti di Monaco](#));
- double-checking the ports presence from geospatial platforms (such as Google Earth or Google Maps);
- direct contact with owners of the companies and/or associations managing the ports.

Eachport identified has a set of data associated with it, which was constantly implemented during the consultancy, as new data becomes available. The IoP was updated four times during the consultancy (IoPs 1.0 April 2024; IoP version 2.0 May 2024; IoPs version 3.0 October 2024; IoP version 4.0 March 2024) and shared with the Pelagos Secretariat.



The Inventory of Ports is made available in different formats, as ESRI shapefile and Keyhole Markup Language (.kml) and Tabular (.xlsx). Attributes are summarized in the “Attribute table and Metadata IoP version 4.0.pdf” file provided with the file package.

Data includes the port name (in Italian or French) as reported in the pilot books or port website. When inconsistencies were found, the name as given in the pilot books was adopted. Direct link to the port or pilot book dedicated page has been reported directly on the IoP.

The geographic location of the port was reported as:

- position (latitude and longitude in decimal degrees), as in the pilot books or port’s website. When the information was not available, the position was extracted from the geospatial portals; allowing to georeference the data and create a spatial layer (as point layer) by means of the open-source Geographic Information System (GIS) Quantum GIS (QGIS), version 3.34;
- Country (Italy, France, Principality of Monaco) and
- Region (Liguria, Toscana, Sardegna, Provence Alpes Côte D’Azur, Corsica, Montecarlo).

The main function of the port was reported taking into account the information available on the ports' website, the Port System Authorities' website and the pilot books. The main port function has been grouped into four macro-categories:

- Touristic: for port specifically oriented towards nautical tourism. A further classification by type was then made in:
  - ✓ *Tourist port*: a complex of facilities designed to serve pleasure boating, also through complementary services;
  - ✓ *Canal port*: a tourist port located along an artificial canal or by a river accessible through a navigable waterway;
  - ✓ *Small landing place*: small landings where only small decks or piers without any facilities are available;
  - ✓ *Mooring buoys or Bay in which to moor*.
- Commercial if focus on the transport of goods or passengers (Cargo or Passengers). As for touristic also here a further classification was made based on the commercial activity performed by the port as:
  - ✓ *Passengers*: for port hosting ferries and cruise ships;



- ✓ **Cargo:** for port hosting all commercial ships categories (*i.e.*, container, Ro-Ro) other than passengers.
- Military if specifically designed and equipped to meet the needs of a nation's naval forces;
- Fishing if fishing boats are hosted.

In case the port performs multiple functions, the record was repeated.

The size of the port was reported taking into account the information available in the pilot books or port's website on port capacity (number of berths) and maximum ship length capacity (in metre).

Where possible, a distinction has also been made between public and private ports, taking into account the ownership and management of the ports.

In addition, based on spatial data provided by the Pelagos Secretariat, information on whether the municipality where the port is located has signed the [Pelagos Partnership Charter](#) has been included.

In view of better understanding the legal and conservation *status* of the port location, the presence or proximity (considering 1 km buffer) of Marine Protected Areas (MPAs) and other areas of special protection (such as Natura 2000 sites and Marine Parks) were spatially associated, by using QGIS tools and spatial data extracted from the [Protect Planet database](#).

Finally, the type, name and amount of environmental certifications obtained by the port ([Blue Flag marina](#), [Port Propres](#), [Port Propres Actifs en Biodiversité](#)) were also reported (updated to October 2024).

The data were then analysed in terms of frequency to characterize the existing scenario of the Pelagos Sanctuary area and better target the recommendation.

In addition data on port traffic for the Italian Port System Authorities located in the Pelagos Sanctuary area, were extracted by the statistic provided by the Italian Port Association - [Assoport](#). Data referred to goods (solid, liquid, container and Ro-Ro) and passengers' traffic.

## **2.2 Selection of the potential impact on marine mammals and their habitats**

The first task of the consultancy required to conduct a critical review to gather information on the potential impacts of port-related activities on marine mammals and their habitat, by considering various sources:



- scientific literature on the topic through the consultation of databases such as ScienceDirect, SCOPUS, Research Gate, and Google Scholar.

These databases provide comprehensive results covering a broad range of sources such as scientific papers, dissertations, academic books, and technical reports.

The search for information on the environmental impacts of port-related activities was not limited by year. General keywords were selected alone or in combination with others (*i.e.*, “port impacts”, “port activities”, “marine water quality”, “cetaceans”, “marine mammals”). The following terms were used as synonyms for ports: “harbour”, “marina”, “port” and “seaport”. More specific terms were used to search for impacts (*i.e.*, “sewage”, “noise”, “biofouling”, “POPs”, etc.);

- EU Reports on Blue Economy and Tourism, deliverables from European-funded Territorial Cooperation Programmes (*i.e.*, MED INTERREG or LIFE programs), other “grey literature” (technical reports, conference proceedings);
- any documentation made available from port authorities;
- direct contacts with stakeholders, through in person or virtual meeting (*i.e.*, CEO of the Marinedi Group; General Manager of Navigo).

Although the consultancy mainly focuses on the Pelagos Sanctuary area, the review considered the knowledge from studies carried out both in the Mediterranean and extra-Mediterranean areas.

The search resulted in the selection of approximately 150 publications.

Given the above, the main port-related activities that may affect marine mammals were identified. For each of the identified activities, the main potential impacts relevant to marine mammals that these pressures exert on the marine environment were summarised. Based on the selected literature, the effects the identified potential pressures may have on marine mammals were indicated.

Finally, based on the information collected, the potential impacts were classified as directly (*i.e.*, causing behavioural changes, mortality) or indirectly affecting marine mammals (*i.e.*, causing degradation of critical coastal habitats due to port developments and/or water and sediment contamination from a variety of sources).

### **2.3 Review of existing guidelines, best practices and relevant initiatives**

In relation to the selected port-related activities, a review and identification of existing guidelines, best practices and relevant initiatives currently being



implemented was conducted to guide possible eligible actions of the Pelagos Sanctuary aimed at mitigating and addressing their potential impact towards marine mammals and their habitat. The legal context was also examined, starting with the reference framework at international, regional and EU level and, where relevant, with references to national legislation (see Deliverable 3 for details).

Therefore, the work was focused on the current available measures related to the selected potential impacts of port-related activities, as identified in the previous task (see Deliverable 1a for details on the selected potential impacts). For this reason, ship-related activities (*i.e.*, potential impacts related to vessel traffic, collisions, noise during navigation), associated potential impacts and good practice were not considered.

The review was conducted considering various sources, such as by:

- consulting documentation of international Resolutions, Best Available Techniques (BAT) and Best Environmental Practice (BEP) (*e.g.*, ACCOBAMS, CMS, UNEP-MAP, IMO MEPC, MARPOL, RAMOGE);
- consulting documentation of national guidelines (*e.g.*, ISPRA);
- consulting documentation, deliverables and scientific publications related to national and international projects (*i.e.*, LIFE projects, MED-INTERREG project, Cetacean Habitat and Observation (ECHO) Program);
- consulting Port Management Plans strategies (*i.e.*, Port of Seattle Underwater Noise Mitigation and Management Plan);
- web-searching for commercial technological solutions and existing relevant initiatives (*e.g.*, EKKOPOL, Fishing for Litter, UTO by Ecoalf);
- review current environmental certifications aimed at reducing the environmental impact of ports (*i.e.*, Port Propres, Blue Flags marina, Green Marine).

Furthermore, a series of in person and virtual meetings between the consultants and relevant stakeholders were organized to better understand the existing best practices adopted by the ports. In particular, meetings were organized with:

- CEO of the Marinedi Group;
- General Manager of Navigo;
- Société d'Exploitation des Ports de Monaco (Chargé de Prévention et Recyclage des Déchets, Chargé de Environnement-Sécurité);



- President of FEE Italia Foundation;
- President of the Consortia CASTALIA;
- General Secretary SEA INDEX;
- General Secretary of Ansep Unitam (Associazione Nazionale Servizi Ecologici Portuali) and Unione Nazionale Imprese per la Tutela dell'Ambiente Marino);
- Managing Director, Fundacion Ecoalf.

Information were also collected through email correspondence with:

- Port of Vauban (Antibes), facilitated by the call supervisor Dr. Maxime Sebe;
- Union des Ports de Plaisance Provence Alpes Côte d'Azur et Monaco;
- FEE (Foundation for Environmental in Education).

Additional information was also found when the consultants actively participated in the following events:

- International Genoa Boat Show 2024 - RAMOGE Roundtable (Genoa, Italy September 2024);
- Pelagos & RAMOGE Agreements joined event (Science Po Campus Menton, France October 2024);
- Pelagos "Living lab" event, celebration of the 25th anniversary of the Pelagos Agreement (Monaco Oceanographic Museum, Monaco Principality December 2024);
- IFAW Roundtable Underwater noise, IMO and the EU: what's next? (CMA CGM Headquarters, Marseille, France March 2025), contact with General Manager of Green Marine Europe.

## **2.4 Assessment of the level of potential impact of port-related activities**

Main aim of this phase of the consultancy was to identified and ranked the risks of potential impacts associated with port-related activities, using a risk assessment matrix<sup>2</sup> based on the review of the scientific literature, legislation and expert opinion, following the qualitative model developed by Lewin *et al.* (2019) for assessing the environmental impacts of recreational fisheries and then

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<sup>2</sup> Risk assessment is the science-based component of risk analysis that concerns itself with characterizing the probability of exposure to a hazard and the consequences/effect of exposure for the target (Burgman, 2005). Risk assessment enables decision makers to prioritise and evaluate management strategies with regards to their effectiveness of reducing the risks (Leopold *et al.*, 1971). In this framework, risk matrices are used as simple tools for ranking and prioritizing the risk of events and making decisions (Burgman, 2005).



adapted by Carreno & Loret, (2021)<sup>3</sup> to assess the impact leisure boating on the marine environment.

This qualitative method<sup>4</sup> was selected due to the broad scope of this work in assessing the overall assessment of the actual potential impact of port-related activities in the Pelagos Sanctuary area. Other methods of assessing the environmental impact could be available to port and public authorities within the quantitative scope or a narrower scale of assessment. If detailed quantitative and comparable data on port activities will be available, it would be beneficial to apply quantitative approaches to better define the risk of the different activities.

The criteria selected in this study were defined as follows:

- (i) the potential impact probability;
- (ii) the non-reversibility of the effects;
- (iii) the management complexity or difficulty to mitigate the potential impact.

Unlike Lewin *et al.*, 2019 and Carreno & Loret, (2021), in this study, the spatial scale of the potential impact was not considered among the criteria, as this would imply a level of detail on the different impacts currently unavailable for all ports in the Pelagos area.

Each criterion considered was assigned a rank as high (H), moderate (M) and low (L), as follows:

- (i) the potential impact probability was classified as
  - high (H), highly likely to directly impact cetaceans;
  - moderate (M), likely to directly impact cetaceans), and
  - low (L), unlikely to directly impact cetacean).
- (ii) the non-reversibility of the impacts, the ranks were classified as
  - high (H), potential impact is non-reversible or very difficult to reverse;
  - moderate (M), somewhat reversible, and
  - low(L), reversible.
- (iii) the management complexity was classified as
  - high (H), potential impact is difficult to manage or control);

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<sup>3</sup> Unlike Lewin *et al.*, 2019 and Carrano Carreno & Loret, (2021), in this study, the spatial scale of the potential impact was not considered among the criteria, as this would imply a level of detail on the different impacts currently unavailable for all ports in the Pelagos area.

<sup>4</sup> Qualitative risk estimates rely primarily on ratings (high, medium, and low) and narrative descriptions. There is no internationally agreed approach on how to conduct a qualitative risk assessment. However, qualitative assessments include both a narrative description of the risk and a qualitative risk estimate, which together provide a descriptive or categorical treatment of risk information in an organized manner to be reproducible. Much of the relevant evidence in any given risk assessment is not numerical. Thus, a qualitative assessment compiles the available evidence and combines it in a logical and transparent manner that supports a statement of risk (Gorris & Yoe, 2014). Finally, qualitative assessments reveal data gaps and can be useful in directing resources to productive areas of research.



- medium (M), solutions to tackle the potential impact are somewhat difficult to find or to adopt, and
- low (L), solutions exist and are affordable.

Last, an overall rank was estimated considering all the different ranks detailed above to define the risk of potential impact as:

- High risk: Severe potential impacts, difficult to reverse and to manage (*i.e.*, management measure does not exist or are not implemented yet).
- Moderate risk: Moderate potential impacts, somewhat reversible but still difficult to manage (*i.e.*, management measures exist at national or regional scale).
- Low risk: Low impacts, reversible and manageable (*i.e.*, management measures exist and are at least promising).

### 3. RESULTS

With reference to each of the tasks A and B (and related Deliverables), as reported at the beginning of Chapter 2 - Material and Methods and in Figure 1, please find below a summary of the outcomes.

The last two - C and D – that draw the conclusions based on the work conducted in the previous ones, are described in Chapter 4 - Recommendation and 5 – Roadmap for the implementation of the recommendations of this document.

#### 3.1 Inventory of Ports

The Inventory of Ports (version 4.0) was developed by consultants and made available in different formats - as ESRI shapefile and Keyhole Markup Language (.kml) and Tabular (.xlsx). This phase was essential to the objectives of the consultancy, as it allowed the evaluation of the existing scenario in the Sanctuary area and better target the proposed recommendations (see Recommendation Section and Deliverable 4 for details).

Currently, the Inventory of Ports (IoP-version 4.0) present a list of 255 different ports with 174 in Italy (66 in Liguria, 40 in Sardinia, and 68 in Tuscany) 79 in France (44 in Provence-Alpes-Côte d'Azur and 35 in Corsica) and 2 in the Principality of Monaco (Figure 2 and 3). Considering the Pelagos Sanctuary extends for about 2,022 kilometres of coastline, there is in average a port every eight kilometres.

72% of the Port are located in or close proximity with an existing site recognised for ecological importance (MPAs, Natura 2000 sites and Marine



Parks) and 55% are located in municipalities that have adopted the Pelagos Partnership Charter.

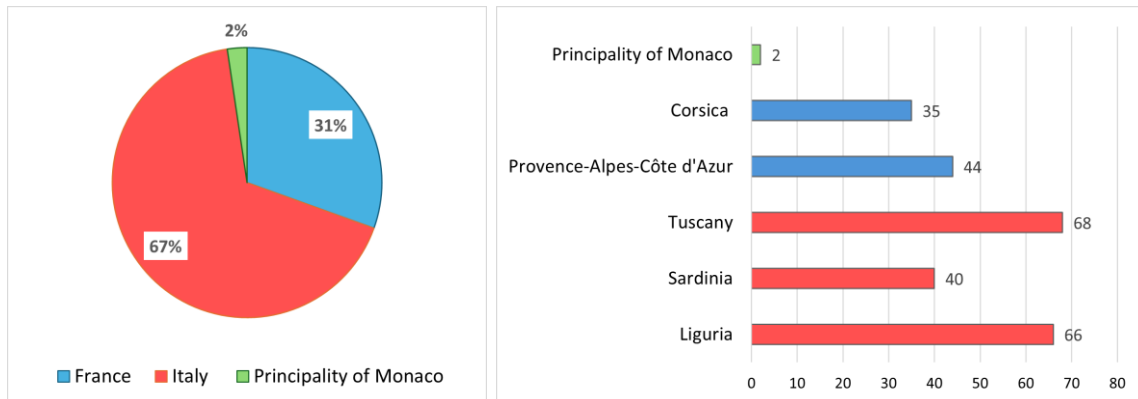


Figure 2. Port classification by Country and Region.

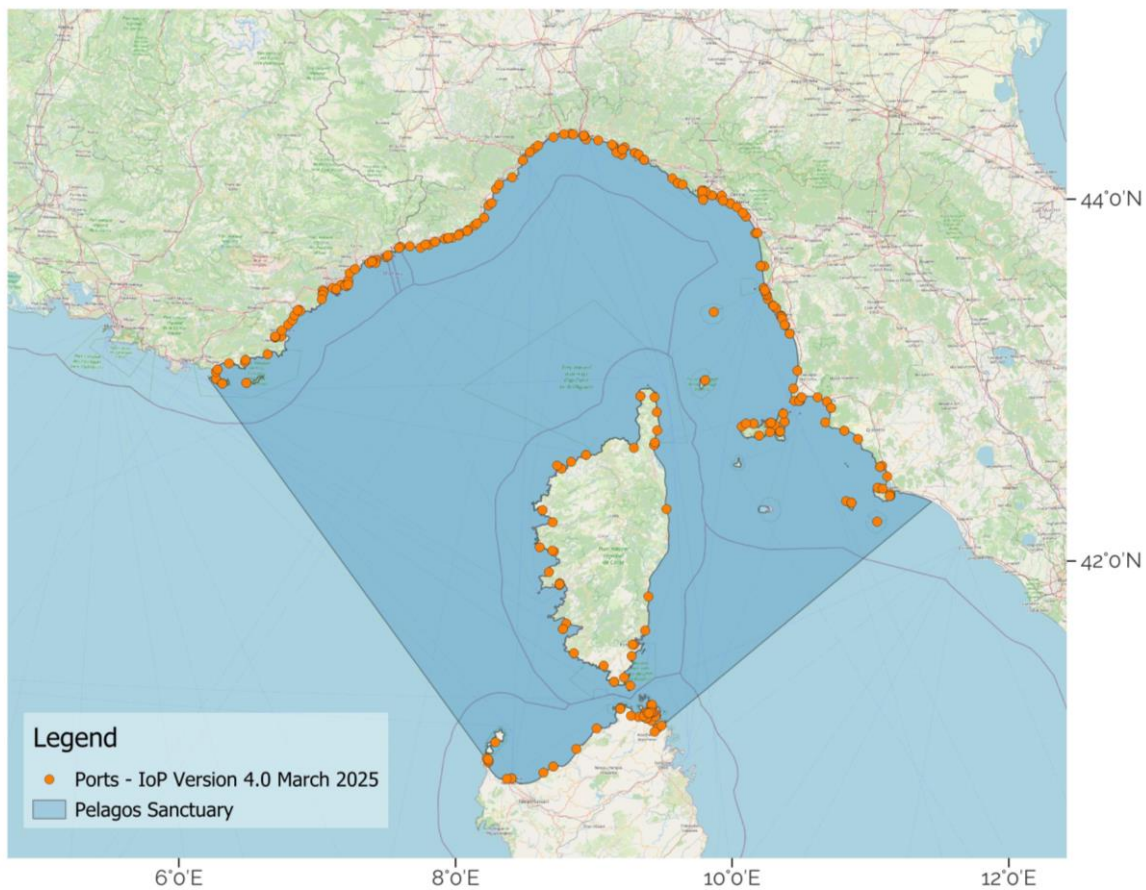


Figure 3. Georeferenced location of the ports identified within the Pelagos Sanctuary.

75,3 % of the ports are dedicated to a single function (*i.e.*, only touristic or only commercial function), while the remaining 24,7% serves for multiple functions. 36 ports are classified as Commercial, including both Cargo and Passengers categories, 55 as Fishing (if hosting fishing boats) and one as Military.



The Principality of Monaco has only 2 touristic ports, while the commercial, touristic and fishing categories are represented in all French and Italian regions (see Figure 4).

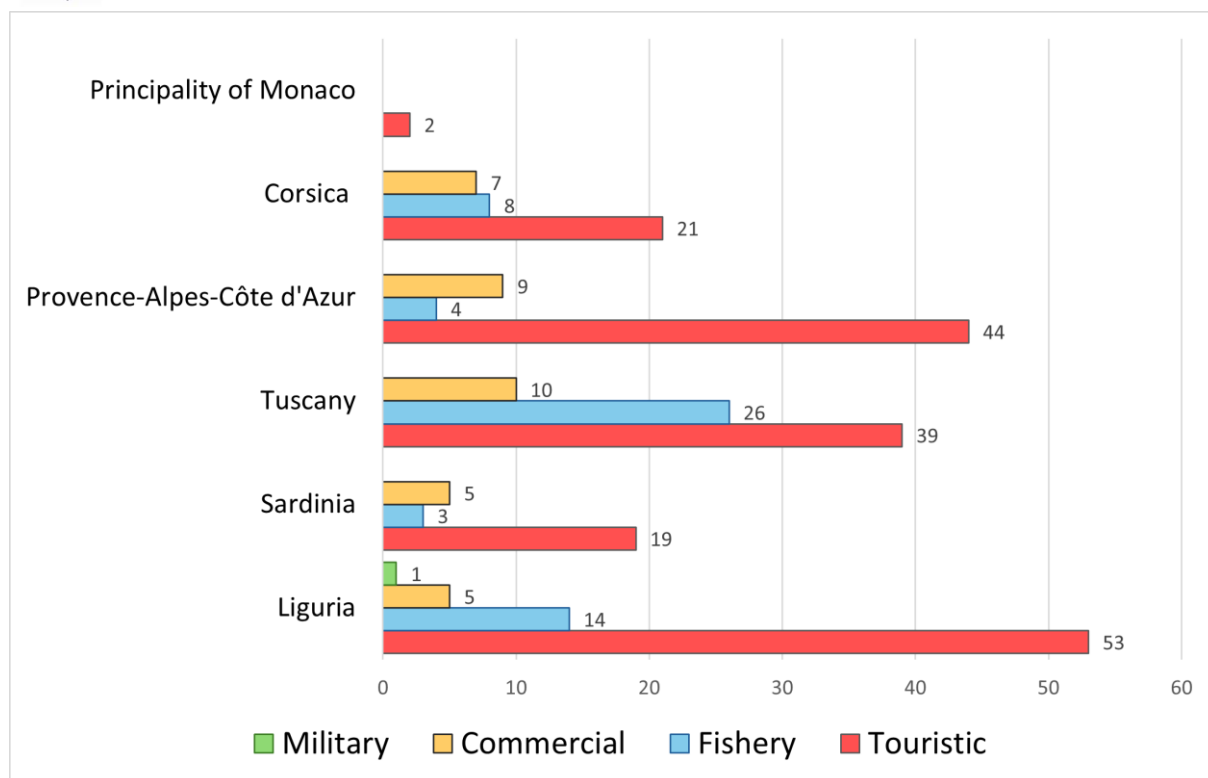
Among the Commercial ports, 22% serve both Cargo and Passengers functions, of which 30 are dedicated to passenger transport (using different vessels ranging from ferries to cruise ship and fast ferries) and 14 to cargo (container, Ro-Ro). 55% of the Commercial ports are located in Italy having 4 of the 16 Italian Port System Authorities (AdSP) present in the Pelagos Sanctuary area:

- AdSP Mar Ligure Occidentale - Western Ligurian Sea: Genova, Prà, Savona and Vado Ligure;
- AdSP Mar Ligure Orientale - Eastern Ligurian Sea: La Spezia and Marina di Carrara;
- AdSP Mar Tirreno Settentrionale - Northern Tyrrhenian Sea: Livorno, Capraia, Piombino, Portoferraio, and Rio Marina – Cavo;
- AdSP Mare di Sardegna - Sardinian Sea: Porto Torres, and Santa Teresa di Gallura (only these two ports of this latter AdSP are within the Pelagos Area).

Among the Touristic, 178 ports are classified as “Tourist port” that offers a complex of facilities designed to cater pleasure boating, also through complementary services, while the other touristic categories - 34 “small landings”, 18 “mooring buoys or bays” in which to moor and 8 “canal ports” - are lacking in offering services to pleasure boating and, therefore, have been not considered in the following analyses - but they should be taken into account when disseminating good practices to reduce the potential impact of port-related activities on marine mammals and their habitat.

The touristic category is well represented and quite homogeneously distributed in all Countries, with a slightly higher percentage in Italy, probably due to the large portion of Italian coastline suitable for port development, included within the Pelagos Sanctuary borders. Similarly, fishing ports are more represented in Tuscany (47%).

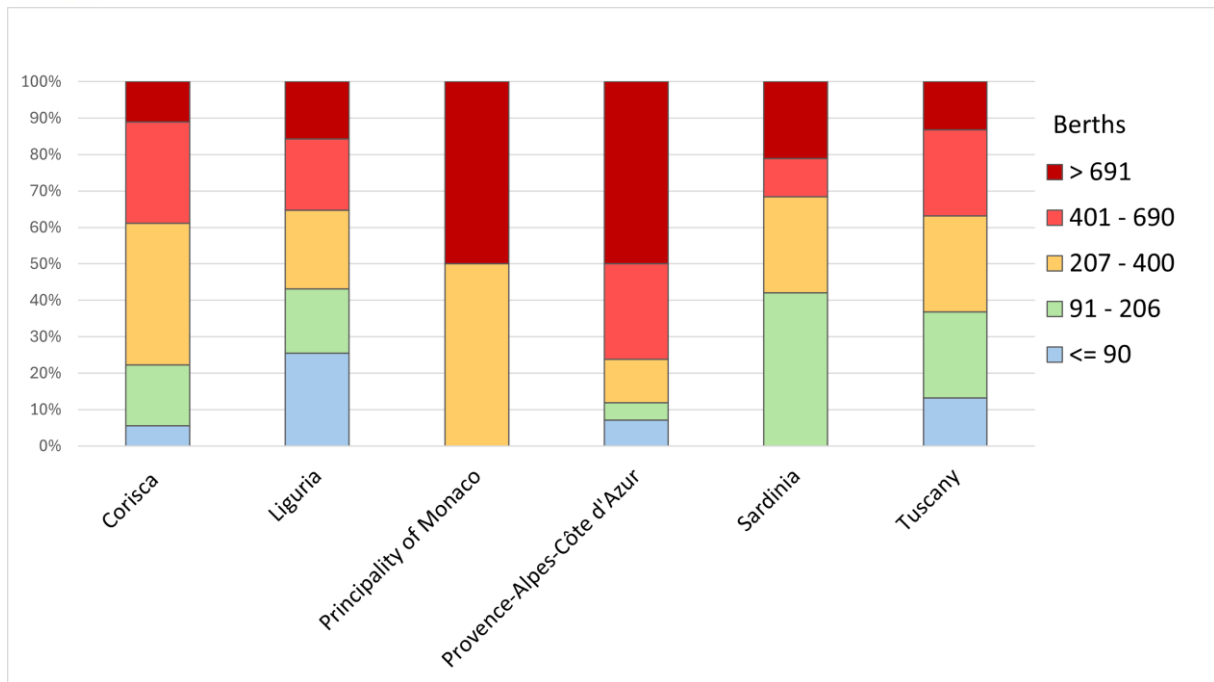
Only one proper military port is present in the Pelagos Sanctuary (La Spezia, Liguria, Italy).



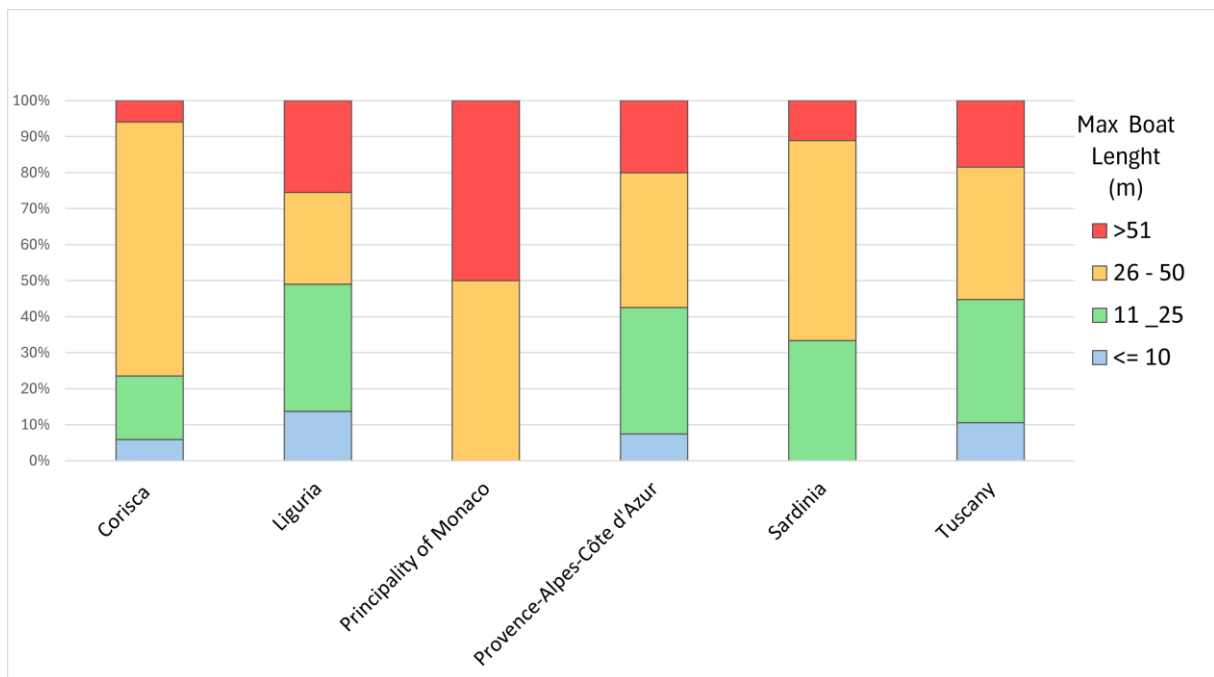
**Figure 4.** Port classification by Region and Function. The Touristic category only includes port classified as “Tourist port” that offers a complex of facilities designed to serve pleasure boating, also through complementary services.

Information on port capacity (number of berths) and maximum length capacity (in metre) were available for 96% (no. 170) of the ports classified as “Tourist ports” and therefore only this category was considered in the analysis. Port capacity has been classified in five classes (<90, 91-206, 207-400, 401-690, > 691 number of berths). According to frequency analysis of the classes by Region, ports of different size are well represented in Corsica, Sardinia and Liguria, with the Provence-Alpes-Côte d'Azur and the Principality of Monaco having the largest port capacity in terms of berths (see Figure 5).

Data on the maximum size of boats that the port can accommodate have been classified into four classes (<10, 11-25, 26-50, > 50 meters of length). The frequency analysis shows that across all the Regions touristic ports can accommodate boat of different sizes and also large yachts (26-50 and over 50 meters of length, see Figure 6).



**Figure 5.** Touristic Port capacity by Region. Only “Tourist port” that offers a complex of facilities designed to serve pleasure boating, also through complementary services were used.



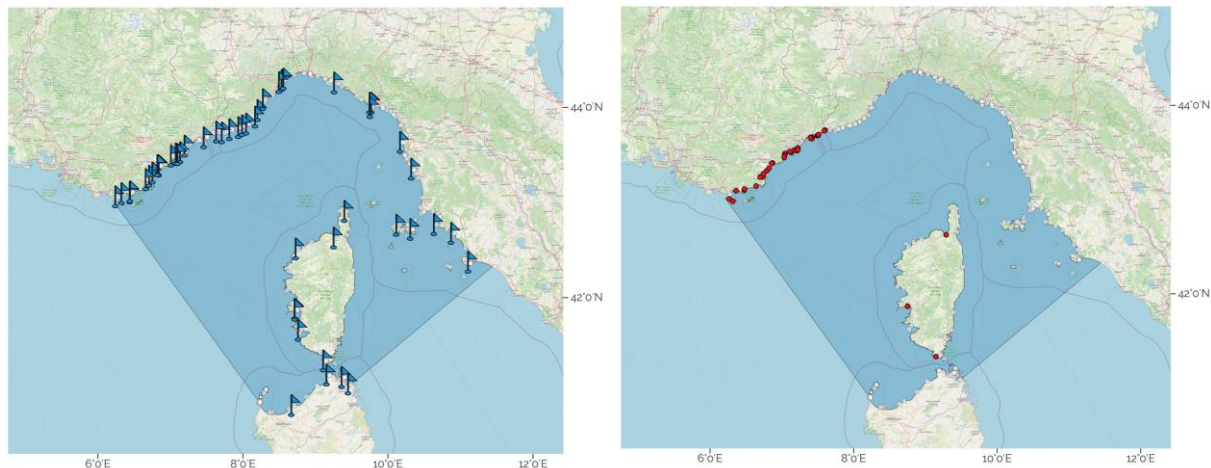
**Figure 6.** Maximum boat length the Touristic port can accommodate by Region. Only “Tourist port” that offers a complex of facilities designed to serve pleasure boating, also through complementary services were used.

72 ports were certified in 2024 with at least one of the currently available environmental certifications, 43 located in France, 27 in Italy and both the two of the Principality of Monaco.

More than one third (66%) are certified with *Blue Flag for port and marinas* certification, 27 in Italy and 23 in France (Figure 7).

Half of the certified ports (51,3%) obtained the *Port Propres* certification (37 in France and 2 in in the Principality of Monaco, Figure 7), and 28 the more specific *Ports Propres Actifs en Biodiversité* (26 in France and 2 in the Principality of Monaco) environmental certification. None of the Italian ports is certified with *Port Propres* and *Ports Propres Actifs en Biodiversité*.

Currently, none of the ports located in the Pelagos Sanctuary area is certified with Green Marine certification, since it will be available for the European ports starting from 2026.



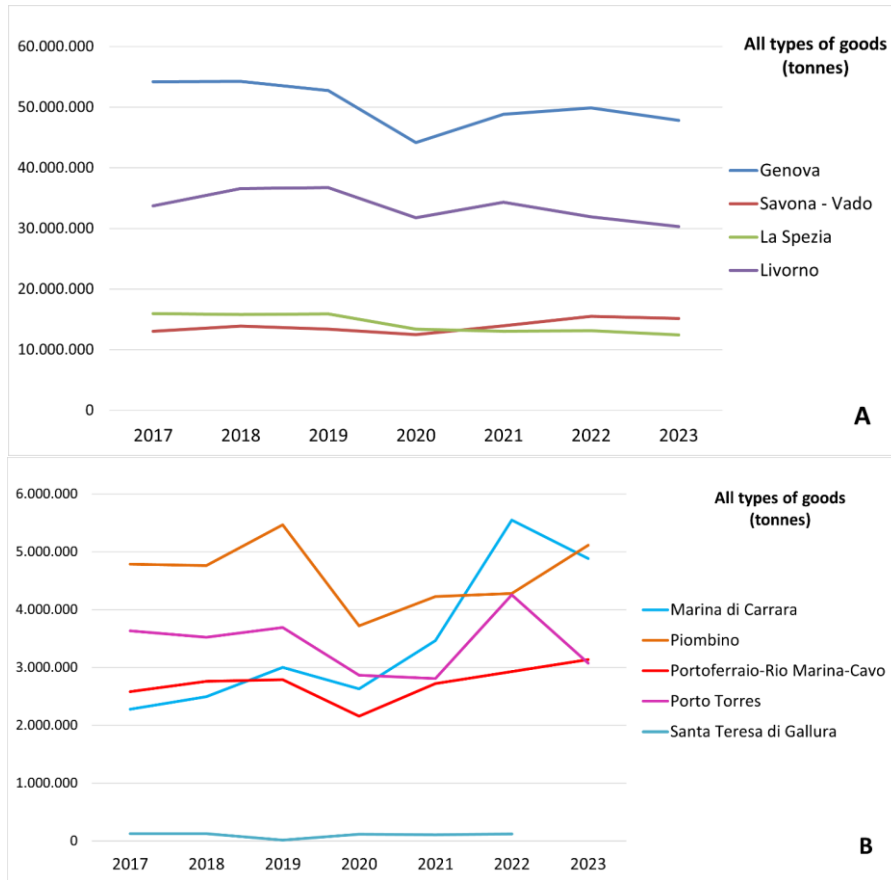
**Figure 7.** Geographic location of the port certified with *Blue Flag for port and marinas* (on the left) and with *Port Propres* (on the right).

Comparing the available statistics on port transport (updated to December 2023) of the eight ports belonging to the Italian Port System Authorities (AdSPs) present in the Pelagos Sanctuary, emerged that the main ports maintain a fairly stable flow of goods, with Genoa and Livorno remaining the most important.

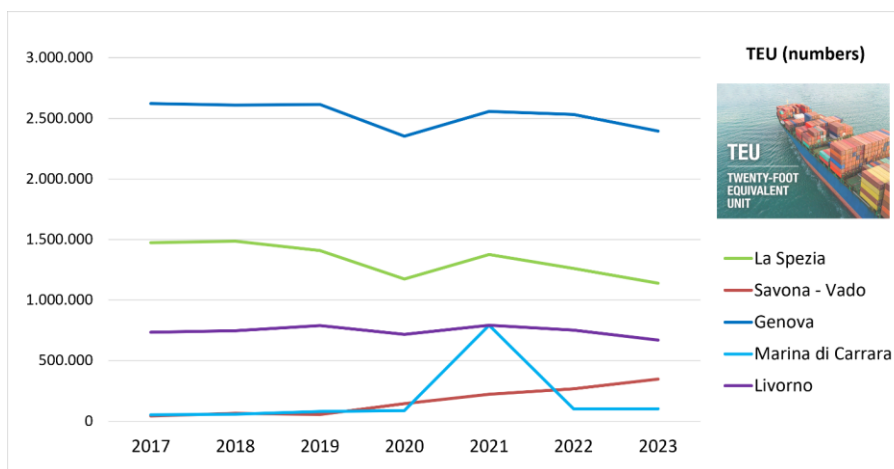
In fact, considering all types of goods (solid, liquid, container and Ro-Ro) Genoa and Livorno support the largest amount of traffic with levels not comparable to all other ports (see Figure 8). This is also true when considering the number of Ro-Ro (Figure 10).

Genoa is confirmed over time as the port with the high levels of container mobilization calculated in terms of TEU (Twenty-foot Equivalent Unit) (Figure 9). Passenger traffic, on the other hand, experienced a sharp drop in line with the COVID19 pandemic period. However, it returned to pre-pandemic levels in 2023,

with even higher values (Figure 11). Major passengers port are Genova, Livorno, Portoferraio e Piombino.



**Figure 8.** Tonnes of goods handled by ports from 2017 to 2023. A shows ports with overall goods handling between 10 and 30 million tons. B shows those with overall goods handling between 2 and 6 million tons per year.



**Figure 9.** Number of TEU handled by ports from 2017 to 2023.

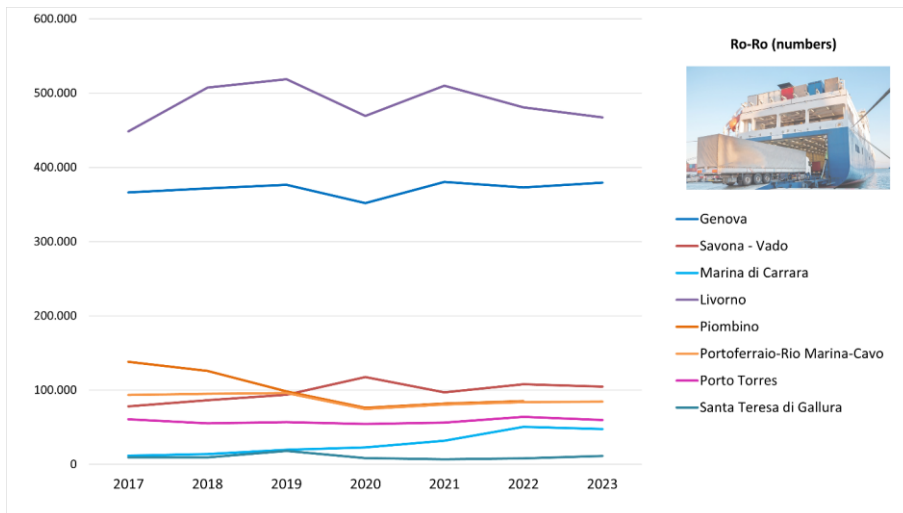


Figure 10. Number of Ro-RO handled by ports from 2017 to 2023.

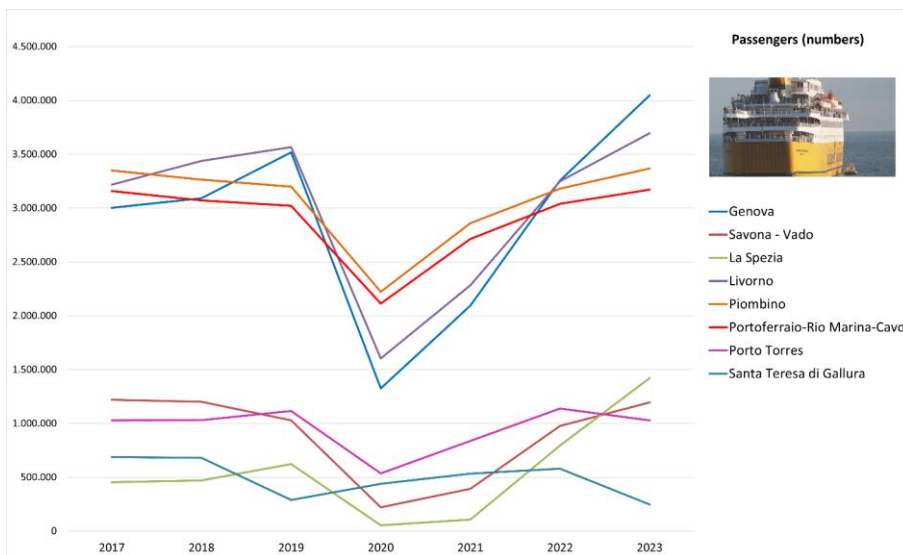


Figure 11. Number of Passengers (including passengers from Cruise, Ferries and Local ferries) handled by ports from 2017 to 2023.

### 3.2 Selection of port-related activities that may have a direct or indirect impact on marine mammals and their habitat, Review of existing guidelines, best practices and relevant initiatives and Assessment of the level of potential impact of port-related activities

The work conducted by the consultants with reference to the selection of likely port-related activities affecting cetaceans and their habitats (Deliverable 1a), highlighted that ports may represent a source of cumulative impact acting on the marine environment. In particular, the activities conducted in ports may

represent a source of pressure that could directly or indirectly affect marine mammals, especially small resident populations of coastal species.

Based on literature review and stakeholders' consultations, the main port activities that may affect marine mammals and their habitat can be grouped into four main categories:

- 1) Port development (*i.e.*, pier construction) and/or maintenance (*i.e.*, dredging);
- 2) Accidental introduction of oil or chemicals from port activities (*i.e.*, oil spills);
- 3) Waste management (*i.e.*, sewage, such as bilge water, and marine litter);
- 4) Ship anti-fouling systems (*i.e.*, use of biocides or ultrasonic antifouling systems).

Based on the information collected, the potential impacts can be classified as directly or indirectly affecting cetaceans.

Here below is a summary table (Table 2) of the selected activities and associated potential impacts affecting marine mammals, as presented in Deliverable 1a.

**Table 2.** Summary of the selected port-related activities and associated potential impacts that may have a direct or indirect effect on marine mammals, as reported in Deliverable 1a.

ACTIVITIES/PRESSURE FROM PORTS	POTENTIAL IMPACT	POSSIBLE EFFECTS	TYPE OF EFFECT
<b>PORT DEVELOPMENTS</b>	HABITAT AND BIODIVERSITY LOSS AND FRAGMENTATION	Alteration of prey availability, potential changes in distribution	INDIRECT
	NOISE POLLUTION (impulsive and continuous)	Behavioural changes (displacement from the area)	DIRECT
	OTHER IMPACT: COLLISION (with dredgers)	Physical injuries or death (only one case reported)	DIRECT
<b>ACCIDENTAL LEAKAGE OF OILS AND CHEMICALS</b>	WATER AND SEDIMENT CONTAMINATION (HM and PAHs)	Bioaccumulation and biomagnification, physiological and biochemical disorders, immunosuppression, disease susceptibility, hormonal disruptions.	INDIRECT
<b>WASTE MANAGEMENT</b>	PLASTIC POLLUTION	Chronic health concerns, diseases, injuries, death	DIRECT



	INTRODUCTION OF PATHOGENS FROM SEWAGE RELEASE	Potential reverse zoonosis (little or no documentation on marine mammals)	INDIRECT
SHIP'S ANTIFOULING SYSTEMS	SEDIMENT CONTAMINATION (EDCs)	Bioaccumulation and biomagnification, physiological and biochemical disorders, immunosuppression, disease susceptibility, hormonal disruptions	INDIRECT
	NOISE POLLUTION (US systems)	Behavioural changes (displacement from the area)	DIRECT

Paragraphs 1 and 2 summarise the selected port-related activities by type of potential impact – direct or indirect, as well as the legal tools and good practices currently available to mitigate these potential impacts, while Paragraph 3 is specifically dedicated to port environmental certifications - as presented respectively in Deliverable 1a and Deliverable 3.

A summary table (Table 3) for every selected activity recaps the associated potential impacts and available good practices.

For details, please refer to the full text of Deliverable 1a and Deliverable 3.

### 3.2.1 Direct potential impacts

Among the port activities that may directly impact marine mammals and their habitat, those that introduce underwater noise and litter - particularly plastic - are of particular concern.

#### **Noise**

Pile driving during port developments and the use of novel antifouling systems - such as Ultrasonic Antifouling systems (“UA”), have been identified as port activities that may directly impact cetaceans by introducing underwater noise, with reported consequential behavioural effects, such as displacements (*ex multis* Graham *et al.*, 2017, Trickey *et al.*, 2022).

Currently, underwater noise from human activities is widely recognised as a threat to marine life. The first and to date only example of legislation which directly addresses noise pollution is Descriptor 11 of the Marine Strategy Framework Directive 2008/56/EC (hereafter referred as MSFD), adopted by the European Union in 2008, which requires that levels of underwater noise pollution do not adversely affect marine ecosystems. The MSFD has stimulated a concerted research effort across Europe to develop noise monitoring programmes and to conduct research towards specifying threshold values for

both anthropogenic impulsive (*i.e.*, noise generated by pile driving activities) and continuous noise (Sigray *et al.*, 2023; Borsani *et al.*, 2023), as well as monitoring guidance specifications (see Dekeling *et al.* 2014 for impulsive noise) which would define 'Good Environmental Status' (GES) for underwater noise.

Dedicated recommendations, resolutions and guidelines on noise-related activities have been developed by international organisations, such as the United Nation Environmental protection – Mediterranean Action Plan (UNEP – MAP, - see IG.26/L.2/Add.3, 2023) of the Barcelona Convention (under the Ecological Objective 11 – Energy including underwater noise), the Agreement for the Conservation of Cetaceans of the Black Sea, Mediterranean Sea and contiguous Atlantic Areas (ACCOBAMS - see Resolution 7.13) and the Convention for Migratory Species (CMS – see Resolution 12.14).

Operational measure and Best Available Technologies (BAT) to reduce the noise levels from pile driving operation emitted during port constructions have been developed in last decades to reduce underwater noise pollution. These includes the use of technological solutions such as custom bubble curtains or hydro sound dumper (see ACCOBAMS Methodological guidance v.3.1, 2022).

On the other hand, globally marketed alternative antifouling technologies such as ultrasonic (UA) or infrasonic antifouling systems - recent sound-based systems that uses high (>20 kHz) or low (17–27 Hz) frequency signals respectively and that cause vibration or cavitation to disrupt and prevent the establishment of biofouling organisms (Huang *et al.*, 2024) - have not yet been specifically regulated, nor are there any guidelines for this technology or dedicated policies.

Virtuous examples of best practices to manage underwater noise emissions within the framework of port activities are available from the extra mediterranean context, as by the Vancouver Fraser Port Authority [ECHO Program](#) and the Prince Rupert Port Authority (Canada) or the Port of Seattle (USA). There, specific Underwater Noise Management Plans are developed to mitigate the impact of noise emissions helping ensure that commerce, communities and cetaceans present in the area, can co-exist. The plans include actions such as the speed reduction and the adoption of a permanent noise monitoring system (*i.e.*, helping to evaluate how does reduced vessel speed change the underwater noise generated by a specific vessel and by type of vessels - Joy *et al.*, 2019). In addition, there are a number of attractive incentives for ship-owners, such as port fees reduction or priority access for ships using quiet technologies (*i.e.*, reduced propeller and machinery noise) and/or have received a quiet vessel notation (*i.e.*, [SILENT-E notation](#)). The development of a management plan helps to increase the rating level in the environmental certification (such as [Green Marine](#)) issued to the port and vessels as it includes

two indicators on underwater noise from ships and port activities among the performance indicators.

### **Plastic pollution**

Among the activities that are likely to directly impacting marine mammals and their habitat, also those that introduce marine litter - particularly plastic - are of particular concern because of the persistence and accumulation in the marine environment and the severity of the effects they may generate on marine mammals. Ingestion of marine litter (*i.e.*, macroplastic) can cause injury or mortality of marine mammals.

Another consequence of the release of plastic at sea is its fragmentation into micro(nano)plastics, which can be assumed by marine mammals directly and indirectly via the food web causing health effects (Nabi *et al.*, 2022). It should be noted that this pressure is of particular concern, since the Ligurian Sea has a very high microplastic contamination, comparable to that recorded in the North Pacific Gyre (Fossi *et al.* 2017, 2018).

While most marine litter comes from land (urbanized areas, rivers, onshore activities and infrastructures), marine activities such as increasing ship traffic also contribute to the increasing amounts of litter in the marine environment. With reference to plastics, all vessels and ships rely on adequate and convenient reception facilities being available within ports for its disposal.

Inadequate facilities may discourage users from disposing of their litter responsibly ashore and may lead to waste being dumped into the environment and discharged into the sea.

In this regard, it is fundamental that all ports correctly apply the specific EU legislation on Port Reception Facility (Directive EU 2019/883 of 17 April 2019). This directive, which aims to protect the marine environment against the negative effects from discharges of waste from ship (over 2.5 m), is applicable not only to commercial ports, but also – to a large extent - to touristic ports/marinas (although in some cases it has been necessary for administrative courts to intervene to clarify this scope of application).

Dedicated resolutions on plastic pollution have been developed by international organisations, such as ACCOBAMS (see Resolution 8.2) and the CMS (see Resolution 12.20). Recently, recommendations have been developed as result of the workshop on ingested marine litter and entanglement evidence in the ACCOBAMS area (April 2024). Resolution on Marine Plastic Pollution, was also adopted by the International Whaling Commission in 2022.

In Europe, the MSFD (under the Descriptor 10 – marine litter) and UNEP/MAP Barcelona Convention for the Mediterranean Sea are providing frameworks for monitoring and large-scale actions to assess and mitigate the impacts of marine litter (under the Ecological Objective 10 – marine litter).

On the other hand, the sector of ship-generated waste is, at international level, mainly regulated by the International Convention for the Prevention of Pollution from Ships (also known as MARPOL 73/78). However, the effectiveness of ships to comply with the discharge requirements of MARPOL depends largely upon the availability of adequate Port Reception Facilities (PRFs).

The International Maritime Organization (IMO) has recognized that the provision of PRFs is crucial for effective MARPOL implementation, and the Marine Environment Protection Committee (MEPC) has strongly encouraged Member States to fulfil their treaty obligations on that respect.

EU has adopted a specific legislation on PRFs for ship waste, the so-called Port Reception Facility Directive (Directive EU 2019/883 of 17 April 2019, amending Directive 2010/65/EU and repealing Directive 2000/59/EC). This Directive applies not only to commercial ports, but also – to a large extent - to touristic ports/marinas. In March 2018, MEPC adopted the MEPC.1/Circ.834/Rev.1 Revised Consolidated [Guidance](#) for PRF providers and users. Good practices for both shipmaster and PRFs operators are considered. Shipmaster good practices include the optimization/minimization of the waste generated on board (*i.e.*, minimize packaging from ship stores, recycle plastic) and if possible, the enhancement of waste treatment on board. In addition, to facilitate the landing of recyclable residues/waste, ship operators should establish contracts with facilities in ports that are visited on a regular basis.

Among the good practices, PRFs should include procedures to facilitate better integration with shipboard and landside wastes/residues management practices - although legal requirements for PRFs will vary depending on the port State's implementing legislation, The guidance also recommends that, in order to provide efficient PRFs services, port authorities prepare a Port Waste Management Plan, making sure that relevant information about the available reception services and associated costs are disclosed and made available to ship operators well in advance of the ship's arrival (a good example is the information provided in material published by the [Port of Rotterdam](#), Netherlands).

Port Vauban (Antibes, France) is a good example of best practice in the Pelagos. It obtained the "*Ports propres*" certification in 2014 and the "*Clean Ports Active in Biodiversity*" certification in 2021, thanks to its efficient waste management plan committed to a comprehensive and ambitious environmental approach, including optimizing the reception facilities and waste management.

Ports can use various systems and devices to collect and subsequently treat plastic: pollution clean-up dedicated vessels (*i.e.*, Castalia in Italy or EKKOPOL) equipped with technology for the collection of both solid and liquid floating waste; devices to collect litter such floating barriers, advanced filtration systems (*i.e.*, DPOL), containers and nets meant to collect floating waste and direct them toward a point of collection<sup>5</sup>.

Removal technologies are also implemented to collect waste directly from the seabed (e.g. the bubble barrier or the robotic seabed cleaning) (Schmaltz *et al.*, 2020). These technologies serve as promising complements that can work in tandem with policy efforts to combat marine plastic pollution.

Ports can also be an effective vehicle for promoting initiatives aimed at raising public awareness about waste recycling (*e.g.*, the Rotterdam Port Authority is one of the partners that created a Recycled Park consisting of eight floating platforms made entirely of recycled plastic waste) or waste collection (*e.g.* Port Vauban promotes annual seabed clean-ups that help collect several tonnes of submerged waste per year and participates in the collection of cigarette butts to turn them into insulation for the construction industry or textiles).

The fishing communities can also play a significant role, as they commonly catch plastic waste while working at the sea. So-called Fishing for Litter initiatives encourage the fishing communities to collect and discharge waste recovered at sea, through incentives, connection to recyclers on land and ports and specific communication strategies. Its success is made possible because of the joint efforts of fishers, ports, waste collectors and local, regional and national authorities. In particular, the Fishing for Litter Scheme<sup>6</sup> was adopted by OSPAR<sup>7</sup>

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<sup>5</sup> In Italy, the anti-pollution marine service and containment of “marine litter” have been awarded in concession to the company Castalia until 31 December 2024. In February 2025, the Ministry of the Environment and Energy Security (MASE) announced a tender for the award of a two-year contract for the marine anti-pollution service, but unlike the previous two-year period, the service excludes patrols to collect plastic. <https://www.mase.gov.it/bandi/gara-laffidamento-del-servizio-antiquinamento-marino-cig-b4e3f9ff80-avviso-sulla-verifica>

Pending the award of the tender, the concession was extended in favour of the company Castalia.

<sup>6</sup> According to the Scheme, fishing boats are given big bags to collect the plastics, ghost gear and other debris that gathers in their nets during normal fishing activities. When the fishing boats come into port, they can unload the bags of litter. These bags are collected regularly, and the rubbish is recycled or disposed of on land. All the fishers who participate in the project are volunteers. The initiative not only removes rubbish from the sea, it also raises awareness among fishers of the impact of marine litter and changes fishers’ waste-related behaviours while out at sea. Source: [www.fishingforlitter.org](http://www.fishingforlitter.org)

<sup>7</sup> “OSPAR is the mechanism by which 15 Governments & the EU cooperate to protect the marine environment of the North-East Atlantic. OSPAR started in 1972 with the Oslo Convention against dumping and was broadened to cover land-based sources of marine pollution and the offshore industry by the Paris Convention of 1974. These two conventions were unified, up-dated and extended by the 1992 OSPAR Convention. The new annex on biodiversity and ecosystems was adopted in 1998 to cover non-polluting human activities that can adversely

in 2016 and incorporated in its Regional Action Plan. In 2019, it was included as “passively fished waste” in the new European Port Reception Facility Directive. It is recognised by international marine protection bodies including the European Commission (which highlights it as best practice), the United Nations Environment Programme Mediterranean Action Plan of the Barcelona Convention System and the OSPAR Regional Sea Convention. The Fishing for Litter Scheme currently operates in 9 EU Member States and, in relation to the Pelagos Sanctuary area, only the port of Livorno is reported as a participant<sup>8</sup>.

### 3.2.2 Indirect potential impacts

Indirect potential impacts include the degradation of critical coastal habitats due to port developments and water and sediment contamination from a variety of sources (such as accidental leakage of oil, chemical or sewage and the use of traditional antifouling coatings). Although indirectly affecting marine mammals, these pressure do constitute a concern to marine mammals as they contribute to the depletion of the marine habitat and should be considered in the development of mitigation strategies.

#### ***Habitat degradation***

The degradation of critical coastal habitats (*i.e.*, seagrass meadows) due to coastal construction and development activities are a cause of concern for marine mammals as can lead to resource depletion and subsequent changes in marine mammals’ prey availability (Todd *et al.*, 2015).

The construction of infrastructural works of a certain size in the port area are subject to Environmental Impact Assessment (EIA, Council Directive 85/337/EEC of 27 June 1985 on the assessment of the effects of certain public and private projects on the environment ) and/or to Strategic Environmental Assessment (SEA, Directive 2001/42/EC of the European Parliament and of the Council of 27 June 2001 on the assessment of the effects of certain plans and programmes on the environment). Ports must balance their economic goals and infrastructure development with responsible environmental resource management, while meeting regulatory requirements<sup>9</sup>.

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*affect the sea. The fifteen Governments are Belgium, Denmark, Finland, France, Germany, Iceland, Ireland, Luxembourg, The Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and United Kingdom. OSPAR is so named because of the original Oslo and Paris Conventions ("OS" for Oslo and "PAR" for Paris)". Source: <https://www.ospar.org/about>*

<sup>8</sup> See map at <https://fishingforlitter.org/>

<sup>9</sup> For example, in Italy, commercial ports that are seats of Port System Authorities (such as Vado Ligure, Genoa, La Spezia, Massa Carrara and Livorno) must adopt an Energy and Environmental Planning Document in which, among other things, the Port System Authorities must identify how to coordinate environmental measures and actions (with the identification of certain objectives) with the planning of infrastructural works in the port system (art. 4-bis of law 84/94 on the reorganisation of port legislation).

Among the mitigations strategies ports can take, areas can be designated for ecological restoration and long-term protection. In this framework, the Nature Restoration Law, adopted in June 2024 by the EU<sup>10</sup>, is a key element of the EU Biodiversity Strategy, which sets binding targets to restore degraded ecosystems, including the sea<sup>11</sup>.

Developments of coastal infrastructures (such as port developments), water quality alteration from dredging and anchoring (the latter being relevant, but out of the scope of this work) are listed among the main causes of regression of the *Posidonia oceanica* meadows. The species is listed as protected under several international conventions ratified by most countries of the Mediterranean including France, Italy and Monaco and has been also selected as an indicator of GES for marine areas within the MSFD (under Descriptor 1-biodiversity).

The damage suffered by the meadows due to the execution of coastal works and infrastructures subjected to EIA procedures can be compensated via *Posidonia* transplantation. Other actions include the use of artificial fish nursery (*i.e.*, Biohut), the adoption of eco-design solution to promote the colonization of the infrastructure (*i.e.*, artificial substrate and cavity modules). The use of dredgers as well as of turbidity curtains systems (*i.e.*, floating barriers or bubble curtains) can minimize the sediment spreading and therefore the degradation linked to the sediment movement (*i.e.*, light reduction, chemicals contamination).

Port Vauban - with the support of Ecocean the Agence de l'eau Rhône Méditerranée Corse and the Région Sud - installed 56 Biohut artificial nurseries. During the MARETERRA project in Monaco, a six-hectare surface district built on the sea, vulnerable species transplantation has been performed; both turbidity curtains and close mud skip have been used for dredging operation and actual submerged structures are equipped with devices designed to accommodate marine flora and fauna.

### ***Water and sediment contamination***

There are a wide variety of potential contaminant sources to enclosed ports that can decrease water and sediment quality, including dredging and excavation activities (Fisher *et al.*, 2015), vessel antifouling coatings (Schiff *et al.*,

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<sup>10</sup> Regulation (EU) 2024/1991 of the European Parliament and of the Council of 24 June 2024 on nature restoration and amending Regulation (EU) 2022/869

<sup>11</sup> The Regulation on nature restoration establishes a framework within which Member States shall put in place effective and area-based restoration measures with the aim to jointly cover, as a Union target, throughout the areas and ecosystems within the scope of this Regulation, at least 20 % of land areas and at least 20 % of sea areas by 2030, and all ecosystems in need of restoration by 2050 (Art.1, Alinea 2).



2007), shipyard or boatyard discharges (*i.e.*, sewage), runoff from adjoining urban and industrial areas, motor exhaust and hazardous material spills (Agarwala & Saengsupavanich, 2023), discharge of bilge water (water generated in the engine room) (Carreno & Lloret, 2021), accidental discharge of oil and chemicals from operations on terminals and fuel deposits (Rogowska *et al.*, 2010), loss from deposit tankers and pipelines as well as dry docks operation (NSRP, 1995).

Water and sediment contamination – by heavy metals, and Persistent Organic Pollutants (POPs) such as Polycyclic Aromatic Hydrocarbons (PAHs) - are particularly dangerous, as they are persistent in the environment and can be highly toxic, acting as vectors of toxins and pathogens. In fact, hundreds of chemicals pesticides and pathogens are either added or adsorbed by the microplastic. The biomagnification and bioaccumulation process makes them a potential threat to marine mammals that could act at individual or population level, contributing to reducing the population size.

Although limited knowledge is available with respect to marine mammals, also the discharge of sewage may affect the marine environment through oxygen depletion (which can influence fish and plant survival), causing diseases (also posing a risk to public health) and by nutrient enrichment.

### ***Accidental leakage of oil and chemicals***

The International Convention for the Prevention of Pollution from Ships (MARPOL) is the main international convention covering prevention of pollution of the marine environment by ships from operational or accidental causes. The Barcelona Convention and its seven Protocols adopted in the framework of the Mediterranean Action Plan (MAP) constitute the principal regional legally binding Multilateral Environmental Agreement (MEA) in the Mediterranean Sea. At EU level, Directive 2005/35/EC of the European Parliament and of the Council of 7 September 2005 on ship-source pollution and on the introduction of penalties for infringements (so-called SSP Directive), as amended by Directive 2009/123/EC, provided to incorporate international standards for ship-source pollution into EU law, in order to ensure that persons responsible for discharges are subject to adequate penalties. The United Nations Convention on the Law of the Sea (UNCLOS) specifies, among other things, that a State can impose penalties for pollution committed by a foreign vessel in case of major damage to the coastal State or if the flag State in question has repeatedly disregarded its enforcement obligations. EU flag States are also required to impose penalties in line with UNCLOS on their ships if they discharge polluting substances illegally into sea in or outside the EU.

In the event of a leakage of oils or chemicals, ports should be able and trained to intervene as quickly as possible. Apart from the above-mentioned response plans<sup>12</sup>, there are several services available to ports and marinas that could minimize the effect of and help detecting in real time a possible leakage. These includes pollution clean-up dedicated vessels (*i.e.*, EKKOPOL) equipped with technology for the collection of both solid and liquid floating waste; the *CleanSeaNet*, the European satellite-based oil spill and vessel detection service (to tackle ship-source pollution) managed by the European Maritime Safety Agency (EMSA)<sup>13</sup>; devices to collect hydrocarbons such as sponges (*i.e.*, FoamFlex Kit), advanced filtration systems for recovering hydrocarbons (*i.e.*, DPOL) and water quality smart sensors (probes) for real-time monitoring (*i.e.*, Sinay water module).

### **Seawage**

In relation to sewage, its discharge into the sea is prohibited according to Annex IV of MARPOL 73/78, except when the ship has in operation an approved sewage treatment plant or when the ship is discharging comminuted and disinfected sewage using an approved system, which has been certified by the Administration, at a distance of more than 3 nautical miles from the nearest land. Sewage, which is not comminuted or disinfected, may be discharged at a distance of more than 12 nautical miles from the nearest land when the ship is in route at not less than 4 knots., and the rate of discharge of untreated sewage shall be approved by the Administration. The IMO has adopted for “Special Areas” (such as the Baltic Sea) more restrictive measures for discharge sewage at sea<sup>14</sup>.

With the adoption of Directive No. 883 of 2019 on PRFs for ship-generated waste (which applies to all vessels over 2.5 m), the European Union also intended to reduce this practice of discharging sewage into the sea (albeit within the limits permitted by MARPOL) by incentivising the discharge not only of solid waste from ships but also of sewage (which includes both black water and bilge and wash water), through, where appropriate, financial incentives (as provided for in the PRFs Directive).

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<sup>12</sup> In this framework, it has also to be acknowledged the plan to fight accidental pollution – called RAMOGEPOL - adopted in 1993 after the sinking of the oil tanker Haven and periodically updated under the RAMOGE Agreement. The plan aims at strengthening the cooperation between France, Italy and the Principality of Monaco in the event of a major pollution incident and to share their available ships and aircrafts.

<sup>13</sup> As also recently outlined by the European Court of Auditors, Public authorities of the Member States (in particular the Harbour Masters) should make better and greater use of this service. See [Special report 06/2025: EU actions tackling sea pollution by ships | European Court of Auditors](#)

<sup>14</sup> [https://wwwcdn.imo.org/localresources/en/OurWork/Environment/Documents/200\(62\).pdf](https://wwwcdn.imo.org/localresources/en/OurWork/Environment/Documents/200(62).pdf).

Special area means a sea area where for recognized technical reasons in relation to its oceanographical and ecological condition and to the particular character of its traffic the adoption of special mandatory methods for the prevention of sea pollution by sewage is required.



Research has shown that some smaller Italian ports (e.g. marinas or ports accommodating small ferries) in the Pelagos area have deemed the PRFs Directive inapplicable to them and do not have a waste management plan or the necessary vessels to reach ships moored at anchor. Moreover, in these so-called 'exempted' ports, the system of ship waste collection is integrated into Municipal collection systems which, however, as recognised by the Regional Administrative Court of Tuscany (TAR Tuscany) in its judgement of 28 November 2023, no. 484, are not capable of 'collecting, fractioning and treating special and hazardous waste, cargo residues and food scraps'. The judgment of TAR Tuscany has been confirmed by the Council of State (judgement n. 7316 of 30 August 2024), which, among others, outlined that *"the absence of dedicated port reception facilities in ports which, like those under consideration, have traffic of ships obliged to deliver their special and hazardous waste, would also expose the environment and health to serious risks"*.

The Council of State's judgment is of particular importance because it immediately put an end to the situation of s.c. "anarchy" that had arisen in the ports of Santo Stefano and Talamone (located within the Pelagos area) where there was no management plan for waste produced by ships. This situation led to the fact that for years even ferries (e.g. those sailing to the island of Giglio) did not register the waste delivered (with the serious risk of sewage being discharged into the sea, even within the 3-mile limit).

On the other hand. It must be noted that water quality smart sensors (probes) for real-time monitoring are available and can be used to detect and quantify water contamination levels.

With regard to pathogens (e.g., coliform bacteria etc.) present in sewage from ships (also discussed in paragraph 2.2.2), it appears from information gathered at ANSEP (Associazione Nazionale Servizi Ecologici Portuali - National Association of Port Ecological Services) that even the presence of adequate port reception facilities has not stopped the practice of many vessels (in particular cruise ships), to discharge, more than 3 miles from the coast, comminuted and disinfected sewage using an approved sewage system plant. Analyses made (in year 2020) by ANSEP of sewage discharged from ships equipped with such systems showed that the discharged treated sewage continue to contain pathogens and sometimes even hydrocarbons.

### ***Antifouling systems***

Before the introduction of International Convention on the Control of Harmful Anti-fouling Systems on Ships (hereinafter, AFS Convention), a variety of poisonous substances, as like the organotin compound tributyltin (TBT), were



used to coat ships' hulls. At EU level, the AFS Convention, pending its entry into force, was preceded by Regulation (EC) No 782/2003 of the European Parliament and of the Council of 14 April 2003 on the prohibition of organotin compounds on ships, subsequently amended by Commission Regulation (EC) No 536/2008 of 13 June 2008.

Modern anti-fouling paints use metallic compounds which contain biocides (mainly copper oxide) that are continuously released into the environment and have well-known negative impacts on marine ecosystems (*ex multis*, Dafforn *et al.*, 2011; Turner, 2010).

Good practices include the use of biocide-free self-polishing coatings (SPCs) - based on a combination of silicone and hydrogel - the use of special adhesive wrap applied to the hull, the adoption of floating structures that keep the boat out of the waters when in dock (*i.e.*, miniature dry dock) or the use of In Water Cleaning (IWC) devices that avoid particles entering in the water during cleaning. Additional current alternatives of biofouling prevention consist of the use of unregulated sound-based system - using both ultrasonic and infrasonic signals (UAs). However, as already discussed, these systems may have direct negative effects on cetaceans (see paragraph 2.1.1 Noise).

A successful example of the use of non-toxic antifouling techniques is represented by the Stockholm Archipelago in Sweden, where boaters have moved away from biocidal coatings. One key driver for this change were the stricter requirements set by local authorities for the management of wastewater and paint particles derived from maintenance activities in marinas and discounted port fees (Parsmo *et al.*, 2024).

**Table 3.** Summary of selected port activities, their potential direct or indirect impact on cetaceans and the good practices available to mitigate the impact.

ACTIVITIES/PRESSURE FROM PORTS	POTENTIAL IMPACT	TYPE OF EFFECT	GOOD PRACTICE
PORT DEVELOPMENTS	HABITAT AND BIODIVERSITY LOSS AND FRAGMENTATION	INDIRECT	Transplantation ( <i>Posidonia oceanica</i> , <i>Pinna nobilis</i> )
			Biohub (artificial fish nursery)
	NOISE POLLUTION	DIRECT	Artificial habitats to promote colonization Anti turbidity systems (floating barriers or bubble screens) Dredger with close mud skip Mitigation Technologies for dredging and piling (e.g., Big and small Bubble curtains, Hydro sound Dumper) ACCOMABS 2019 Underwater Noise Management Plan Permanent noise monitoring system Green Marine certification program (includes noise performance indicators) Incentives (as discount in harbour dues/priority) to ships using quieting technology
	OTHER IMPACT: COLLISION (with dredgers)	DIRECT	Voluntary vessel slowdown
ACCIDENTAL LEAKAGE OF OILS AND CHEMICALS	WATER AND SEDIMENT CONTAMINATION (HM and PAHs)	INDIRECT	Pollution clean-up vessels (e.g., EKKOPOL) Suction pump for floating waste, (DPOL depollution system for recovering surface waste and hydrocarbons) and sponges (e.g., FoamFlex kit) Water quality smart sensors for real-time monitoring (Water module)
WASTE MANAGEMENT	PLASTIC POLLUTION	DIRECT	Pollution clean-up vessels Advanced filtration systems and nets Waste collection devices, (e.g., Floating barriers, probes and pumps - DPOL, Pollustock)
	INTRODUCTION OF PATHOGENS FROM SEWAGE RELEASE	INDIRECT	Water quality sensors and pumps - As for Accidental of oil and chemicals
SHIP'S ANTI FOULING SYSTEMS	SEDIMENT CONTAMINATION (EDCs)	INDIRECT	Biocide-free marina - not allowing anti-fouling paints and removing old paints from hulls as well as using mechanical cleaning in combination with the monitoring of fouling Biocide-free self-polishing coatings (SPCs) - based on a combination of silicone and hydrogel Antifouling modelled on sea urchins- Special adhesive wrap applied to the hull Miniature dry dock - floating structures that keep the boat out of the waters when in dock IWC - In Water Cleaning devices - avoid particles entering in the water
	NOISE POLLUTION (US systems)	DIRECT	Developed as "green" alternative to current antifouling systems



**Figure 12.** Example of best practices: A: Bubble curtains; B: Logo of the Green Marine Certification the only including Noise as performance Indicator, C: DPOL and D: Floating Barriers for waste recovery, E: Biohub (artificial nursery), F: Miniature dry dock and G: Water Cleaning devices to prevent particles entering in the water during vessel cleaning.



### 3.3 Port environmental certifications

A review of the available port environmental certifications was also conducted, taking into account the results of the IoP that showed that 40% of the ports of the Pelagos Sanctuary have an environmental certification, with 48 certified with the Blue Flag (25 in Italy and 23 in France) for port and marinas and 37 obtained the *Port Propres* certification (see Figure 7), of which 28 the more specific *Ports Propres Actifs en Biodiversité*<sup>15</sup> (none of which is an Italian port). See Figure 7 where the geographic location of the port certified with Blue Flag for port and marinas (on the left) and with Port Propres (on the right) is reported.

Currently, none of the ports located in the Pelagos Sanctuary area have joined the EcoPorts network<sup>16</sup>, nor have they been able to obtain the Green Marine certification, since it will be available to European ports starting from 2026.

Please refer to Deliverable 3, Paragraph 6 for a detailed analysis.

### 3.4 Assessment of the level of potential impact of port-related activities

Based on the results emerged in the previous phases of the consultancy from the review of the impacts (Deliverable 1a) and the existing guidelines and best practice (Deliverable 3) the potential impacts and associated risks were ranked as high (H), moderate (M), and low (L) using a risk assessment matrix.

This matrix summarizes the existing information on the ecological potential impacts of the selected port activities, which may have direct and indirect potential impacts on cetaceans and their habitat. These impacts were grouped in seven board typologies - associated to four main port related activities (port development, accidental leakage of oil and chemicals, waste management and ship's antifouling systems) evaluated under specific assessment criteria. Among the potential impacts resulting from port development activities, collision with dredgers has not been considered in this analysis, as only one case of collision has been reported in the literature with this type of vessels (Best et al., 2001), that generally operates at reduced speed (1–3 knots - Reilly, 1950). Therefore, based on the current knowledge dredging is not expected to significantly increase the risk of collision with cetaceans (Todd et al., 2015).

An overall risk was then ranked as High, Moderate and Low (Table 4) and then discussed in the following paragraphs.

<sup>15</sup> The optional *status of Ports Propres Actifs en Biodiversité* requires the commitment to more specific and additional environmental standards, complying with Clause 7 “*Optional suite: active biodiversity harbours*” and the specified criteria (18-24).

<sup>16</sup> See <https://www.ecoport.com/network>

**Table 4.** Severity of the potential impacts of port related activities. The activities and their potential impacts were ranked as High (H), Moderate (M), and Low (L) following the methodology described in the material and methods.

Criteria	Port development		Accidental leaked of oil and chemicals	Waste management		Ship's antifouling systems	
	Habitat Loss from constructions	Noise pollution (i.e. pile driving and dredging)	Water and Sediment contamination from PHA and HM	Plastic pollution from litter	Water contamination from sewage release	Sediment contamination	Noise emission from UA systems
Potential impact probability	L	H	M	H	L	M	H
Non-reversibility of the effects	M	M	H	H	M	H	M
Complexity or difficulty to mitigate the potential impact	L	H	M	M	M	M	H
Rating score	L	H	M	H	M	M	H

### 3.4.1 High risk of potential impact to marine mammals

Of the seven potential impacts considered, three were classified as moderate risk and only one as low risk. However, the methodology used to determine the severity of the potential impact is based on evidence in the existing literature and therefore it is important to consider that some potential impacts may be underestimated if not recorded in literature.

Three potential impacts were ranked as high-risk (severe potential impacts, difficult to reverse and to manage):

- noise pollution from port development activities (*i.e.*, pile driving and dredging);
- noise from novel sound based antifouling systems and
- plastic pollution.

The severity of the potential impacts and the difficulties in their management make these potential impacts a priority, as well as the development of harmonised recommendations and guidelines among the three States of the Pelagos Agreement as a matter of urgency.

#### **Noise pollution**

“Noise pollution” - from both port development activities and sound-based antifouling systems - and “plastic pollution” were ranked overall as high-risk. These potential impacts are very likely to have a severe direct impact on cetaceans and their habitats.



The effect of anthropogenic noise on the marine environment is a serious concern. Underwater noise generated by port activities (vessel movements, dredging, pile driving, use of explosives) or the use of ultrasonic antifouling systems contributes to the alteration of the soundscape essential to cetacean life. The emissions of noise from port activities and the use of sound based antifouling systems can result in direct behavioural effects, such as displacement from the used area for short to medium periods. However, exposure to sound may cause a wide range of effects, the severity and reversibility of which are complex to assess as they depend on several factors (*i.e.*, type of noise source, distance from the source, noise propagation, environmental conditions, physiographic features, hearing sensitivity of the species, etc.).

Only recently, with the MSFD (Directive 2008/56/EC) - Descriptor 11, noise from anthropogenic sources has been recognised as a pollution source. The subsequent implementations of the Directive are now helping to stimulate and develop methodologies to define threshold levels, as well as monitoring guidance specification for Member States. Currently, dedicated guidelines and best available technologies to reduce the noise emission during operation such as pile driving, or the use of explosives have been proposed by international organisations (*i.e.*, ACCOBAMS, CMS). However, guidelines are not harmonized across the Pelagos Sanctuary's three Member States.

The Environmental Impact Assessment (EIA, Directive 85/337/EEC) and Strategic Environmental Assessment (SEA, Directive 2001/42/EC) Directives have also important implications related to noise pollution, as they require to undertake environmental assessments for individual projects (EIA Directive) or development programs and plans (SEA Directive). Noise monitoring and mitigation measures are conducted in relation to EIA and SEA procedure for specific activities (such as activities requiring pile driving).

Although some national legislations, such as the French and Italian ones (there is still no uniform EU legislation on dredging) provide complex procedures aimed at ensuring stringent and accurate controls regarding the chemical-physical characterisation of marine sediments (Mugnai et al, 2018), the analysis of noise and its potential impact on cetaceans does not appear to be part of these procedures.

There are many potential activities that introduce noise into the marine environment, many of them new, and the difficulty in managing them is also linked to the fact that some are not currently recognised or regulated (*i.e.*, ultra - and infra- sonic antifouling systems).

Unlike in other countries (Canada, USA), voluntary ports' environmental certifications adopted by the Pelagos three Member States does not consider



underwater noise among the performance indicators and a specific underwater noise management plan to mitigate the impact of noise emissions by the port is not yet required.

### ***Plastic pollution***

Meanwhile, plastic and associated pollution has increased significantly and is now recognised as a global problem (CBD, 2016), with more than 800 species known to be adversely affected (Fossi et al., 2018; Fossi et al., 2020, Kühn and van Franeker, 2020). Plastic pollution is classified as a high-risk because it persists and accumulates in the marine environment, causing cascading negative effects on the marine ecosystem.

The consequences can be severe and non-reversible. The ingestion of marine litter (*i.e.*, macroplastic) can cause injury or mortality (*i.e.*, entanglement can result in injury drowning or strangulation; ingestion can cause blockage of the digestive tract and suffocation). A consequence of the release of plastic at sea is its fragmentation in micro(nano)plastics, that can be assumed by cetaceans, directly and indirectly via the food web, causing health effects.

Cetaceans are constantly exposed to microplastics, directly and indirectly via the food web, therefore, micro(nano)plastics act as vectors of pollutants and toxins which, along with the biomagnification and bioaccumulation process, make microplastics a potential threat to cetaceans that could contribute to reducing the population size, especially in vulnerable populations (Nabi et al., 2022).

At European level, the MSFD (under the Descriptor 10 – marine litter) are providing frameworks for monitoring and large-scale actions to assess and mitigate the impacts of marine litter, however the size of the problem, the scale (*i.e.*, the Ligurian Sea has a very high microplastic contamination compared to other areas), the wide variety of sources makes managing the plastic pollution impact extremely complex.

Plastic can reach and accumulate in port areas from many sources, both onshore and offshore as well as from ships. Although the sector of ship generated waste is regulated at international level by the International Convention for the Prevention of Pollution from Ships (MARPOL 73/78) and EU specific legislations and consolidated guidance on PRFs exists and applies not only to commercial ports, but also to touristic ports/marinas (such as the Port Reception Facility Directive), inadequate facilities may significantly decrease the effectiveness of ships in meeting discharge requirements and discourage boaters from disposing of their litter responsibly ashore, with the consequence that plastic being dumped into the environment and the sea.



The optimization of the PRFs and the implementation of efficient waste management plans, using technologies to collect plastic or the adoption of specific actions and activities to collect or recycle plastic, as well as awareness campaigns are somehow being considered among the environmental criteria of most of the port certifications adopted by France, Monaco (*Port Propres*) or Italy (*Blue Flag*).

Currently, best practices to effectively manage and minimize waste are adopted by single ports and, if adopted at larger than local scales, could contribute to minimize the overall impact of plastic pollution from port activities.

### **3.4.2 Moderate risk of potential impact to marine mammals**

Water and sediment contamination from a variety of sources – accidental leakage of oil and chemical, sewage discharge, or from traditional antifouling systems – were ranked overall as moderate-risk. These potential impacts contribute to the contamination of the marine environment and to the degradation of the habitat.

The presence of pollutants in the environment are particularly dangerous (*i.e.*, PHAs or endocrine disruptor chemicals -EDC), as they are persistent in the environment and can be highly toxic, acting as vectors of toxins and pathogens. Ports are known as sinks for the accumulation of pollutants and therefore many harbours are classified as harmfully polluted environments due to the persistence of high contents of contaminants. Remobilization of such contaminants by port activities (*i.e.*, dredging) can increase uptake by marine organisms, which will disseminate through the food web to marine mammals. Marine mammals have long life spans and occupy a high trophic status in the food chain, therefore they can accumulate high levels of contaminants. The biomagnification and bioaccumulation process makes them a potential threat to marine mammals that could act at individual or population level, contributing to reducing the population size. Indeed, the chemical contamination can affect cetaceans' health, inducing negative effects on their immune, nervous and reproductive systems. Nevertheless, the wide nature of the sources makes it challenging to assess the extent to which the remobilisation of contaminants from ports contributes to the observed contamination.

The quality of port water can also be degraded by the discharge of sewage that contributes to oxygen depletion, causing disease and nutrient enrichment. Although the presence of intestinal protozoan parasite in cetaceans has been reported (Marangi *et al.* 2021), knowledge is still scarce, and the assessment of the potential source is again difficult to attribute to ships or port infrastructure, rather than from other land-based sources.

Even though technologies exist to minimise the release of contaminants into the sea, ports do not always seem to be adequately prepared and there are still many difficulties in implementing the current legal framework.

### **3.4.3 Low risks of potential impact to marine mammals**

Habitat loss and fragmentation due to port construction and development activities was ranked overall as low risk. Their potential impact contributes to the degradation of coastal habitats that can lead to resource depletion and subsequent changes in marine mammals' prey availability (Todd et al., 2015).

Legislation exists and infrastructural works in the port area are considered in the EIA and SEA processes as can directly impact critical coastal habitat such as *Posidonia oceanica*.

In addition to restore degraded ecosystems a recent EU regulatory intervention - Nature Restoration Law - have been adopted by the EU with the aim to restore 20% of the EU's land and sea areas by 2030 and mention specific targets marine ecosystems including restoring the habitats of iconic marine species such as dolphins, sharks and seabirds.

It needs to be made clear that even though the potential risk for marine mammals is here ranked as lower than the other potential impacts related to port development (*i.e.*, noise emissions), these activities still constitute a concern and should be taken into account in the development of recommendation and mitigation strategies.

It should be also noted that all the actions aimed at minimizing the potential threats to marine mammals can improve the perspectives for the protection of other marine organisms and the ecosystem itself. In this framework, a sustainable management of ports activities can play a strategic role in the process of mitigate the potential impacts to marine mammals and their habitat acting as catalyst of virtuous actions and by favouring the connection and collaboration among stakeholders

However, potential impact from port related activities that are here classified with a lower risk (*i.e.*, chemical and biological pollution, habitat loss) still constitute a cause of concern and should be taken into account in the development of recommendation and mitigation strategies.

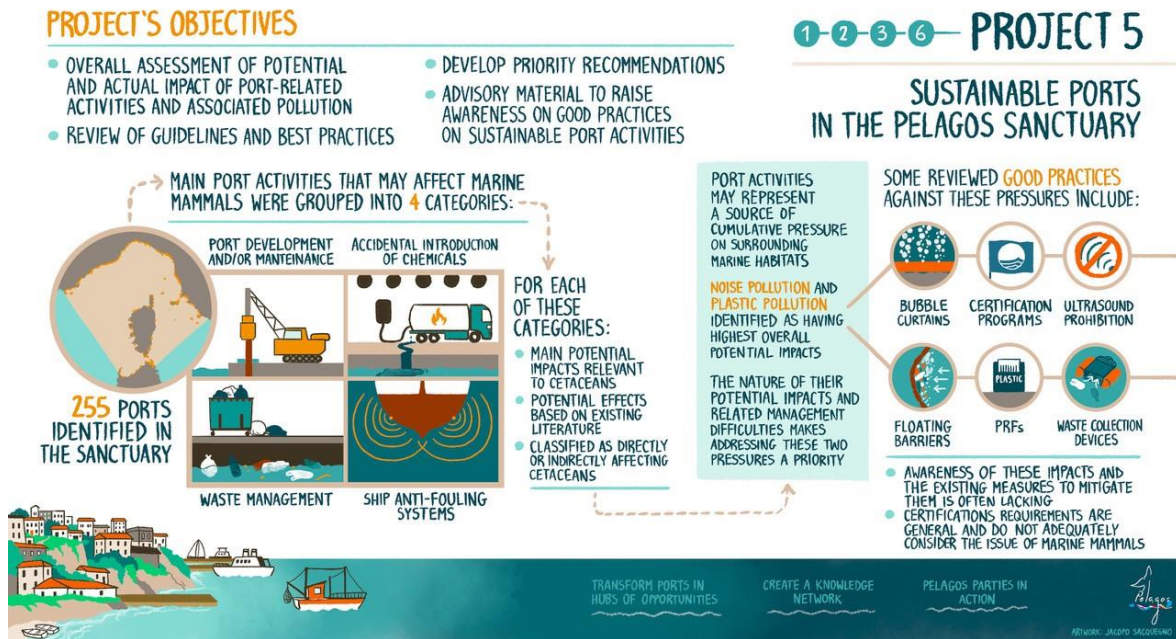
It should be also noted that all the actions aimed at minimizing the potential threats to marine mammals can improve the perspectives for the protection of other marine organisms and the ecosystem itself. In this framework, a sustainable management of ports activities can play a strategic role in the process of mitigate the potential impacts to marine mammals and their habitat

acting as catalyst of virtuous actions and by favouring the connection and collaboration among stakeholders.

**Table 5.** Summary of the potential risk by port-related activities and associated generated pressures that may have a direct or indirect effect on marine mammals (see Deliverable 1a).

PORT-RELATED ACTIVITY	GENERATED PRESSURE	POTENTIAL EFFECTS	TYPE OF EFFECT	POTENTIAL RISK
<b>PORT DEVELOPMENTS</b>	NOISE POLLUTION (impulsive and continuous)	Behavioural changes (displacement from the area)	DIRECT	<b>HIGH</b>
	HABITAT AND BIODIVERSITY LOSS AND FRAGMENTATION	Alteration of prey availability, potential changes in distribution	INDIRECT	<b>LOW</b>
	OTHER IMPACT: COLLISION (with dredgers)	Physical injuries or death (only one case reported)	DIRECT	Not assessed <sup>17</sup>
<b>WASTE MANAGEMENT</b>	PLASTIC POLLUTION	Chronic health concerns, diseases, injuries, death	DIRECT	<b>HIGH</b>
	INTRODUCTION OF PATHOGENS FROM SEWAGE RELEASE	Potential reverse zoonosis (little or no documentation on marine mammals)	INDIRECT	<b>MEDIUM</b>
<b>SHIP ANTIFOULING SYSTEMS</b>	NOISE POLLUTION	Behavioural changes (displacement from the area)	DIRECT	<b>HIGH</b>
	SEDIMENT CONTAMINATION (EDCs)	Bioaccumulation biomagnification, physiological and biochemical disorders, immunosuppression, disease susceptibility, hormonal disruptions.	INDIRECT	<b>MEDIUM</b>
<b>ACCIDENTAL LEAKAGE OF OILS AND CHEMICALS</b>	WATER AND SEDIMENT CONTAMINATION (HM and PAHs)	Bioaccumulation and biomagnification, physiological and biochemical disorders, immunosuppression, disease susceptibility, hormonal disruptions.	INDIRECT	<b>MEDIUM</b>

<sup>17</sup> \* Collision with dredgers has not been considered in this analysis as only one case of this kind has been reported in the literature (Best et al., 2001). These vessels generally operate at reduced speed (1–3 knots - Reilly, 1950). Therefore, based on the current knowledge, dredging is not expected to significantly increase the risk of collision with cetaceans (Todd et al., 2015).



**Figure 13.** Infographic developed by Jacopo Sacquegno to illustrate the CALL main objectives, impacts and good practices identified with respect to the priority topic such as noise and plastic pollution.

#### 4. RECOMMENDATIONS

As a result of the analysis and tasks carried out by the Call, priority Recommendations were provided to inform the Pelagos Agreement Contracting Parties on selected actions aimed at mitigating and addressing the potential direct or indirect impact of port-related activities on marine mammals and their habitat<sup>18</sup>, as identified in Deliverable 1a. Therefore, priority was given to pressures having an higher risk of producing a potential impact based on the assessment presented in Deliverable 1c (see Table 6 of this report for reference).

As emerged from the work, in fact, “noise pollution” (*i.e.*, noise generated by port development activities and sound-based antifouling systems) and “plastic pollution” were identified as having the overall higher potential risk to severely affect cetaceans and their habitats. Addressing these two pressures is considered a priority, given the nature of their potential impact and the related management difficulties. Furthermore, the development of a harmonised approach by the three Agreement Contracting Parties is recommended as a matter of urgency.

The Recommendations are divided in three macro sections:

**Section 1:** Cross-cutting Recommendations aiming to lay the groundwork for future specific actions needed to mitigate the potential impacts of

<sup>18</sup> See Deliverable 4 “Develop priority recommendations with a view to facilitate the adoption by the Pelagos Agreement of tailored guidelines/charters for sustainable ports and marinas” for reference and details.

port-related activities (see Table 7 of this Report and Deliverable 4 for details);

**Section 2:** Specific Recommendations to tackle priority pressures generated by port-related activities: noise and plastic pollution (see Table 8 and 9 of this Report and Deliverable 4 for details);

**Section 3:** Recommendations on the use of environmental port certifications and the steps needed for them to better address the protection of marine mammals and their habitats (see Table 10 of this Report, Deliverable 4 for details and Annex I for the Step-by-step Recommendations and related technical analysis).

A closing Section of considerations was finally dedicated to commercial ports.

For each recommendation of each section, the consultants identified the addressees of the recommendation, the leaders and partners involved and the time frame for their implementation, bearing in mind that short-term means a timeframe of two years, while medium to long term shall be considered a period beyond 2027, based on the Pelagos Management and Action Plan (2022- 2027)<sup>19</sup>.

While the detailed, technical analysis for each category/section of recommendations can be found in Deliverable 4 “Develop priority recommendations with a view to facilitate the adoption by the Pelagos Agreement of tailored guidelines/charters for sustainable ports and marinas” (see Table X for a quick reference), a summary is reported below.

**Table 6.** Recommendation topic and reference to the corresponding Section, Chapter and Paragraph as reported in Deliverable 4 to facilitate the cross-reference of the documents

Topic of the summary table	Deliverable 4 Section	Deliverable 4 Chapter/Paragraph
Cross-cutting Recommendations/Actions on port-related activities	Section 1	Chapter 3
Recommendations/Actions on NOISE	Section 2	Paragraph 4.1
Recommendations/Actions on WASTE- PLASTIC	Section 2	Paragraph 4.2
General Recommendations/Actions on PORTS CERTIFICATIONS	Section 3	Paragraph 5.1
Step-by-step recommendations on PORTS PROPRES	Section 3	Sub-Paragraph 5.2.1
Step-by-step recommendations on BLUE FLAG	Section 3	Sub-Paragraph 5.2.2

<sup>19</sup> Considering that the sub-theme “ECOPORTS” – including best practices to make ports sustainable among port authorities within the Pelagos Sanctuary - is part of the High priority theme for Parties “Fights Against Pollution” identified in the Pelagos Agreement Management Plan and Action Plan (2022-2027), the timeframe for the implementation of the proposed recommendations was linked to the Action Plan time period.

### Section I: Cross-cutting

The Cross-cutting Recommendations summarized in Table X (see Deliverable 4 for details) are based on these guiding strategies:

- **Engage and Educate:** transform Ports in hubs of opportunities;
- **Research and Innovate:** create a knowledge network;
- **Plan and Take Action:** Contracting Parties in action.

**Table 7.** Summary of the cross-cutting recommendations for the port-related activities that could potentially affect marine mammals and their habitat. CTS: the Scientific and Technical. Pelagos WGs: Pelagos Working Groups. The period referred to the Pelagos Management and Action Plan (2022-2027) with anything below two years to be short-term and anything requiring a period beyond 2027 as medium to long term.

Topic	General Recommendation/Action on port-related activities	Who is it addressed to	Leader/Project manager	Partner	Timing to implement the action
Engage and Educate	Develop collaborative programmes (e.g., ECHO Program <sup>20</sup> ) to address the potential impact of port-related activities on marine mammals and their habitat	Contracting Parties	Port Public Authorities, port management entities and their associations	Shipping industry, Certification bodies, Shipyards, Port users, Fishermen, Local communities, Scientists, Technology developers, Environmental groups (i.e., NGOs)	Mid/Long-term
	Draft guidelines and identify BAT to monitor and mitigate the potential impacts of port-related activities on marine mammals and their habitat	Contracting Parties	CTS	Pelagos WGs, Consultants	Short/Mid-term

<sup>20</sup> Vancouver Fraser Port Authority launched the Enhancing Cetacean Habitat and Observation (ECHO) Program. <https://www.portvancouver.com/environmental-protection-at-the-port-ofvancouver/maintaining-healthy-ecosystems-throughout-our-jurisdiction/reducingunderwater-noise/>

	Disseminate tools for boaters, via the collaborative programmes, to raise awareness on the “special” status of the port area ( <i>i.e.</i> , ports/marinas of the Pelagos Sanctuary SPAMI, PSSA)	Port management authorities, ports public authorities	Secretariat	CTS, Pelagos WGs	Short/Mid-term
Research and Innovate	Encourage to adopt standardized protocols to collect, analyse and interpret data on port-related activities that can directly or indirectly impact marine mammals and their habitat	Contracting Parties	Port Public Authorities/port management entities	CTS, Pelagos WGs	Mid-term
	Encourage to conduct monitoring of port-related activities that can directly or indirectly impact marine mammals and their habitat	Contracting Parties	Public Port Authorities/port management entities	CTS, Pelagos WGs	Mid-term
	Encourage data sharing among the three Contracting Parties to assess the impact and the level of impact of port-related activities	Contracting Parties	Public Port Authorities/port management entities	Secretariat, CTS, Pelagos WGs	Mid-term
	Encourage the application the most up-to-date procedures and BAT to mitigate the potential impact of port-related activities on marine mammals and their habitat	Contracting Parties	National authorities/ Public Port Authorities/port management entities	Secretariat, CTS, Pelagos WGs	Mid-term
	Plan and take action	Support incentive schemes to encourage the adoption of best practices by port users and stakeholders	Contracting Parties	National authorities/ Public Port Authorities/port management entities	Secretariat, CTS, Pelagos WGs
Encourage the adoption and implementation of port management plans that consider actions aimed at mitigating the potential impact of port-related activities on marine mammals and their habitat		Contracting Parties	Public Port Authorities/port management entities	Secretariat, CTS, Pelagos WGs	Mid/Long - term



## Section II: Noise pollution

**Table 8.** Summary of the recommendations for Noise Pollution. CTS: the Scientific and Technical. Pelagos WGs: Pelagos Working Groups. The period referred to the Pelagos Management and Action Plan (2022- 2027) with anything below two years to be short-term and anything requiring a period beyond 2027 as medium to long term.

Recommendation/Action on NOISE	Who is it addressed to	Leader/Project manager	Partner	Timing to implement the action
Encourage the implementation of Underwater Noise Management Plans <sup>21</sup>	Contracting Parties	Public Port Authorities/Port management entities	Secretariat, CTS, Pelagos WG Impact (sub-WG Noise)	Mid/Long-term
Encourage the development of long-term noise monitoring plans <sup>22</sup>	Contracting Parties	National Authorities/ Port public authorities	Secretariat, CTS, Pelagos WG Impact (sub-WG Noise)	Mid/Long-term
Encourage the adoption the most updated guidelines and BAT (see ACCOBAMS Resolutions 7.13 (2022), and the Annex 2 Section D) <sup>23</sup>	Contracting Parties	National Authorities/ Public Port Authorities/port management entities	Secretariat, CTS	Short-term
Encourage the adoption of the "ACCOBAMS Methodological guide: Guidance on underwater noise mitigation measures"	Contracting Parties	National authorities/ Public Port Authorities/port management entities	Secretariat, CTS	Short-term
Encourage the contribution to national Noise Registers for impulsive noise	Contracting Parties	National Authorities	Public Port Authorities/Port management entities	Mid-term

<sup>21</sup> The mitigation of underwater noise can be improved by establishing Underwater Noise Management Plans (UNMP), especially if developed in consultation with the relevant stakeholders. Ports can play a crucial role in monitoring, and mitigating Underwater Radiated Noise from commercial vessels, through the use of appropriate technologies and the adoption of policy measures, such as speed reduction and incentive schedules (Vakili *et al.*, 2020).

<sup>22</sup> At least with reference to commercial ports, implementing Underwater Listening Station to measure noise emissions of vessels entering and exiting the port as well as cetacean vocalizations), including standardized methodologies to evaluate the noise emission within ports of the Pelagos Sanctuary area.

<sup>23</sup> Such as Bubble curtains, Hydrosound Dumper, Cofferdam, IHC Noise Mitigation System), as reported in detail in the updated "ACCOBAMS Methodological guide: Guidance on underwater noise mitigation measures" with specific regards to port developments activities (i.e.: pile driving, drilling, dredging and explosive).

Support the adoption of incentive schemes to encourage the use of mitigating measures by port and port users ( <i>i.e.</i> , adopting quiet technologies and/or voluntary vessel speed reduction) <sup>24</sup>	Contracting Parties	National Authorities/ Public Port Authorities/port management entities	Shipping industry, Certification bodies, Pelagos WGs	Mid-term
Recommend to avoid using sound based anti-fouling systems within the Pelagos Sanctuary area	Contracting Parties	National Authorities/ Public Port Authorities/port management entities	Shipping industry, NGOs, Local communities	Short-term

## Section II: Waste - Plastic pollution

**Table 9.** Summary of the recommendations for Waste-Plastic Pollution. CTS: the Scientific and Technical. Pelagos WGs: Pelagos Working Groups. The period referred to the Pelagos Management and Action Plan (2022- 2027) with anything below two years to be short-term and anything requiring a period beyond 2027 as medium to long term.

Recommendation/Action on WASTE- PLASTIC	Who is it addressed to	Leader/Project manager	Partner	Timing to implement the action
Encourage the implementation of port waste management plans to optimize the adequacy of PRFs, with a particular focus on plastics and end-of-life fishing gear <sup>25</sup>	Contracting Parties	Public Port Authorities/port management entities	Secretariat, STC, Pelagos WG Impact	Mid-term

<sup>24</sup> Ports can propose recommended standards for different types of vessels with consideration of actions that can improve both ship efficiency and underwater noise pollution mitigation, and those that comply with them can be provided with a certificate of quiet technology, in order to qualify for the presented incentives (*i.e.* port fees reduction or priority berth access in high season).

<sup>25</sup> It is generally acknowledged that the adequacy of PRFs can be improved by establishing up-to-date Port Waste Management Plans (PWMP), especially if developed in consultation with the relevant stakeholders (also following Directive (EU) 2019/883 of the European Parliament and of the Council of 17 April 2019 on port reception facilities for the delivery of waste from ships). Waste Management Plans play a key role in achieving a sustainable waste management in general, as they give an overview of all waste generated (including imported, and by specific waste streams) and treatment options for this waste. In the framework of PWMP, ports should collaborate with fishing operators and organizations to ensure that adequate facilities are provided for end-of-life fishing gear. Reference to best practices on PWMPs can be made to the Guidance Document on Developing Port Waste Management Plans, By Peter Van den dries, IMO Consultant Brussels, Belgium, published by the International Maritime Organization and Peer Reviewed by the Food and Agriculture Organization of the United Nations, London, 2022.



Encourage to undertake specific mitigation procedures and BAT to prevent the dispersal and accumulation of plastic debris	Contracting Parties	National Authorities/ Public Port Authorities/port management entities	National authorities, Secretariat, CTS, Pelagos WG Impact	Mit-term
Encourage the adoption of mitigation measures ( <i>i.e.</i> , recently proposed by ACCOBAMS)	Contracting Parties	National Authorities/ Public Port Authorities/port management entities	Secretariat, CTS, Pelagos WG Impact, ACCOBAMS	Short/Mid term
Support the identification of hot-spot areas for marine litter accumulation	Contracting Parties	Public Port Authorities/port management entities	CTS, Pelagos WGs, ACCOBAMS	Mid-term
Promote agreements with fishing gear manufacturers and recycling businesses to maximize opportunities for cost-effective and environmentally responsible disposal of waste	Contracting Parties	Public Port Authorities/port management entities	Secretariat, Recycling businesses, Fishing gear industry, NGOs	Short/Mid-term
Support initiatives to encourage the fishing communities to collect and discharge waste ( <i>e.g.</i> , 'Fishing for Litter' and UTO <sup>26</sup> )	Contracting Parties	Public Port Authorities/port management entities	Secretariat, CTS, Pelagos WGs Impact and Communication, Fishing communities, NGOs	Mit-term
Support initiatives to educate and engage communities in plastic pollution prevention ( <i>e.g.</i> , Clean Sea Campaign <sup>27</sup> )	Contracting Parties	Public Port Authorities/port management entities	Secretariat, CTS, Pelagos WGs Impact and Communication, Shipping companies, Local and Fishing communities, Scientist, Technology developers, NGOs	Short/Mid-term

<sup>26</sup> Some virtuous examples in this sense are in fact the Fishing for Litter Scheme adopted by OSPAR in 2016 and incorporated in its Regional Action Plan and the Upcycling the Oceans ("UTO") projects.

<sup>27</sup> UNEP Clean Sea Campaign launch in 2017, has become a catalyst for change, transforming habits, practices, standards and policies around the globe. To date, 69 countries have joined, making the CSC the biggest global coalition devoted to ending marine plastic pollution. <https://www.cleanseas.org/about>.



Implement awareness campaigns to inform and educate on the responsible use of the PRFs	Port public authorities/Port management authorities	Secretariat	CTS, Pelagos WGs Impact and Communication, NGOs	Short/Mid-term
Encourage to avoid using single-use plastics	Port public authorities/Port management authorities	Secretariat	Sipping companies, Businesses within the port/port users/ Local communities/ RAMOGE	Short-term

### Section III: Port Environmental Certifications

Recommendations on port environmental certifications are summarized in Table X and Y (See Deliverable 4 for details).

It would be highly beneficial that ports adopt the environmental certifications currently available to ports of the three Contracting Parties, while ensuring that additional and specific criteria are envisaged (Figure 14 and 15), to take account of the specificity of the area and the objectives of the Pelagos Agreement.

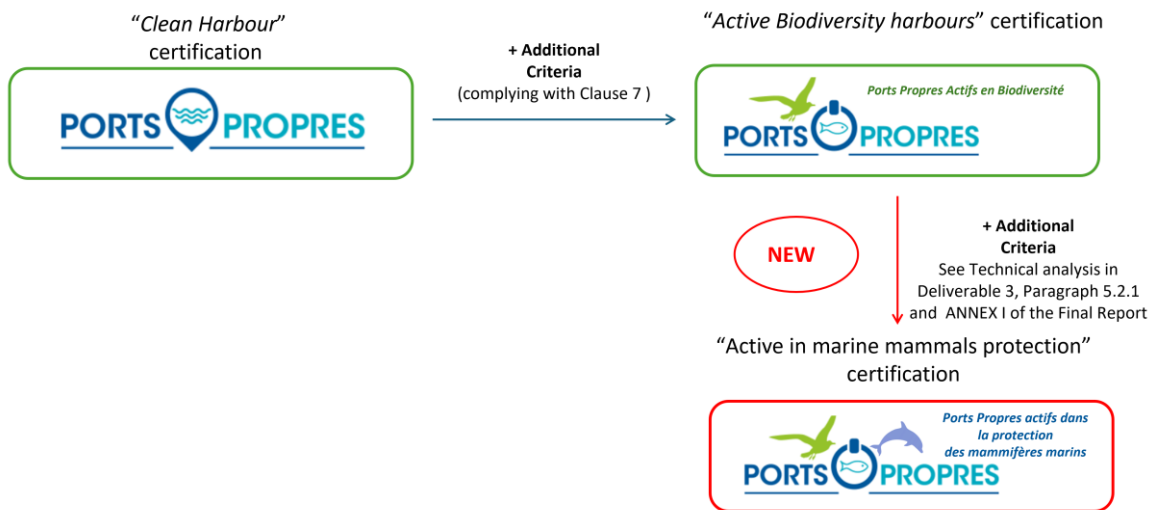
See Annex I for the Step-by-step Recommendations and related technical analysis to guide the envisaged expansion and integration of the Ports Propres ISO 18725 and Blue Flag programme current requirements.

**Table 10.** Summary of the recommendations on port certifications. CTS: the Scientific and Technical. Pelagos WGs: Pelagos Working Groups. The period referred to the Pelagos Management and Action Plan (2022- 2027) with anything below two years to be short-term and anything requiring a period beyond 2027 as medium to long term.

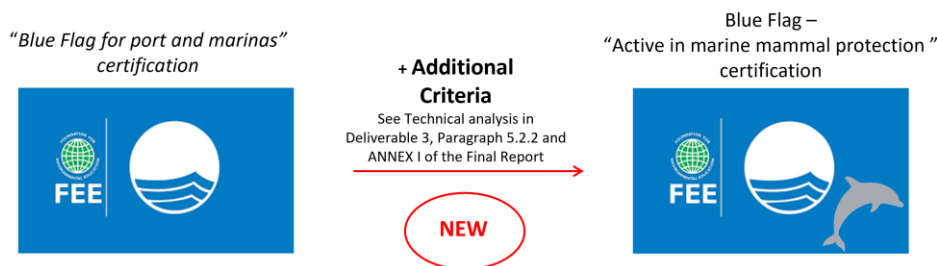
Recommendations/Action on ENVIRONMENTAL PORTS CERTIFICATIONS	Who is it addressed to	Leader/Project manager	Partner	Timing to implement the action
Encourage the adoption of at least one of the environmental certifications currently available ( <i>Ports Propres</i> and more specifically <i>Ports Propres Actifs en Biodiversité</i> <sup>28</sup> and/or Blue Flag)	Contracting Parties	Port management entities	UPACA/AFNOR, FEE, Secretariat, CTS, Pelagos WGs, Call 5 consultants	Short-term

<sup>28</sup> The optional *status of Ports Propres Actifs en Biodiversité* requires the commitment to more specific and additional environmental standards, complying with Clause 7 “Optional suite: active biodiversity harbours” and the specified criteria (18-24). See Deliverable 3 (Paragraph 6.3) and 4 (Chapter 5, Section 3, Paragraph 5.2.1) for details.

Expand existing criteria of the available certifications to address specifically the protection of marine mammals <sup>29</sup>	Contracting Parties	UPACA/AFNOR, FEE	Secretariat, CTS, Pelagos WGs, Call 5 consultants	Mid/Long-term
Eventual creation of a specific (sub) certification/label for the ports complying with additional criteria introduced to take into account the protection of marine mammals and their habitat (e.g., “Ports Propres actif dans la protection des mammifères marins” and Blue Flag - Active in marine mammal protection. See Image box below)	Contracting Parties	UPACA/AFNOR, FEE	Secretariat, CTS, Pelagos WGs, Call 5 Consultants	Mid/Long-term



**Figure 14.** Diagram showing Port Propres potential specific sub-certification process in an ideal, long-term scenario, also in the light of giving the ports a recognition for the additional actions taken to protect marine mammals and their habitats the protection of marine mammals.



**Figure 15.** Diagram showing Blue Flag for port and marinas potential specific sub-certification process in an ideal, long-term scenario, also in the light of giving the ports a recognition for the additional actions taken to protect marine mammals and their habitats the protection of marine mammals.

<sup>29</sup> An analysis carried out by consultants to guide and presented in Deliverable 4, has already identified specific criteria that could serve expansion and integration of the Ports Propres ISO 18725 and Blue Flag Program.

## Considerations on commercial ports

**Table X.** Summary of the recommendations on commercial port. CTS: the Scientific and Technical. Pelagos WGs: Pelagos Working Groups. The period referred to the Pelagos Management and Action Plan (2022- 2027) with anything below two years to be short-term and anything requiring a period beyond 2027 as medium to long term.

Recommendation/Action on COMMERCIAL PORTS	Who is it addressed to	Leader/Project manager	Partner	Timing to implement the action
Incorporate the Cross-cutting Recommendations, as well as those related (but not limited) to noise and plastic pollution into their environmental management system and strategies ( <i>i.e.</i> , within EMAS system)	Contracting Parties	Public Port Authorities	TSC/ Pelagos WGs	Mid/Long-term
Propose, within the IMO, policies aimed at mitigating to the so-called naval gigantism (mega ships)	Secretariat/Contracting Parties	IMO	TSC/MAP Co- ordination Unit of the Barcellona Convention	Mid/Long-term

## 5. ROADMAP FOR THE IMPLEMENTATION OF THE RECOMMENDATIONS

As a communication strategy is key to the positive implementation of the Recommendations<sup>30</sup>, the Call also provided a technical analysis with suggested steps and actions in Deliverable 5 “Roadmap for the implementation of the recommendations to raise awareness among port authorities, shipping companies, tourism organisations and recreational boaters on good practices in sustainable port activities”.

The Roadmap summarized below (see Deliverable 5 for details and additional information) is developed with reference to each of the guiding principles of the Recommendations: Engage and Educate, Research and Innovate,

<sup>30</sup> Effective communication is the ability to share information and ideas clearly, concisely, and persuasively. Kindersley (2022) and Robbins & Coulter (2020) define effective communication as the process of transmitting information to others in a way that they understand and can act on. According to McQuail & Deuze (2020), effective communication can be defined as a process of exchanging information between a sender and a receiver in which both parties seek to find mutual meaning. Effective communication involves clear and concise messaging, active listening, and feedback to ensure that the intended message is received and understood.

Plan and Take Action <sup>31</sup>, as well as for the implementation of the Recommendations on port environmental certifications.

### **Engage and Educate: Transform ports in hubs of opportunities**

The overall message is to make the stakeholders aware of the potential of ports to become centres for the promotion of sustainable actions for the protection of the marine environment, thus contributing to the objective of the Pelagos Agreement. Three different aspects have been specifically considered:

#### **a. Development of collaborative programmes: Transform ports in hubs of opportunities**

Contracting Parties should start a proactive dialog with Public Port Authorities, port management entities and their associations, developing collaborative programs endorsed by the Pelagos Agreement, also through dedicated tools, to address the potential impact of port-related activities - especially those of particular concern, such as the introduction of underwater noise and debris, principally plastic - and assess their potential to participate in or lead conservation actions.

Within the framework of future collaborative programmes, it will be then necessary to discuss the possibility to:

- promote the conclusion of agreements with both fishing gear manufacturers and recycling businesses to maximize opportunities for cost-effective and environmentally responsible schemes for the disposal of waste originated from ports and their users/boats;
- support initiatives to encourage the fishing communities to properly collect and discharge waste (*e.g.*, 'Fishing for Litter' and UTO, see Deliverable 3 for details on these good practices);
- support initiatives to educate and engage communities in plastic pollution prevention (*e.g.*, Clean Sea Campaign, see Deliverable 3 for details on these good practices);
- promote the adoption of incentive schemes to encourage the use of mitigating measures for underwater noise emissions (*e.g.*, adopting quiet technologies and/or voluntary vessel speed reduction, based on the experiences of the ECHO Programme of the Vancouver Fraser Port

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<sup>31</sup> These three topics can be considered as the three main aspects (or "slogan") to communicate through the awareness campaign with the objective to inform the various stakeholders involved about the potential impact of port-related activities, encouraging them to take action to minimise their impact on marine mammals and their habitat.

Authority and the Prince Rupert Port Authority (Canada) or the noise management plan of the Port of Seattle (USA)<sup>32</sup>).

**b. Draft guidelines to monitor and mitigate the potential impacts of port-related activities on marine mammals and their habitat**

Contracting Parties, in consultation with the CTS of the Pelagos Agreement, with the involvement of the Pelagos WGs, should develop specific Pelagos Sanctuary guidelines and identify the Best Available Technologies (BAT) to monitor and mitigate the potential impact of port-related activities on marine mammals and their habitat, with the main aim to promote among ports the voluntary adoption of such guidelines and mitigation measures, giving priority to those related to noise and plastic pollution<sup>33</sup>.

A second step will be to make these available to all port personnel operating in the Pelagos Sanctuary, through a dedicated training course.

**c. Dissemination of tools for boaters, via the collaborative programmes, to raise their awareness**

The first message to convey is that pilot books, navigation systems, and the port itself should clearly mention that the area is located within the Pelagos Sanctuary, which is a Specially Protected Area of Mediterranean Importance (SPAMI), and within the Northwestern Mediterranean Particularly Sensitive Sea Area (NW Med PSSA)<sup>34</sup>.

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<sup>32</sup> Vancouver Fraser Port Authority launched the Enhancing Cetacean Habitat and Observation (ECHO) Program. <https://www.portvancouver.com/environmental-protection-at-the-port-ofvancouver/maintaining-healthy-ecosystems-throughout-our-jurisdiction/reducingunderwater-noise/>

The Vancouver Fraser Port Authority and the Prince Rupert Port Authority (British Columbia, Canada) have offered incentives (as discount in harbour dues) to ships using quieting technology or with quiet notations since 2017, making Canada the first country to provide such incentives.

<https://www.portvancouver.com/environmental-protection-at-the-port-ofvancouver/climate-action-at-the-port-of-vancouver/ecoaction-program>

<sup>33</sup> See Deliverable 3 “Review of existing guidelines, good practices, charters for sustainable ports” for reference. In particular, the following materials should be considered:

- the existing guidelines (such as international Resolution and Guidance on Noise and Plastic litter (see details in Deliverable 1c and 4);
- the specific mitigation procedures and the BAT to prevent the dispersal and accumulation of plastic litter (see Deliverable 3). CONTROLLARE I RIFEIRIMENTI E RENDERLI COERENTI CON LE RACCOMANDAZIONI IN TABELLA

<sup>34</sup> In the port, the presence of the Pelagos Sanctuary should be highlighted through a visual communication campaign supported by dedicated information panels or promoting campaigns with fixed installations (such as [Pelagos Discovery Bordighera](#)) and photo exhibition (e.g., Greg Lecour - [We are Mediterranean](#)). The existence of the Sanctuary should also be mentioned in the information material given to boaters who register at the port upon arrival or book a berth (e.g., by including a reference to the Pelagos Agreement and its scopes in the contractual documents used for renting berths to boaters).



Then, Public port Authorities and port management entities should provide to port users clear information on how to behave to minimize their impact on marine mammals and their habitat.

With particular reference to the identified priority pressures, such as noise and plastic, the information provided should:

- highlight the effects that noise and marine litter, especially plastics, have on marine mammals, as well as the measures to prevent land- and ship-related litter pollution and underwater noise pollution;
- encourage boaters to avoid the use of sound based anti-fouling systems in the Pelagos Sanctuary area;
- encourage boaters and all stakeholders operating within ports to avoid single-use plastics and joined initiative such as "[plastic free](#)";
- educate boaters to a responsible use of the PRFs.

While Contracting Parties and the Secretariat/CTS should develop and disseminate *ad hoc* materials (such as infographics, short texts, dedicated sections of the Pelagos Agreement Website, QR codes etc.), the following existing materials should be also shared:

- the "Code of Good Conduct for Whale Watching in the Mediterranean" developed by Pelagos/ACCOBAMS;
- good practices described in the guide "*Breve guida per il diportista consapevole kit informativo per gli Ambasciatori Pelagos*", developed by ISPRA for the Pelagos Agreement, in collaboration with RAMOGE Agreement, and "*Il diportista ecologista, miniguia alla sostenibilità: i prodotti ecolabel UE*".

### **Research and Innovate: Create a knowledge network**

The overall message is that the port can make a fundamental contribution to improving knowledge of the potential impacts of port-related activities on marine mammals and their habitat, and that this will help to better understand and quantify the benefits of mitigation measures.

Contracting parties should start a dialogue with Public Port Authorities and port management entities to encouraged them to monitor their activities through the adoption of standardised measurement and analysis protocols, in order to obtain indicators to quantify not only the impact of their activities but, more importantly, the benefits that the adoption of good practices and mitigation measures have on the marine environment.



This will allow the port to verify the effectiveness of its actions, contribute to the development and refinement of best practices and mitigation actions, and provide a tool to highlight the port's contribution to achieving sustainability targets.

### **Plan and Take Actions: Contracting Parties in action**

Overall message is the opportunity to integrate suggested recommendations, good practices and BAT into their management plans, increasing sustainability of their activities.

Main message is encouraging the adoption and implementation of port management plans with reference to specific actions aimed at mitigating the potential impact of port-related activities, giving priority to the implementation of:

- underwater noise management plans;
- port waste management plans to optimize the adequacy of PRFs, with a particular focus on plastics of end-of-life fishing gear.

### **Strategy for the implementation of the recommendations on port environmental certifications**

Considering that the adoption of an environmental certification remains a voluntary practice by individual ports, the best implementation strategy in this respect necessarily involves specific institutional exchanges with Public Port Authorities, port management entities and their associations, in order to explain the importance of its adoption and discuss the intention and feasibility of its implementation by the ports.

In order to give visibility and try generating a cascading effect, a dedicated web page on the Pelagos Agreement website can be developed, where the list of the ports adopting an environmental certification is reported, together with information related to the relevant activities carried out for the protection of marine mammals and their habitat.

With the aim of trying to expand existing criteria of the available certifications to address specifically the protection of marine mammals and evaluate the eventual creation of a specific (sub) certification/label for the ports complying with these additional criteria (e.g., *“Ports Propres actif dans la protection des mammifères marins”* and Blue Flag - Active in marine mammal



protection. See Figure 14-15), a dialogue with the managing bodies has already been established<sup>35</sup>.

It has to be noted that besides the environmental certifications of *Port Propes* and Blue Flag actually available to the ports of the Pelagos Sanctuary, the Green Marine voluntary environmental certification program for the maritime industry recently announced - during Roundtable of 13 March 2025 at the CMA CGM Headquarters in Marseille - that starting from 2026, Green Marine Europe will be open to certify European ports. As reported by the General Manager of Green Marine Europe talks with the port of La Spezia (Italy) already started.

On this regard, bearing in mind that this certification already takes into account underwater noise from ships and from port activities<sup>36</sup>, it would be highly beneficial to consider a future collaboration with the Pelagos Agreement.

## 6. CONCLUSIONS

The work carried out under this Call shows that the Pelagos Sanctuary is characterised by the presence of numerous ports scattered throughout the protected area, with different functions ranging from tourism to commercial, including military, and fishing.

The area is home to large and important commercial ports and, above all, a dense network of tourist harbours that cater for recreational boating, a sector that has seen significant growth in the Mediterranean in recent decades, with a consequent increase in the development of marinas.

Ports, with their diverse activities, may represent a source of cumulative impact acting on the marine environment. The activities carried out in ports can

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<sup>35</sup> A preliminary meeting was arranged on March 2025 by the Call 5 consultants, during which the project was introduced to the representatives of FEE Italy. The consultants recalled that this could be a great opportunity for FEE to work with the Pelagos Agreement on the common objective of making the ports of the Pelagos Sanctuary a proficient vehicle of awareness and positive actions. The representatives of FEE Italy expressed their willingness to (i) consider the introduction of additional criteria that specifically take into account the objectives promoted by the Pelagos Agreement with regard to sustainable ports for the protection of marine mammals and (ii) continue to dialogue on this matter, involving also the FEE France.

<sup>36</sup> This voluntary environmental certification program has recently included two indicators on underwater noise from ships and from port activities, the latter defined as “*Manage underwater noise sources during ongoing activities, development/construction, and/or port maintenance activities to reduce impacts to marine mammals*” in its North American environmental certification program. Their goal is to specifically reduce the impact of noise on marine mammals. It’s an evaluation that addresses key environmental issues through a total of 14 performance indicators, including underwater noise. Among all the certified ports, Vancouver Fraser Port Authority is the one with the highest underwater noise performance.

<https://green-marine.org/certification/performance-indicators/underwater-noise/>

See Deliverable 3, Paragraph 2.2.3 Best practice examples for further details.



represent a source of pressure that may directly or indirectly affect marine mammals, especially small resident populations of coastal species.

Among the activities with a potential direct impact on marine mammals, those that introduce underwater noise and litter - particularly plastic - are of particular concern.

During the Call emerged that available best practices, mitigation measures and guidelines are not harmonised between the three Pelagos Sanctuary Member States, or in some cases not yet implemented (*e.g.*, with regard to the use of ultrasonic anti-fouling systems).

The Recommendations developed seek to respond to this need to harmonise guidelines and standardise data collection, in order to be able to quantify the potential impact of ports not only to better understand the phenomenon itself, but also to quantify the benefits of adopting mitigation measures.

It is our shared belief that ports could become catalysts for good practice, if they are supported by Contracting Parties – best case scenario, through dedicated incentive systems – and the Pelagos Agreement and taking advantage of the existing (and future) port environmental certifications.

During this Call, a favourable trend has been recorded in this respect, as more and more tourist ports are indeed complying with the rules necessary to obtain environmental recognized (even through ISO) certifications. Likewise, port authorities of large commercial ports voluntarily adhere to eco-management systems/schemes enhancing their environmental performance (such as EMAS). Moreover, some port authorities are even voluntarily submitting sustainability reports regarding their activities (such as the Port System Authorities of the Western Ligurian Sea and the Northern Tyrrhenian Sea).

The Contracting Parties of the Pelagos Agreement can further encourage this positive trend by adopting the Recommendations developed in this Call, which aim to fill the gap in the existing environmental certifications and in the environmental acts adopted by the Port Authorities (managing commercial ports), regarding specific measures and actions to protect marine mammals and their habitat. In addition, this approach will enable all these ports to fully comply with the recently adopted EU technical screening rules to determine whether an activity meets the environmental objectives (namely, the conservation of marine resources and the protection of marine ecosystems) set out in the EU taxonomy legislation (Regulation 852/2020/EU) not only in terms of access to certain public contributions, but also because, by becoming sustainable ports, they will be



more competitive with respect to port users who are increasingly concerned about respecting the marine environment.

It is our shared belief that ports should become centres for the promotion of sustainable actions for the protection of the marine mammals and their environment, thus contributing to the objective of the Pelagos Agreement.

As hubs of opportunity, ports should promote collaborative projects through stakeholder involvement, contribute to raising awareness and knowledge on the potential impact of their activities on marine mammals and their habitat and, most importantly, develop new technologies or strategies to mitigate these impacts: but it is only by acting in synergy with each other that they can become drivers of change.

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## ANNEX I

### STEP-BY-STEP RECOMMENDATIONS AND RELATED TECHNICAL ANALYSIS FOR SELECTED PORT ENVIRONMENTAL CERTIFICATIONS

The Secretariat, in consultation with the Technical and Scientific Committee of the Pelagos Agreement and Pelagos Working Groups, is invited to consider the technical analysis provided in this Annex, to guide the envisaged expansion and integration of the *Ports Propres* ISO 18725 and Blue Flag programme current requirements.

Once agreed upon by the Contracting Parties, the additional requirements could be submitted for evaluation, respectively, to UPACA and FEE.

Therefore, specific step-by-step specific recommendations with reference to *Ports Propres* ISO 18725 and the Blue Flag programme are also provided below.

#### **PORT PROPRES (AFNOR)**

##### **Background**

The certification “*Ports Propres*” (Clean harbours) and the additional “*Ports Propres Actifs en Biodiversité*” (Active Biodiversity harbours) have been developed by the “*Union des Ports de Plaisance Provence Alpes Côte d'Azur et Monaco*” (UPACA), which represents tourist ports’ management in the Provence Alpes Côte d'Azur and Monaco regions. Almost all touristic ports situated in the above region and the ports of the Principality of Monaco are members of the UPACA. Based on the auditor’s report, the above certification decision is made by the technical committee of the French company AFNOR. The certification is issued for a period of 3 years with maintenance audits taking place every year.

Since June 2024, the above certifications enjoy international recognition, following the transformation of the French standard into **ISO 18725** Tourism and related services - Yacht harbours and dry stacks - Requirements for clean harbours and active biodiversity harbours<sup>37</sup>. The ISO 18725 International standard is applicable not only to tourist/yacht ports and marinas, but also to mixed purpose ports (recreational and fishing/trade) and dry stacks, regardless of the public/private authorities and type of management in charge of the concerned port.

The certification is based on the acknowledgement that port-related activities, such as leisure boat and yachting, as well as the development of touristic ports, can influence significantly the surrounding environment and its biodiversity. On the other hand, it is made clear that ports can have a major role in the fight against pollution, providing a significant contribution to the preservation and restoration of marine

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<sup>37</sup> Tourisme et services connexes - Ports de plaisance et ports à sec - Exigences pour les ports propres et ports propres actifs en biodiversité. The International Standard ISO 18725 First edition 2024-06 document was prepared by Technical Committee ISO/TC 228, Tourism and related services.



ecosystems, helping to monitor the quality of the water and promoting environmental awareness, if guided by an optimal technical and environmental approach towards the implementation of a quality environmental policy.

The required approach includes:

- an environmental diagnostic study;
- the implementation of an environmental policy;
- the installation of equipment to fight pollution and to restore the natural environment;
- personnel training;
- the education of yacht harbour users.

Furthermore, the approach shall be adapted to take into account the specific characteristics of each harbour.

In order to obtain the ISO 18725 related to Ports Propres, the port shall adopt a quality environmental policy following Clause 4 “Clean harbour policy statement”, Clause 5 “Implementation of a clean harbour strategic approach”, and Clause 6 “Strategic approach management”. For each Clause, specific criteria are provided (1-17).

The optional *status* of *Ports Propres Actifs en Biodiversité* requires the commitment to more specific and additional environmental standards, complying with Clause 7 “Optional suite: active biodiversity harbours” and the specified criteria (18-24).

#### **STEP BY STEP RECOMMENDATIONS RELATED TO PORT PROPRES CERTIFICATION:**

##### **The Pelagos Contracting Parties should:**

**Step 1:** encourage all the port management authorities (and/or their main associations, namely UPACA) of the Pelagos Sanctuary to comply with the certification requirements of the *Ports Propres Actif en Biodiversité*. (and not only limited to the certification *Ports Propres*);

**Step 2:** invite UPACA - in consultation with the Metropole Nice Cote d’Azur, the SEPM and the Chambers of Commerce that manage the “ports maritimes” (e.g. the 6 Corsican ports) - to require the integration – through AFNOR - of the actual criteria required to be certified as *Ports Propre Actif en Biodiversité*, with additional criteria specifically dedicated to the mitigation of the potential impact of port-related activities to marine mammals. Compliance with the additional criteria will allow ports to apply for a new *status* of “*Ports Propres*”



*actif dans la protection des mammifères marins*” within the ISO 18725 certification (see technical analysis below).<sup>38</sup>

**Step 3:** encourage all the ports of the Pelagos Sanctuary to be certified as “*Ports Propres actif dans la protection des mammifères marins*”.

### TECHNICAL ANALYSIS:

The following paragraphs set out a technical analysis of the recommended integrations to the ISO 18725 criteria that the Secretariat and the Technical and Scientific Committee of the Pelagos Agreement, once agreed upon with the Contracting Parties, could submit to the promoter of the ISO 18725 (*i.e.*, UPACA), which on turn should mandate in this respect the certifying body (*i.e.*, AFNOR), to be certified as “*Port Propres actifs dans la protection des mammifères marins*”. In particular, the proposed integrations are related to two of the clauses and one Annex of the ISO 18725:

- **In ISO 18725, Clause 5.2.2 “Pollution and waste treatment”, Table 1**, among the one already listed, it should be considered adding the following specific requirements:
  - *a criterion related to plastic pollution*, to encourage the adoption of BAT to prevent the dispersal and accumulation of waste, particularly at sea, such as Seabins (*i.e.*, floating baskets capable of collecting around 500 Kg of floating waste from the water per year, including plastics, microplastics and microfibers), Trash Collector (*i.e.*, a device installed at accumulation points, capable of capturing up to 1.5 tons of waste per year, including microplastics), Pixie Drone (*i.e.*, a drone guided by a remote control with a range of 500 meters, capable of intercepting up to 60 kg of large waste during each mission in the water surface);
  - *a criterion referred to the use of alternative technologies (i.e., suction pumps)* for floating waste, macro-waste and applicable also to hydrocarbons removals, (such as DPOLs®);
  - a criterion to encourage the delivery of all the sewage to the port reception facility, also considering setting up specific incentives for ports users;
  - a criterion related to sea water quality and monitoring, encouraging the use of smart sensors for environmental/water quality monitoring, such as the Water Module<sup>39</sup>;

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<sup>38</sup> The amendment procedure should be carried out in accordance with the editorial rules of the ISO Directives. [www.iso.org/directives](http://www.iso.org/directives)

<sup>39</sup> <https://sinay.ai/en/sinay-hub/water-module/>



- a criterion related to underwater noise pollution and reporting actions to mitigate the noise pollution generated by port-activities (see recommendation in paragraph 4.1 - Noise Pollution). In particular, a dedicated Underwater Noise Management Plan (UNMP) would be beneficial in order to comprise specific reference to actions aimed at mitigating the potential impact generated by port-activities and ships, covering implementation methods, plan monitoring, roles and responsibilities, and commitment of all stakeholders involved.
- **In ISO 18725, Clause 5.3.1 “Training and awareness of yacht harbour personnel”, Table 5 – Criteria for training and awareness”,** it should be considered including:
  - reference to training dedicated to yacht harbour personnel on marine mammals presence, ecology and threats and that includes actions and BAT to mitigate the potential impact that port-related activities may have on them and their habitat, with contents agreed and validated by the competent bodies of the Pelagos agreement.
  - **In ISO 18725, Annex C “Examples of actions to preserve biodiversity in yacht harbours”,** it should be considered adding the following specific references to:
    - the respect of the Code of Good conduct for Whale Watching in the Mediterranean Sea established by Pelagos and ACCOBAMS Agreements for cetacean observation aimed at respecting marine mammals in their habitats<sup>40</sup>;
    - the recommendations provided in this document with reference to Noise pollution and Waste - Plastic pollution.

## BLUE FLAG PROGRAMME FOR PORTS AND MARINAS (FEE)

### Background

The Blue Flag programme for beaches, marinas and tourism boats is run by the international, non-governmental, non-profit organisation FEE (the Foundation for Environmental Education). The Blue Flag programme was started in France in 1985, it has been operating in Europe since 1987 and in extra EU areas since 2001 when South Africa joined. Today, Blue Flag has become a truly global programme with an ever-increasing number of participating countries.

The Blue Flag programme promotes sustainable tourism development in freshwater and marine areas, challenging to achieve high standards in a total of six categories: water quality, environmental management, environmental education and information, safety and services, social responsibility and responsible operation around wildlife.

<sup>40</sup> <https://pelagos-sanctuary.org/wp-content/uploads/2023/11/Code-of-good-conduct.pdf>



The “explanatory notes for tourist ports and marinas 2025”<sup>41</sup> provide 25 criteria that can be either mandatory (*i.e.*, the tourist port or marina must comply with them in order to be awarded the Blue Flag) or non-mandatory (*i.e.*, it is preferable that they are complied with).

In the same explanatory notes, it is emphasised that the Blue Flag criteria are minimum criteria and that a national programme may choose to adopt stricter criteria.

It is strongly advised that the ports and marinas of the Pelagos Sanctuary consider and adopt additional measures, when adhering to the Blue Flag programme.

Therefore, the following sections identify specific step-by-step recommendations and a technical analysis with reference to the mandatory and non-mandatory criteria currently adopted by FEE, to ensure that the port of the Pelagos Sanctuary also considers specific measures to mitigate the potential impact of its activities with respect to marine mammals.

### **STEP-BY STEP RECOMMENDATIONS RELATED TO THE BLUE FLAG PROGRAMME FOR PORT AND MARINAS:**

#### **The Contracting Parties should:**

**Step 1:** encourage the ports of the Pelagos Sanctuary to comply with the Blue Flag programme for port and marinas.

**Step 2:** invite FEE, through its local organizations, to evaluate the integration of new criteria specifically dedicated to the mitigation of potential impact of port-related activities to marine mammals. The ports of the Pelagos Sanctuary should comply with the additional criteria in order to obtain the additional label “Blue Flag - Active in marine mammal protection”.

**Step 3:** encourage all the ports of the Pelagos Sanctuary to meet the criteria to be eligible as “Blue Flag - Active in marine mammal protection”.

### **TECHNICAL ANALYSIS:**

The following paragraphs set out a draft of the recommended technical integrations to the Blue Flag criteria, as listed in the “explanatory notes for tourist ports and marinas 2025”, that the Secretariat and the Technical and Scientific Committee of the Pelagos Agreement, once agreed upon with the Contracting Parties, could submit to FEE, in order to create the additional label of ports and marinas “Blue Flag - Active in marine mammal protection”.

In particular, the following integrations to six Blue Flag current criteria, are proposed:

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<sup>41</sup> Current version available at:

[http://www.bandierablu.org/public/questionario/2025/BF25\\_Note%20espliative\\_Approdi.pdf](http://www.bandierablu.org/public/questionario/2025/BF25_Note%20espliative_Approdi.pdf)



**In Criterion 1 “Information on locally relevant ecosystems and environmental phenomena shall be available to the users of the port/marina”,** it should also be required that ports:

- (i) inform port users and boaters that the port is situated within the Specially Protected Area of Mediterranean Importance (SPAMI) of the Pelagos Sanctuary and within the Northwestern Mediterranean Particularly Sensitive Sea Area (NW Med PSSA)
- (ii) display the Code of Good Conduct for Whale Watching in the Mediterranean Sea developed by Pelagos and ACCOBAMS in all Blue Flag ports and marinas of the Pelagos Sanctuary.

**In Criterion 4 “The port/marina is responsible for offering at least three environmental education activity to the users and personnel”** it should be added a specific training targeted to personnel and users on:

- the Pelagos Sanctuary agreement;
- the identification and ecology of marine mammals;
- threats to marine mammals (General);
- the Code of Good Conduct for Whale Watching in the Mediterranean Sea;
- the potential impact that port-related activities may have to marine mammals and their habitat;
- the best practice to mitigate the potential impact of port-related activities.

**In Criterion 5 “An Individual Blue Flag for boaters must be available at the Landing Place”,** the “environmental code of conduct” already provided for boaters who wish to obtain the individual Blue Flag and related guide that the marina can offer or sell to boaters who commit to the “environmental code of conduct”. should be integrated with specific information related to:

- (i) the Pelagos Sanctuary, the species of marine mammals of the Mediterranean Sea and threats;
- (ii) the Code of Good Conduct for Whale Watching in the Mediterranean Sea;
- (iii) Specific indication on how user can contribute to minimize the potential impact to marine mammals and their habitat;
- (iv) how user can contribute to minimize their potential impact, following the document “Breve guida per il diportista consapevole kit informativo per gli Ambasciatori Pelagos”, developed by ISPRA for the Pelagos Agreement, in

collaboration with RAMOGE Agreement, and “Il diportista ecologista, miniguia alla sostenibilità: i prodotti ecolabel UE”, developed by ISPRA<sup>42</sup>.

**In Criterion 7 “The port/marina shall have an environmental policy document and an environmental plan. The plan shall cover water management, waste management, energy consumption, health and safety, use of environmentally friendly products where possible”**, the port should be required to

- (i) develop a dedicated Underwater Noise Management Plan (UNMP) to comprise specific reference to actions aimed at mitigating the potential impact generated by port-activities and ships, covering implementation methods, plan monitoring, roles and responsibilities, and commitment of all stakeholders involved;
- (ii) Implement the Waste Management Plan with particular attention to the management of plastic, sewage and contaminants.

**In Criterion 25 “The water in the berthing area shall be visibly clean, with no evidence of pollution such as oily slicks, floating debris, discharges or other obvious signs of pollution”**, the port should be also required to:

- (i) be equipped with BAT, such as Seabins (*i.e.*, floating baskets capable of collecting around 500 Kg of floating waste from the water per year, including plastics, microplastics and microfibers), Trash Collec’Thor (*i.e.*, a device installed at accumulation points, capable of capturing up to 1.5 tons of waste per year, including microplastics), Pixie Drone (*i.e.*, a drone guided by a remote control with a range of 500 meters, capable of intercepting up to 60 kg of large waste during each mission in the water surface) and DPOLs<sup>®</sup> (*i.e.*, a suction pump for floating waste, macro-waste and hydrocarbons);
- (ii) use of smart sensors for environmental/water quality monitoring, such as the Water Module<sup>43</sup>.

**Criterion 12 “Bilge pumping equipment should be available in port”** should be mandatory for the ports and marinas of the Pelagos Sanctuary.

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<sup>42</sup> Available at: [https://santa-margherita-figura-api.municipiumapp.it/s3/6497/allegati/ambiente/guida\\_per\\_il\\_diportista\\_consapevole.pdf](https://santa-margherita-figura-api.municipiumapp.it/s3/6497/allegati/ambiente/guida_per_il_diportista_consapevole.pdf).  
[https://drive.google.com/file/d/1\\_ViYwZgYSkyS1zRUSXDbQ6OY6inc4Kc3/view](https://drive.google.com/file/d/1_ViYwZgYSkyS1zRUSXDbQ6OY6inc4Kc3/view)

Mention should also be made of the ‘ghost nets’ operation being conducted by the non-profit Mare Vivo Association to recover abandoned nets in the Italian seas. <https://marevivo.it/attivita/operazioni-reti-fantasma/>

<sup>43</sup> <https://sinay.ai/en/sinay-hub/water-module/>