



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

## **Contract No. 2023-09**

**between the Permanent Secretariat of the Pelagos Agreement  
and**

**UNISI**

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

**Call 4 - PROTOCOLS AND ASSESSMENT OF PATHOLOGICAL EFFECTS, INCLUDING  
MORTALITY RESULTING FROM CHEMICAL AND BIOLOGICAL CONTAMINATION IN  
CETACEANS IN THE PELAGOS SANCTUARY**

## **Preliminary technical report**

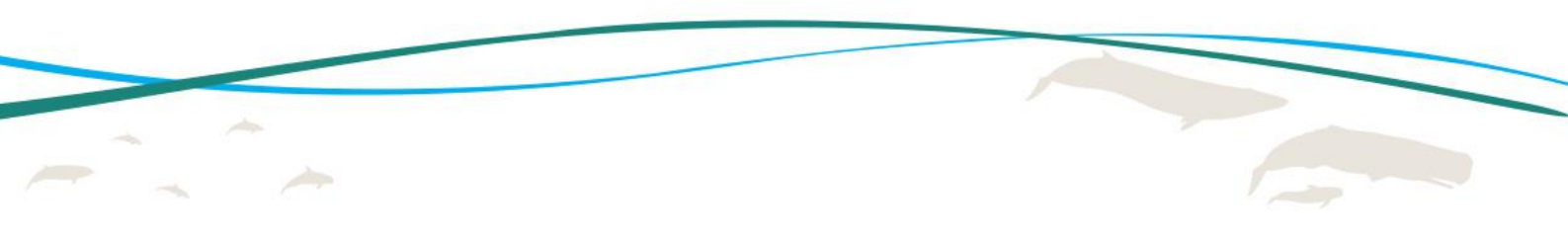
*Consultants:*

Dr. Letizia Marsili, University of Siena  
Dr. Cinzia Centelleghé, University of Padua  
Dr. Hélène Labach, Miraceti

with the contribution of:

Dr. Francesca Capanni, University of Siena  
Dr. Matthieu Duchemin, DM Conseil

**March 22<sup>nd</sup> 2024**





During these initial months, the working group composed of Consultants Dr. Letizia Marsili, Dr. Cinzia Centelleghé, and Dr. Hélène Labach, along with Dr. Francesca Capanni and Dr. Matthieu Duchemin, have been engaged in revising existing protocols aim to evaluate potential harmful effects on marine mammal species, such as mortality, due to chemical and biological contamination, along with examining pertinent legislation at regional, national, and international levels.

Below are outlined the main results achieved through the conducted review.

### 1. INTERNATIONAL LEGAL FRAMEWORK FOR THE CONSERVATION OF MARINE MAMMALS IN THE PELAGOS SANCTUARY

Twelve marine mammal species are currently recognized as regular in the Mediterranean Sea: one seal, the Mediterranean monk seal (*Monachus monachus*) and 11 cetaceans, including fin whale (*Balaenoptera physalus*), sperm whale (*Physeter macrocephalus*), Cuvier's beaked whale (*Ziphius cavirostris*), short-beaked common dolphin (*Delphinus delphis*), long-finned pilot whale (*Globicephala melas*), Risso's dolphin (*Grampus griseus*), killer whale (*Orcinus orca*), striped dolphin (*Stenella coeruleoalba*), rough-toothed dolphin (*Steno bredanensis*), common bottlenose dolphin (*Tursiops truncatus*), harbour porpoise (*Phocoena phocoena relicta*). However, it's important to highlight that killer whales are exclusively regular residents of the Strait of Gibraltar, rough-toothed dolphins are only found regularly in the Levantine Sea, and Black Sea harbour porpoises are commonly observed in the Aegean Sea. Thus, within the Pelagos Sanctuary, only eight cetaceans and one seal are regularly encountered (Notarbartolo di Sciara, 2016).

In this section, international treaties that are relevant for the conservation of marine mammals in the Pelagos Sanctuary, and more generally in the Mediterranean Sea, are reviewed. For a more detailed description of some of these Regulations, please refer to Scovazzi (2016). Table 1 outlines the inclusion of species regularly found in the Pelagos Sanctuary in the annexes of these legislative instruments.

**Table 1:** Inclusion of regular Mediterranean marine mammal species in Annexes and Appendices of international directives, agreements, and conventions.

Species	Bern II <sup>1</sup>	CMS I <sup>2</sup>	CMS II <sup>3</sup>	CIT I <sup>4</sup>	CIT II <sup>5</sup>	Hab II <sup>6</sup>	Hab IV <sup>7</sup>	SPA/BD II <sup>8</sup>	1967/2006 <sup>9</sup>
<i>Balaenoptera physalus</i>	×	×	×	×			×	×	×
<i>Delphinus delphis</i>	×	×			×		×	×	×
<i>Globicephala melas</i>	×				×		×	×	×
<i>Grampus griseus</i>	×		×		×		×	×	×
<i>Physeter macrocephalus</i>	×	×	×	×			×	×	×
<i>Stenella coeruleoalba</i>	×		×		×		×	×	×
<i>Tursiops truncatus</i>	×		×		×	×	×	×	×



<i>Ziphius cavirostris</i>	×	×			×		×	×	×
<i>Monachus monachus</i>	×	×	×	×		×	×	×	×

<sup>1</sup> Bern II - Bern Convention Annex II: *strictly protected fauna species*.

<sup>2</sup> CMS1 – Bonn Convention Appendix I: *Endangered Migratory Species*

<sup>3</sup> CMS2 - Bonn Convention Appendix II: *Migratory Species to be the Subject of Agreements*

<sup>4</sup> CIT I - CITES Appendix I: *species threatened with extinction. Trade in specimens of these species is permitted only in exceptional circumstances.*

<sup>5</sup> CIT II – CITES Appendix II: *species not necessarily threatened with extinction, but in which trade must be controlled to avoid utilization incompatible with their survival.*

<sup>6</sup> Hab II – Habitat Directive 92/43/EEC Annex II: *animal and plant species of community interest whose conservation requires the designation of special areas of conservation.*

<sup>7</sup> Hab IV - – Habitat Directive 92/43/EEC Annex IV: *animal and plant species of community interest in need of strict protection.*

<sup>8</sup> SPA/BD 2 = SPA/BD Protocol of Barcelona Convention Annex II: *list of endangered or threatened species.*

<sup>9</sup> Council Regulation (EC) No 1967/2006 Article 3: *Protected species.*

a. EU Habitat Directive 92/43/EEC of 21 May 1992 on the conservation of natural habitats and of wild fauna and flora

The Habitat Directive is one of the cornerstones of EU biodiversity policy. Between key provisions is the establishment of conservation measures for habitats and species listed in the Annexes of the Directive and the identification and designation of Special Areas of Conservation (SACs) to form the Natura 2000 network.

All marine resident mammal species in the Pelagos Sanctuary are listed in Annex IV – animal and plant species of community interest in need of strict protection, while *Tursiops truncatus* and *Monachus monachus* are listed both in Annex IV and Annex II – animal and plant species of community interest whose conservation requires the designation of special areas of conservation (Table 1).

While the Habitat Directive does not have explicit provisions for pollution control, its holistic approach to habitat and species conservation contributes to broader environmental protection efforts, including pollution mitigation and prevention. Under Art. 17 of the Directive, every six years Member States are supposed to report to the Commission on the conservation status of species and habitat types protected under the Habitats Directive that are present on their territory. Several scientific parameters are used to assess their status (good, poor, bad), including status and trends of species populations and information on main pressures and threats.

b. Washington Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES)

The Washington Convention, also known as the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES), aims to ensure that international trade in wild animals and plants does not threaten their survival.





Species covered by CITES have different degrees of protection through trade regulation depending on the degree of threat they are facing. They are listed in three Appendices, according to the degree of protection they need. All marine resident mammal species in the Pelagos Sanctuary are listed in CITES Appendix II – *species not necessarily threatened with extinction, but in which trade must be controlled to avoid utilization incompatible with their survival*, except for *Balaenoptera physalus*, *Physeter macrocephalus*, and *Monachus monachus* which are listed in Appendix I – *species threatened with extinction. Trade in specimens of these species is permitted only in exceptional circumstances* (Table 1). All species are included in Eu Reg. 338/97 Annex A (Commission Regulation EU No 1320/2014 of 1 December 2014).

While CITES primarily focuses on regulating international trade in endangered species, its broader conservation objectives indirectly contribute to pollution control and environmental protection. Collaborative efforts with other agreements and initiatives enhance the effectiveness of conservation measures and promote holistic approaches to addressing environmental challenges, including pollution.

c. Bern Convention - Convention on the Conservation of European Wildlife and Natural Habitats

The Bern Convention, formally known as the Convention on the Conservation of European Wildlife and Natural Habitats, is an international treaty aimed at conserving biodiversity and promoting the sustainable use of natural resources in Europe. It was adopted in Bern, Switzerland, on September 19, 1979, and entered into force on June 1, 1982.

All regularly occurring marine mammal species of the Pelagos Sanctuary are listed in the Annex II – *strictly protected fauna species* (Table 1).

In the Strategic Plan for the period to 2030, adopted by the Standing Committee in December 2023, GOAL 2 aims at enhancing the conservation status of threatened species, fostering an increase in the abundance of native species, and halting human-induced extinctions. Within this framework, Target 2.2 underscores the imperative to mitigate anthropogenic causes that pose actual or potential negative effects on the conservation status of wild flora and fauna. These efforts are geared towards reducing such impacts to levels that do not impede the conservation and recovery of species. The specified anthropogenic causes encompass, among others (though not exclusively), habitat loss and degradation, including the loss of connectivity; illegal killing, taking, and trade; unsustainable use; toxins and pollution, including micropollutants; barriers to migration; disturbances; light pollution; invasive alien species; and the overarching challenge of climate change.

The indicator selected to monitor progress towards this target is “*Trends in frequency and severity of key anthropogenic pressures impacting on species of wild flora and fauna, as reported under Resolution No. 8 (2012) and the EU nature Directives*”.





d. Bonn Convention - Convention on the Conservation of Migratory Species of Wild Animals (UNEP/CMS)

CMS is a multilateral environmental agreement of the United Nations Environment Programme (UNEP), which provides a global platform for the conservation and sustainable use of migratory animals and their habitats. CMS brings together the States through which migratory animals pass, the Range States, and lays the legal foundation for internationally coordinated conservation measures throughout a migratory range.

The CMS has two Appendices listing migratory species that require international cooperation for their conservation:

- Appendix I: *Endangered migratory species which includes migratory species that are endangered and in need of urgent conservation measures. Member countries are encouraged to take immediate action to protect these species and their habitats;*
- Appendix II: *Migratory species conserved through Agreements that includes migratory species that would significantly benefit from international cooperation for their conservation. Member countries are encouraged to enter into agreements and develop conservation plans for these species.*

Fin whales, sperm whales and monk seals are listed under both Appendix I and II of the Bonn Convention (Table 1). Mediterranean populations of short-beaked common dolphin and Cuvier's beaked whale are listed under Appendix I while Mediterranean populations of Risso's dolphin, striped dolphin, and common bottlenose dolphin are under Appendix II (Table 1). Mediterranean population of long-finned pilot whale is not listed under CMS (Table 1).

Drawing from the latest published report of CMS (UNEP-WCMC, 2024), it is revealed that over one third (276 species, 43%) of CMS-listed species are affected by pollution. This includes agricultural and forestry effluents; domestic wastewater; industrial and military effluents; excess energy; solid waste. Thus, reducing the damaging impacts of environmental pollution is among the priority actions for the conservation of the species. Particularly, among the main goals are:

- *Accelerate the phase-out of toxic lead ammunition and lead fishing weights, including by implementing relevant recommendations outlined in the CMS Guidelines to Prevent the Risk of Poisoning to Migratory Birds.*
- *Reduce the harmful effects of pesticides on migratory species, and their food sources, by lowering usage in or close to critical habitats and by promoting and incentivizing nature-friendly agricultural practices.*
- *Tackle the issue of plastic pollution on land, at sea and in freshwater ecosystems by eliminating problematic and unnecessary plastics and by reducing the unnecessary use and production of plastics through regulations, incentives and practices.*





#### e. ACCOBAMS Agreement

The ACCOBAMS Agreement on the Conservation of Cetaceans of the Black Sea, Mediterranean Sea and Contiguous Atlantic Area is a legal conservation tool created under the auspices of the Bonn Convention (UNEP/CMS). It was adopted on November 24, 1996, in Monaco, and entered into force on June 1, 2001. The agreement encourages cooperation among Parties, international organizations, NGOs, and stakeholders to achieve its conservation objectives, focusing on cetacean conservation in the region.

Useful documents produced within ACCOBAMS Agreement:

- Guidelines concerning best practice and procedure for addressing cetacean mortality events related to chemical, acoustic and biological pollution
- Guidelines for a coordinated cetacean stranding response during mortality events caused by infectious agents and harmful algal blooms
- Best practice on cetacean post mortem investigation and tissue sampling (joint ACCOBAMS and ASCOBANS document)
- Best Practices for cetacean postmortem investigation, tissue sampling and for the development of diagnostic frameworks for specific threat to be investigated during cetaceans' strandings
- Best Practices to assess the impact of chemical pollution on cetaceans / to measure the chemical contamination on cetaceans

It is worth noting that a joint ACCOBAMS/ASCOBANS working group on the Marine Strategy Framework Directive (MSFD) is in force to foster cooperation between the two frameworks to ensure good environmental status (GES) as defined in the MSFD – and according to the Ecosystem approach process implemented by the Mediterranean Action Plan –, at least in the areas representing critical habitats for cetacean species. Enhancing collaboration with MSFD and other environmental protection agreement, organizations or initiatives (e.g., CBD, Barcelona Convention, IWC, GFCM, SAP BIO, etc.) is reported in the new ACCOBAMS Strategy, whose main objective is *to manage effectively the Agreement and to improve the conservation status of cetaceans and of their habitats in the area of competence of the Agreement by 2030* (ACCOBAMS-MOP7/2019/Doc38/Annex15/Res.7.4).

#### f. Convention on biological diversity (Rio de Janeiro, 1992)

The Convention on Biological Diversity (CBD) is an international treaty aimed at promoting the conservation of biological diversity, the sustainable use of its components, and the fair and equitable sharing of benefits arising from the utilization of genetic resources. The CBD was adopted during the United Nations Conference on Environment and Development (UNCED), also known as the Earth Summit, held in Rio de Janeiro, Brazil, in 1992.





The Kunming-Montreal Global Biodiversity Framework (GBF) developed within CBD (CBD COP Decision 15/4) is a comprehensive plan aimed at addressing the urgent need to halt and reverse biodiversity loss by 2030 and achieve a harmonious relationship with nature by 2050.

The framework emphasizes urgent action to address the drivers of biodiversity loss, including changes in land and sea use, direct exploitation of organisms, climate change, pollution, and the invasion of alien species. It sets out four long-term goals for 2050 and 23 action-oriented targets for 2030, focusing on reducing threats to biodiversity, promoting sustainable use and benefit-sharing, and implementing tools and solutions for mainstreaming biodiversity conservation into policies and practices. Target 7 endeavors to *reduce pollution risks and the negative impact of pollution from all sources by 2030, to levels that are not harmful to biodiversity and ecosystem functions and services, considering cumulative effects, including: (a) by reducing excess nutrients lost to the environment by at least half, including through more efficient nutrient cycling and use; (b) by reducing the overall risk from pesticides and highly hazardous chemicals by at least half, including through integrated pest management, based on science, taking into account food security and livelihoods; and (c) by preventing, reducing, and working towards eliminating plastic pollution.*

The Kunming-Montreal Global Biodiversity Framework is a contribution to the achievement of the UN 2030 Agenda for Sustainable Development.

g. Convention for the Protection of the Marine Environment and the Coastal Region of the Mediterranean and its protocols (UNEP/MAP-Barcelona Convention)

The Convention for the Protection of the Marine Environment and the Coastal Region of the Mediterranean, commonly known as the Barcelona Convention, is an international agreement aimed at protecting the marine environment and coastal areas of the Mediterranean Sea adopted under the auspices of UNEP/MAP. It addresses various environmental issues such as pollution, habitat degradation, and overexploitation of marine resources. The Contracting Parties to the Barcelona Convention are 21 Mediterranean countries (including Italy, France, and Monaco) and the European Union.

The UNEP/MAP-Barcelona Convention aims to achieve and maintain Good Environmental Status (GES) in the Mediterranean Sea and coasts. This involves addressing 11 Ecological Objectives, including biodiversity, eutrophication (EO 5), pollution (EO 9), and marine litter (EO 10). These objectives are further detailed into Operational Objectives (COP 17 Decision IG.20/4) and associated targets (COP 18 Decision IG.21/3). A major component of the ecosystem approach implemented by UNEP/MAP is related to the monitoring and assessment of the status of the marine and coastal environment. In view of establishing a coherent region-wide framework, the Contracting Parties adopted in 2016 the Integrated Monitoring and Assessment Programme of the Mediterranean Sea and Coast and Related Assessment Criteria (**IMAP**). Monitoring is ensured through 27 mandatory and candidate Common Indicators (COP 19 Decision IG.22/7).





Marine mammals are explicitly included in **EO 1 Biodiversity**. Also, they are included in **EO 10 Marine litter** (specifically, *Candidate Indicator 24: Trends in the amount of litter ingested by or entangling marine organisms focusing on selected mammals, marine birds, and marine turtles*), but they are not explicitly mentioned for the other objectives dealing with pollution. The relevant objectives for this Call, with relative proposed indicators are reported in Table 2.

**Table 2:** List of IMAP Ecological Objectives (EOs) and Indicators of relevance for the current call.

Ecological Objective	Indicator
<b>EO 9 Pollution</b>	
Contaminants cause no significant impact on coastal and marine ecosystems and human health	Common Indicator 17: Concentration of key harmful contaminants measured in the relevant matrix (EO9, related to biota, sediment, seawater)
	Common Indicator 18: Level of pollution effects of key contaminants where a cause and effect relationship has been established (EO9)
	Common Indicator 19: Occurrence, origin (where possible), extent of acute pollution events (e.g. slicks from oil, oil products and hazardous substances), and their impact on biota affected by this pollution (EO9);
	Common Indicator 20: Actual levels of contaminants that have been detected and number of contaminants which have exceeded maximum regulatory levels in commonly consumed seafood (EO9);
	Common Indicator 21: Percentage of intestinal enterococci concentration measurements within established standards (EO9)
<b>EO 10 Marine litter</b>	
Marine and coastal litter do not adversely affect coastal and marine environment	Common Indicator 22: Trends in the amount of litter washed ashore and/or deposited on coastlines (EO10);
	Common Indicator 23: Trends in the amount of litter in the water column including microplastics and on the seafloor (EO10);
	Candidate Indicator 24: Trends in the amount of litter ingested by or entangling marine organisms focusing on selected mammals, marine birds, and marine turtles (EO10)

threshold values are reported for some Common Indicators of EO 9 and EO 10 GES (UNEP/MED WG.563/Inf.13 common indicators 17, 18, 20; UNEP/MED WG.509/11 common indicator 22; UNEP(DEPI)/MED IG.22/Inf.7 common indicator 21).







The Barcelona Convention has several protocols focusing on specific environmental issues:

- Dumping Protocol
- Prevention and Emergency Protocol
- Land-Based Sources Protocol (LBS)
- Specially Protected Areas and Biological Diversity Protocol (SPA/BD)
- Offshore Protocol
- Hazardous Wastes Protocol
- Integrated Coastal Zone Management Protocol

All marine resident mammal species in the Pelagos Sanctuary are listed in SPA/BD Protocol Annex II: *list of endangered or threatened species* (Table 1).

In the Annexes of the LBS protocol, priority source categories and substances of concern are outlined. Contracting Parties are required to consider these when developing regional and, if necessary, sub-regional plans, programs, and measures aimed at preventing, reducing, and controlling pollution in the Convention area.

Out of the seven protocols, only three can be deemed relevant for the current purpose: the Land-Based Sources, the Specifically Protected Areas and Hazardous Waste protocols. However, the former deals with chronic pollution and the latter with accidental pollution. They cover an exhaustive list of anthropogenic activities which can drive some pollution, characterize the type of chemicals or the risk to the environment to cover but do not describe a prescriptive list of chemicals to monitor nor levels of chemicals to control in the view of protecting the environment, and marine mammals to a lower degree.

The UNEP/MAP Medium-Term Strategy 2022-2027, adopted by the 22nd Meeting of the Contracting Parties to the Barcelona Convention and its Protocols (COP 22, 7-10 December 2021, Antalya, Turkey), comprises four thematic programmes, among which the first is "*Towards a Pollution and Litter Free Mediterranean Sea and Coast Embracing Circular Economy*".

Established in 1975, the Programme for the Assessment and Control of Marine Pollution in the Mediterranean (**MED POL**) aims to assist Mediterranean countries in the implementation of three major protocols of the Barcelona Convention, namely the LBS protocol, the Dumping Protocol and the Hazardous Wastes protocol. Its activities include pollution monitoring and assessment, focusing on achieving GES as per the Barcelona Convention and related protocols (Article 12 of the Barcelona Convention and Articles 8 and 13 of the LBS Protocol). At the regional level, the development of legally binding regional measures, known as Regional Plans, constitutes an important aspect of MED POL's work in line with Article 15 of the LBS Protocol. Thus far the Contracting Parties have adopted ten Regional Plans addressing Persistent Organic Pollutants (POPs), wastewater, the food sector and marine litter.

Under the framework of the Barcelona Convention and its Prevention and Emergency Protocol, the Regional Marine Pollution Emergency Response Centre for the Mediterranean Sea





(**REMPEC**) was established. REMPEC serves as a focal point for preparedness and response to marine pollution incidents in the Mediterranean region.

Finally, the Mediterranean Strategy for Sustainable Development (**MSSD**) 2016-2025 provides an integrative policy framework for all stakeholders, including MAP partners, to translate the 2030 Agenda for Sustainable Development and the Sustainable Development Goals (SDGs) at the regional, sub-regional, national and local levels in the Mediterranean region. The MSSD was adopted by all Mediterranean countries at the 19th Meeting of the Contracting Parties to the Barcelona Convention (COP 19, Athens, Greece, 9-12 February 2016) (Decision IG.22/2). The implementation of the MSSD is supported by the UNEP/MAP – Barcelona Convention system, through the work of the Mediterranean Commission on Sustainable Development (**MCS**D).

#### h. Pelagos Agreement

The Pelagos Sanctuary is closely associated with the Barcelona Convention as its Agreement references the Convention's LBS protocol in Article 6. Additionally, it has been listed as a Specially Protected Area of Mediterranean Importance (SPAMI) since 2001 under the SPA/BD protocol, underscoring its integration into the Mediterranean Sea's environmental protection framework.

The Pelagos Agreement is a multilateral agreement signed in 1999 by France, Italy and for the establishment of a sanctuary for the protection of marine mammals. Under this agreement, the parties commit to implementing measures to maintain a favorable conservation status for all marine mammal species and to shield them and their habitats from any detrimental effects, whether direct or indirect (Article 4). Furthermore, they pledge to prohibit any intentional "taking" of marine mammals within the sanctuary, defined as "hunting, capturing, killing, or disturbing marine mammals, or attempting such actions" (Article 7).

The Permanent Secretariat for the Pelagos Agreement recently founded a project (Convention No. 2018-03) aimed at assessing, monitoring, and mitigating biological and toxicological contamination among cetaceans in the sanctuary. As a key outcome of this project, two protocols have been developed: one for sample collection and analysis on terrestrial pathogens, and another for sample collection and preparation for toxicological analyses.

#### i. United Nations Convention on the Law of the Sea (UNCLOS - Montego Bay Convention)

The United Nations Convention on the Law of the Sea (UNCLOS), also known as the Montego Bay Convention, is an international treaty that governs the use and management of the world's oceans and seas. It was adopted in 1982 and entered into force in 1994. UNCLOS establishes the legal framework for various activities in the oceans, including navigation, fishing, marine research, environmental protection, and the exploitation of marine resources. It defines the rights and responsibilities of nations concerning their territorial waters, exclusive economic zones,





continental shelves, and the high seas. Additionally, UNCLOS sets out procedures for resolving disputes between countries regarding maritime boundaries and other ocean-related matters.

UNCLOS prescribes general obligations with respect to pollution.

Two provisions of the UNCLOS pertain directly to marine mammals:

*Article 65: Nothing in this Part [= Part V: Exclusive economic zone] restricts the right of a coastal State or the competence of an international organization, as appropriate, to prohibit, limit or regulate the exploitation of marine mammals more strictly than provided for in this Part. States shall cooperate with a view to the conservation of marine mammals and in the case of cetaceans shall in particular work through the appropriate international organizations for their conservation, management and study.*

*Article 120: Article 65 also applies to the conservation and management of marine mammals in the high seas.*

Consequently, Articles 65 and 120 stipulate that the standard framework for exploiting marine living resources outlined in the UNCLOS does not extend to marine mammals. Unlike other marine organisms, the exploitation of marine mammals can be restricted, limited, or regulated by states or competent international organizations, regardless of their endangered status or declining populations.

j. Convention for the Regulation of Whaling (ICRW) and International Whaling Commission (IWC)

The International Convention for the Regulation of Whaling (ICRW), also known as the Whaling Convention, was established in Washington in 1946 to regulate the hunting of whales for commercial purposes. The International Whaling Commission (IWC) is the competent body governing the implementation of the ICRW.

The IWC mandate covers both the management of whaling and the conservation of whales. It regulates commercial whaling, namely through a moratorium prohibiting commercial whaling enacted in 1986. It also regulates scientific research whaling.

To address chemical pollution issue, the IWC Scientific Committee has launched four extensive and successive research initiatives: Pollution 2000, Pollution 2000+, Pollution 2020, and most recently, Pollution 2025.

Pollution 2000 and Pollution 2000+ analyzed tissue levels of critical pollutants in significant cetacean species to identifying toxicological indicators and health evaluation endpoints that could indicate negative health impacts. A focus has been posed to PCBs, DDTs and mercury. Pollution 2020 was focused in assessing the risk to cetaceans from microplastics and polycyclic aromatic hydrocarbons (PAHs). Pollution 2025 is focusing on cumulative effects and multiple stressors, setting out a multi-disciplinary, 'One Health' approach.





Regarding marine litter pollution, IWC adopted at the 68<sup>th</sup> meeting the Res. 2022-1 *Resolution on marine plastic pollution*. In the Resolution, the Commission, *inter alia*

*DIRECTS the IWC Secretariat to explore ways to increase collaboration and cooperation with relevant international organisations and bodies to share information that contributes to the development of effective measures to prevent or mitigate marine plastic pollution impacts on cetaceans, avoiding unnecessary duplication of work and regulation and in addition to action encouraged in Resolution 2018-3;*

*REQUESTS the Scientific Committee to develop an approach to be considered by the IWC that would assess the current knowledge of the impact of marine plastic pollution on cetaceans and would provide a global risk assessment that identifies 'hotspots' of cetacean exposure to plastic debris;*

*RECOMMENDS Contracting Governments to report relevant information, such as status, reduction, recycling and reuse efforts, on marine plastic pollution and plastic ingestion in stranded animals in their voluntary conservation and national Scientific Progress reports.*

Regarding biological pollution, a recent report entitled deal with SARS-Cov2 and highly pathogenic avian influenza (HPAI) diagnosis in marine mammals (SC/69A/E/16). In the report of the last meeting of the Scientific Committee (SC69A), held in Slovenia in 2023, it is reported:

*Recognising the need to correlate cetacean health data with ongoing ecosystem changes to evaluate the relative vulnerability of cetaceans in a changing ocean, the Committee:*

*(1) recommends that the long-term monitoring of impacts of known and emerging pathogens, toxins, pollutants of concern and anthropogenic activities remains a standing recommendation for the E sub-committee;*

*(2) recommends further investigation of the individual and cumulative effects of these threats on health, reproduction and survival at an individual and population level, and a report of the findings at SC69B; and*

*(3) recommends both prospective and retrospective health and risk assessments are carried out within the context of rapidly changing marine ecosystems to inform management advice.*





## 2. INTERNATIONAL FRAMEWORKS FOR MARINE ENVIRONMENTAL PROTECTION AND REGULATION

At the Mediterranean level, the control of water pollution to maintain good water quality and the healthy state of marine ecosystems is primarily governed by these directives or agreements:

- Basel Convention on the control of transboundary movements of hazardous wastes and their disposal
- RAMOGE Agreement
- Marine Strategy Framework Directive (MSFD) – Directive 2008/56/EC of the European Parliament and of the Council of 17 June 2008 establishing a framework for community action in the field of marine environmental policy
- Water Framework Directive (WFD) – Directive 2000/60/EC of the European Parliament and of the Council of 23 October 2000 establishing a framework for Community action in the field of water policy

The Basel Convention is an international treaty designed to regulate the movement and disposal of hazardous wastes across national borders. It was adopted in 1989 under the auspices of the UNEP and entered into force in 1992. The main objectives of the Basel Convention are to minimize the generation of hazardous wastes, to ensure their environmentally sound management, and to prevent the transfer of hazardous wastes from developed to less developed countries.

The Ramoge Agreement, a regional treaty signed in 1976 by France, Italy, and Monaco to protect the marine and coastal areas of the Mediterranean Sea, is regarded as a localized application of the broader Barcelona Convention. The primary objective is to encourage collaboration among regional authorities of the involved countries to combat marine and coastal pollution and safeguard biodiversity. In 1993, France, Italy, and Monaco, under the agreement, established the RAMOGEPOL Plan to address accidental marine pollution in the Mediterranean, extending from the Rhône River mouth in France to the Anzio Cape lighthouse in Lazio, encompassing Sardinia and Corsica. Additionally, the plan's implementation broadened the Ramoge Agreement's authority to include the high seas.

The European Marine Strategy Framework Directive aims to adopt a precautionary and comprehensive ecosystem-based strategy for the management of marine waters in Europe. This directive aimed first at defining the Ecological good status of the marine environment. This led to a number of research and monitoring programmes. The concept of GES is defined by the Marine Directive through eleven descriptors. Marine mammals are already included in Descriptor 1 MARINE BIODIVERSITY: *Biological diversity is maintained. The quality and occurrence of habitats and the distribution and abundance of species are in line with prevailing physiographic, geographic and climatic conditions.*

For the purpose of this call, the following descriptors are of interest:





- *Descriptor 5 EUTROPHICATION: Human-induced eutrophication is minimised, especially adverse effects thereof, such as losses in biodiversity, ecosystem degradation, harmful algae blooms and oxygen deficiency in bottom waters.*
- *Descriptor 8 CONTAMINANTS: Concentrations of contaminants are at levels not giving rise to pollution effects.*
- *Descriptor 10 MARINE LITTER: Properties and quantities of marine litter do not cause harm to the coastal and marine environment.*

In France, the Observatoire PELAGIS is in charge of monitoring the GES with a focus on marine mammals. In 2019 PELAGIS reviewed chemicals found in tissues of marine mammals based on the list of the MSFD (14 trace elements and 56 Persistent Organic Pollutants) and the national network of stranded animals. The gathered results are published in a report (Méndez-Fernandez et al., 2019). However, this only covers a monitoring with no levels associated with the hazardous chemicals.

The European Commission Joint Research Centre (JRC) has consolidated over 2700 regulated or priority substances into a comprehensive reference list to aid in identifying relevant contaminants in marine environments (Tornero and Hanke, 2017). This report compiles in a single list more than 2700 substances (or groups of substances) coming from main lists of chemicals compiled by relevant global conventions, European legislation, and dedicated research work (Barcelona Convention, HELCOM, OSPAR, REACH, Stockholm Convention on POPs, HASEC etc.). This compilation promotes the use of a standardized naming system for clear identification of concerning substances, ensuring consistency in reporting data for MSFD Descriptor 8.

This list includes priority substances included in the Annex X of the Water Framework Directive (WFD), which Member States are obligated to monitor in surface waters. Since 2000, the WFD has been the main law for water protection in Europe. WFD sets Environmental Quality Standards that must be met to achieve good surface water chemical status in accordance with WFD Article 4 and Annex V point 1.4.3.

A significant step toward the definition of pollution threat to marine mammals has been taken in the Northeast Atlantic in the context of SDG 14.1 *by 2025, prevent and significantly reduce marine pollution of all kinds, particularly from land-based activities, including marine debris and nutrient pollution* by OSPAR Commission. Within the framework of the 2023 quality status report, a pilot assessment of the status and trends of persistent organic chemicals (POC) in marine mammals has been published, reporting potential indicators for long-term monitoring of contamination in marine mammals across the North Atlantic (Pinzone et al., 2022)p.

The main findings of this assessment underline the urgency for evaluating the trends and effects of PCBs (and other chemicals) pollution in marine mammals at the species-specific level as well as at larger spatial and temporal scales. Such efforts should also include information on age, sex,





reproductive capacity, trophic position and diet into the interpretation and application of toxicity thresholds.

The primary findings of this assessment underscore the critical need to evaluate trends and impacts of PCB (and other chemical) pollution in marine mammals on both a species-specific level and broader spatial and temporal scales. These efforts should incorporate data on factors such as age, sex, reproductive capability, trophic level, and diet into the interpretation and application of toxicity thresholds (Pinzone et al., 2022).

Additionally, the International Convention on the Control of Harmful Anti-fouling Systems on Ships (AFS), an international treaty adopted by the International Maritime Organization (IMO), specifically targets harmful anti-fouling systems that contain compounds such as tributyltin (TBT), which can have detrimental effects on marine ecosystems and human health.

Indirectly, limitations to water pollution are given by legislation on maritime spatial planning (Directive 2014/89/EU) ship-source pollution (Directive 2005/35/EC), bathing water quality (Directive 2006/7/EC) and the contamination of foodstuff (Regulation (EC) No 853/2004, Directive 2004/41/EC, Commission Regulation (EU) 2023/915, etc.).

### 3. FINAL COMMENTS

With regards to all the legislation and regulations directly or indirectly related to marine mammals we have investigated, provisions specifically focusing on the chemical or biological contamination of marine mammals are rare.

However, we can highlight a few items. The chemicals of interest are usually the same, based on list of Persistent Organic Pollutants and heavy metals which have been identified as very hazardous to the marine environment for more than 40 years. They are measured in marine mammals' tissues, but cannot be related to impaired physiology, nor mortality. The group of experts on marine mammals of the OSPAR Commission have shown in 2022 the levels of those chemicals were below estimated toxicity thresholds.

The difficulty in establishing cause-effect relationship stems from the inability to conduct controlled experiments and define control populations. Complicating matters further, marine animals are simultaneously exposed to a mixture of chemicals (cocktail effect), many of which may be unknown or not regularly monitored. Additionally, individual vulnerability to the potential toxic actions of substances depends on numerous biological factors (e.g., species, sex, age, diet, ...) and species-specific susceptibility to the given substance or group of substances to which the animal is exposed.

A systematic approach to monitoring and evaluation, as outlined in the MSFD, is crucial for achieving meaningful results. The MSFD provides criteria and methodological standards for assessing marine waters' ecological status and defines monitoring and evaluation methods for





assessing pressures and impacts. Collaboration at the union, regional, or sub-regional levels is essential for defining threshold values.

As extensively reported in the literature, marine mammals can serve as excellent bioindicators of marine ecosystem health due to their long lifespan and position at the top of the food chain. (Bossart, 2011). They accumulate high concentrations of contaminants, making them sensitive to environmental stressors and capable of integrating environmental contamination. Marine mammals are already considered one of the components of MSFD Descriptor 1. In this sense, they can be considered good indicator species under the WFD and the MSFD and be included in monitoring programs under criteria D8C1 and D8C2. A similar suggestion already arises from OSPAR Commission and the Observatoire PELAGIS.

In the view of setting up provisions or plans to monitor chemicals to protect those species, it is foreseen to consider bioaccumulation rather than water analysis. Bioaccumulation of chemical is the biological process by which the animals will get contaminated and potentially exert some toxic effects. Also, mortality of individuals may not be a reliable indicator as the toxic effects can be sublethal and occur only on the next generation. It seems also an option to consider chemicals which would have shown concern from the European Chemical Agency during the REACH regulation process. A list of Substances of Very High Concern is updated on a regular basis, depending on the ecotoxicological data evaluation.

Standardization of sampling and analysis protocols is critical, particularly in the Mediterranean region. The joint ACCOBAMS/ASCOBANS protocol (IJseldijk et al., 2019) and national protocols for stranded cetaceans (C.Re.Di.Ma. Centro di Referenza Nazionale per le Indagini Diagnostiche sui Mammiferi marini spiaggiati, n.d.; Van Canneyt et al., 2015) provide guidance, but there's a need for standardization of contaminant investigation methods. Establishing reference laboratories in the region could promote consistency and comparability of results over time.







#### 4. REFERENCES

- Bossart, G.D., 2011. Marine Mammals as Sentinel Species for Oceans and Human Health. *Vet. Pathol.* 48, 676–690. <https://doi.org/10.1177/0300985810388525>
- C.Re.Di.Ma. Centro di Referenza Nazionale per le Indagini Diagnostiche sui Mammiferi marini spiaggiati, n.d. Protocollo di intervento sui cetacei morti sul territorio nazionale.
- IJsseldijk, L.L., Brownlow, A.C., Mazzariol, S., 2019. MOP7/2019/Doc 33 Best practice on cetacean post mortem investigation and tissue sampling.
- Méndez-Fernandez, P., Caurant, F., Spitz, J., 2019. Stratégie de suivi des contaminants chez les cétacés des côtes françaises.
- Notarbartolo di Sciara, G., 2016. Marine Mammals in the Mediterranean Sea: An Overview, in: Notarbartolo Di Sciara, G., Podestà, M., Curry, B.E. (Eds.), *Advances in Marine Biology*. Academic Press, pp. 1–36. <https://doi.org/10.1016/BS.AMB.2016.08.005>
- Pinzone, M., Parmentier, K., Siebert, U., Gilles, A., Authier, M., Brownlow, A., Caurant, F., Das, K., Deaville, R., Galatius, A., Geelhoed, S., Hernández Sánchez, M.T., Mendez-Fernandez, P., Murphy, S., Persson, S., Roos, A., Van Den Heuvel-Greve, M., Vinas, L., Williams, R., 2022. Pilot Assessment of Status and Trends of Persistent Chemicals in Marine Mammals.
- Scovazzi, T., 2016. The International Legal Framework for Marine Mammal Conservation in the Mediterranean Sea. *Adv. Mar. Biol.* 75, 387–416. <https://doi.org/10.1016/BS.AMB.2016.07.006>
- Tornero, M.V., Hanke, G., 2017. Potential chemical contaminants in the marine environment: An overview of main contaminant lists, JRC Technical Reports. <https://doi.org/10.2760/337288>
- UNEP-WCMC, 2024. State of the World's Migratory Species, UNEP-WCMC. Cambridge, United Kingdom.
- Van Canneyt, O., Dabin, W., Dars, C., Dorémus, G., Gonzalez, L., Ridoux, V., Spitz, J., 2015. Guide des échouages de mammifères marins. Cahier technique de l'Observatoire PELAGIS sur le suivi de la mégafaune marine, Université de La Rochelle et CNRS. <https://doi.org/10.13140/RG.2.1.1495.6002>

