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## NOISE HOTSPOTS REPORT II

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Presented by Ocean Care representative, ACCOBAMS Partner

**Issue:** report with updated overview on noise hotspots in ACCOBAMS area

### 1. Action requested

The Scientific Committee is invited to:

- a. **note** the Report II of noise hotspots in the ACCOBAMS Agreement Area;
- b. **advise** on the development of this overview.

### 2. Background

In 2015, the ACCOBAMS Secretariat funded the first overview of noise hotspots in the ACCOBAMS Area, whose objective was to gather baseline knowledge on noise-producing human activities in the Mediterranean Sea, by:

- making an inventory of noise-producing human activities
- mapping areas where such activities are carried out
- recommending, on the basis of the findings, a methodology to monitor noise from human pressures and noise sources over time.

The review of impulsive noise hotspots maps in the ACCOBAMS area is foreseen in the 2020-2022 ACCOBAMS Work Programme (Resolution 7.6, MOP 2019).

This report was prepared by OceanCare based on data collected by SINAY Maritime Data Solution.

**DRAFT - SECOND HOTSPOTS REPORT:  
UPDATED OVERVIEW OF THE NOISE HOTSPOTS IN THE  
ACCOBAMS AGREEMENT AREA**

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## **PREPARATION OF THE DOCUMENT**

This document was prepared by OceanCare based on data collected by SINAY Maritime Data Solution and in partnership with the ACCOBAMS Secretariat, which has also commissioned the report.

The Agreement on the Conservation of Cetaceans of the Black Sea, Mediterranean Sea and contiguous Atlantic Area (ACCOBAMS) is a regional international conservation treaty established to reduce threats to cetaceans in the Agreement Area. Signed in 1996 and entering into force in 2001, Parties to ACCOBAMS have committed to tackling the multiple threats posed to cetaceans, including bycatch, ship strikes and anthropogenic underwater noise. As of October 2021, twenty-four Range States have ratified the Agreement and it has subsequently entered into force in those States.

SINAY Maritime Data Solution collects and gathers large volumes of data from a wide range of sources and analyses these data using advanced machine learning tools.

OceanCare is a Swiss-based non-profit organisation that was founded in 1989 with a strong commitment to realistic and cooperative environmental protection efforts. OceanCare works at national, regional and international level in the areas of marine pollution (including invisible forms of pollution such as underwater noise), fisheries, whaling, sealing and on general issues relating to ocean governance. OceanCare holds Special Consultative Status with the Economic and Social Council of the United Nations (ECOSOC) and is a partner of the General Fisheries Commission for the Mediterranean, the Convention on Migratory Species (CMS), and the UNEP/CMS Agreement on the Conservation of Cetaceans in the Black Sea, Mediterranean Sea and Contiguous Atlantic Area (ACCOBAMS), as well as UNEP/MAP. OceanCare has also been accredited as a Major Group to the United Nations Environment Assembly (UNEA), which is the governing body of UNEP and is a part of the UNEP Global Partnership on Marine Litter. OceanCare has been an observer at the International Whaling Commission (IWC) since 1992.

## **ACKNOWLEDGMENTS**

This report has been made possible by the generous contributions of time and resources from several people and institutions, as well as information provided by ACCOBAMS Focal Points, ACCOBAMS Partners and other relevant stakeholders. A debt of gratitude is owed to anyone who has contributed to this report.

## I. INTRODUCTION AND OBJECTIVE

Cetaceans, and marine mammals in general, are highly dependent on sound, including for feeding, reproduction, communication, navigation, and predator detection. They are, consequently, sensitive to human-generated underwater noise. The ocean is filled with natural sounds, yet it is anthropogenic underwater noise emanating from shipping (e.g., propellers and engines), intense seismic airgun surveys, sonar used to detect submarines, and offshore (or close to shore) construction activities that involve drilling, explosions, and pile driving, that places a significant and unnatural stressor on marine life, and specifically on cetaceans given their reliance on sound for survival. This has been well established elsewhere (e.g., Weilgart, 2007) and has been addressed in more detail in the introduction of the First Hotspots Report commissioned by ACCOBAMS in 2015. There is, therefore, little value in going into further detail here. Suffice it to note, that while different factors have to be taken into account when assessing the impact of noise on marine life, including aspects related to species, sex, age and the type of noise generated (as well as a spatial and time elements), a number of general impacts have been documented.<sup>1</sup> Available evidence demonstrates that underwater noise pollution can have a range of deleterious effects on cetaceans, including masking, disrupting reproductive behaviours, habitat displacement, temporal loss of hearing sensitivity, physical injury, and in some cases even death.<sup>2</sup> Equally important, there has been increasing evidence of the impacts of anthropogenic underwater noise on fish and invertebrates<sup>3</sup> which can, subsequently, have an indirect impact on cetaceans' ability to secure sufficient food, an important element for survival.

Ocean noise should also be considered in the context of the United Nations Global 2030 Agenda for Sustainable Development. Specifically, the impacts of underwater noise pollution threaten the achievement of SDG 2: End hunger, achieve food security and improve nutrition and promote sustainable agriculture, as those dependent on fish for a source of food may be affected by reduced fish catch rates. Moreover, the continued propagation of human-generated noise activities may delay SDG 14: Conserve and sustainably use the oceans, seas and marine resources for sustainable development, as such activities adversely affect marine and coastal ecosystems and, in turn, prevent healthy and productive oceans.

It is essential to understand that the impacts of underwater noise pollution can cover vast areas and that noise travels great distances underwater. For example, a study assessing 10 years (1999-2009) of noise recordings from the ocean floor in the Atlantic found that noise generated by seismic airguns (a method deployed in the course of oil and gas exploration) was the loudest part of the background noise at 4000km (Nieukirk et al., 2012). The IWC Scientific Committee Report (2005 and 2007) moreover concluded that a single seismic airgun survey can blanket an area of over 300,000km<sup>2</sup>, raising noise levels continuously for weeks or months (IWC, 2005, 2007), Adverse effects emanating from underwater noise can be both acute or chronic (Dekeling et al., 2014) and noise can be of short duration (e.g. impulsive sounds such as explosions or seismic surveys) or long lasting (e.g. continuous such as shipping and dredging) (Commission Decision 2010/477/EU). Impulsive sounds which are

<sup>1</sup> See Weilgart (2017) for a more detailed treatment of the issue.

<sup>2</sup> For a more detailed description of the effects of underwater noise on cetaceans see OceanCare's "Under Pressure- The need to protect whales and dolphins in European Waters, available at: <https://www.oceancare.org/en/underpressure/>

<sup>3</sup> In 2018 Dr. Weilgart undertook a review of 115 primary studies of various human-produced sources of underwater noise and examined their impact on fish and invertebrates. The review concluded that noise impacts can have an impact on development (e.g., body malformations, high egg or immature mortality, development delays), anatomical impacts (e.g., internal injuries and cellular damages), physiological impacts (e.g., increase in stress) and behavioural impacts (e.g., related to reproduction). Catch rates have also been seen to drop, while bycatch rates have increased. See 'The Impact of Ocean Noise Pollution on Fish and Invertebrates', available at: [https://www.oceancare.org/wp-content/uploads/2017/10/OceanNoise\\_FishInvertebrates\\_May2018.pdf](https://www.oceancare.org/wp-content/uploads/2017/10/OceanNoise_FishInvertebrates_May2018.pdf).

repeated at intervals may turn into continuous noise over distance, and lower frequency sounds travel further in the deep ocean than higher frequency ones (Dekeling et al., 2014).

In the past few decades, the threat posed by anthropogenic underwater noise, including its general challenge to ocean sustainability and the ocean's ability to provide marine ecosystem services, has garnered increasing attention and concern. The recognition of the impacts of underwater noise on population and species, and the indirect impacts (e.g., food security), has led to the development of a number of guidelines and standards aimed at monitoring noise pollution. This effort, both on a regional and global scale, has resulted in the adoption of regulatory and mitigation measures (e.g., environmental impact assessments). Indeed, the United Nations General Assembly has frequently made note of the potentially significant adverse impact of underwater noise on marine resources and has *“expressed concern over the potential social, economic and environmental impacts of anthropogenic underwater noise due to the growth of ocean-related human activities, which has resulted in increased sound in many parts of the ocean”* (A/RES/75/239, operative para. 282).<sup>4</sup> It is also worth recalling that the nineteenth meeting of the UN Open-ended Informal Consultative Process on the Oceans and the Law of the Sea (ICP-19) dedicated its entire meeting to the issue of anthropogenic underwater noise in 2018, discussing the sources and impacts of underwater noise as well as its transboundary nature and potential mitigation and management approaches. Delegates also recognised the socioeconomic impacts of human-generated noise activities, including on the tourism and transport sectors.<sup>5</sup>

More recently, two separate yet related UN processes have produced important assessments of the current state of our environment. Firstly, the United Nations Environment Programme (UNEP), the leading global environmental authority established in 1972 and tasked with coordinating conservation efforts within the United Nations system, undertook a diligent and all-encompassing assessment on the progress made in achieving internationally agreed environmental objectives. The resulting UN Environment GEO-6 Report was published in 2019 and specifically noted with concern the potential impact of anthropogenic underwater noise, identifying seismic surveys, commercial shipping, and offshore construction, as well as military operations, as the main culprits causing anthropogenic underwater noise pollution (UN Environment (GEO-6) Report, 2019, 180 & 190). Secondly, the Second World Ocean Assessment (WOAII), which is the only integrated global ocean assessment that addresses the interlinkages between environmental and socioeconomic aspects, also raised concern over the increase of anthropogenic underwater noise in our ocean. The report dedicated an entire chapter (Chapter 20) to identifying trends in inputs of anthropogenic noise into the marine environment, again highlighting marine traffic (e.g., commercial shipping), seismic exploration, industrial activity, and sonar as contributors to ocean noise.

The International Maritime Organization (IMO) - a specialised agency of the United Nations established to regulate global shipping - has, likewise, recognised the emission of underwater noise as a concern. Although continuous noise has not been considered in the course of this research project, it is, nevertheless, worth taking note of the 2014 IMO Guidelines for the Reduction of Underwater Noise from Commercial Shipping to Address Adverse Impacts on Marine Life, which provide guidance to shipbuilders and designers on how to reduce noise emissions. This work has gained further traction at the 76th Meeting of the Marine Environment Protection Committee (MEPC) where it was decided to task the IMO Sub-Committee on Ship Design and Construction (SDC) to undertake a review of the above-mentioned 2014 guidelines until 2023 (MEPC.1/Circ. 833). On the basis of

<sup>4</sup> For some of the most recent references see A/RES/73/124, operative paras. 273m 274 and 275, as well as A/RES/74/19, operative paras. 279, 280 and 281.

<sup>5</sup> For a summary report of the discussions, see the Earth Negotiations Bulletin's 'Summary report, 18-22 June 2018', available at: <https://enb.iisd.org/events/icp-19/summary-report-18-22-june-2018>.

this review, the SDC will develop a proposal for a programme of action and or next steps to further prevent and reduce underwater noise.

Regional and international multilateral environmental agreements have come to play an essential part in global efforts to manage and reduce anthropogenic underwater noise pollution. Indeed, a growing number of international fora have recognised anthropogenic underwater noise as a potential threat to the marine ecosystem, and conservation efforts more broadly, and have consequently adopted related decisions, resolutions, standards, and guidance. Such efforts include decisions X.29 and XIII.10 by the Convention on Biological Diversity (CBD), the former of which specifically addresses the impacts of anthropogenic underwater noise on marine and coastal biodiversity. It is particularly worth noting the ongoing work within the framework of the Convention on the Conservation of Migratory Species of Wild Animals (CMS), and the Agreement on the Conservation of Small Cetaceans of the Baltic, North East Atlantic, Irish and North Seas (ASCOBANS) and the Agreement on the Conservation of Cetaceans of the Black Sea, Mediterranean Sea and Contiguous Atlantic Area (ACCOBAMS) created under the auspices of the Bonn Convention (UNEP/CMS).<sup>6</sup>

In 2017, at its 12<sup>th</sup> Meeting of the Conference of the Parties in Manila, Contracting Parties to CMS adopted Resolution 12.14 on the Adverse Impact of Anthropogenic Noise on Cetaceans and Other Migratory Species, strongly urging countries to restrict underwater noise pollution and to develop a regulatory framework aimed at the mitigation of ocean noise if noise-generating activities cannot be avoided (CMS Resolution 12.14, operative para. 4). Particular attention should also be paid to the Annex to Resolution 12.14 as it provides Member States with the CMS Family Guidelines on Environmental Impact Assessment for Marine Noise-generating Activities based on the Best Available Techniques (BAT) and Best Environmental Practice (BEP), a set of activity-specific tailored advice on creating EIA standards. Since then, other agreements and conventions have included the CMS Family Guidelines in their own work, including Parties to ASCOBANS in Resolution 8.11 and ACCOBAMS in Resolution 7.13 which “invites Parties and non-Parties to implement CMS Resolution 12.14”.

The Meeting of the Parties to ACCOBAMS and the Scientific Committee have addressed the issue of underwater noise pollution almost since the inception of the Agreement (see Annex 2 Conservation Plan attached to the Agreement text). From the very beginning, with the adoption of Resolution 2.14 on the Assessment and Impact Assessment of Man-Made Noise, Parties addressed this specific pollutant and have since developed one of the most important sets of measures to monitor and mitigate the impacts of ocean noise on cetaceans (see Appendix A). In 2010 Parties adopted Resolution 4.17 “Guidelines to address the impacts of anthropogenic noise on cetaceans in the ACCOBAMS area” which included detailed guidelines to address the impact of noise generating activities. In 2013 a species-specific Resolution 5.13 was adopted calling for stricter protection of the Cuvier’s beaked whale population in the Mediterranean Sea mainly in response to the impacts of underwater noise causing atypical mass strandings. In its most recent resolution relating to anthropogenic noise, ACCOBAMS Parties adopted a slightly amended version of the guidelines to address the impact of anthropogenic noise on cetaceans in the Agreement Area at its 7th Meeting in 2019, providing both general standards and noise-source specific ones, as well as recognising the vulnerability of cetaceans to noise disturbances. The ACCOBAMS Programme of Work for the Triennium 2020-2022 addresses underwater noise pollution through a variety of Conservation Actions (CA), the most relevant of which is CA 2b. The current Programme of Work includes the

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<sup>6</sup> It is also worth noting that the Convention on Environmental Impact Assessment in a Transboundary Context (ESPOO), which outlines a number of obligations of State Parties with respect to assessing the environmental impact of activities and relating to cooperation and coordination.



revision and completion of impulsive noise hotspots maps of the ACCOBAMS Area, and the support of certain projects as relates to monitoring and assessment (e.g., QuietMed, QuietMed2 and QuietSeas).

The European Union's Marine Strategy Framework Directive (MSFD or Marine Directive) adopted in 2008 is also relevant, not least due to the consideration that numerous EU Member States are parties to ACCOBAMS and that the provisions of the Directive are pertinent to ACCOBAMS's conservation objectives. The MSFD was adopted with the aim of more effectively protecting the environment across the European Union and to achieve Good Environmental Status (GES) of EU marine waters by 2020.<sup>7</sup> For the purpose of the Directive, GES was defined as: *"The environmental status of marine waters where these provide ecologically diverse and dynamic oceans and seas which are clean, healthy and productive"* and, in an attempt to provide Member States with guidance and a set of methodological criteria, eleven descriptors were set out to describe what GES should look like in practice. On the issue of noise, Descriptor 11 refers to Energy including Underwater Noise<sup>8</sup> and states that GES is achieved when the *"Introduction of energy, including underwater noise, is at levels that do not adversely affect the marine environment"*.

To coordinate and collate efforts to reduce noise levels, several projects and initiatives have been developed. These are critical in supporting ACCOBAMS in generating sufficient information to allow for a regional assessment of underwater noise activities. A joint programme on underwater noise for the implementation of the Second Cycle of the MSFD in the Mediterranean Sea is the QuietMED project. One of the project deliverables was to develop a web tool to host data on underwater impulsive noise sources – the Impulsive Noise Register in the Mediterranean Sea, INR-MED (QuietMED, 2018). In essence, it provides decision-makers and stakeholders with a better understanding of the sources of ocean noise and where such activities are taking place. This work is complemented by the UNEP/MAP-Barcelona Convention<sup>9</sup>. The Barcelona Convention follows an ecosystem approach which, like the Marine Directive, aims to achieve and/or maintain GES of the Mediterranean Sea and coasts<sup>10</sup>. The Convention has eleven Ecological Objectives, the last of which is EO 11 – Energy including Underwater Noise. This Ecological Objective includes Operational Objective 11.1 – "Energy inputs into the marine environment, especially noise from human activities is minimized".<sup>11</sup>

The INR-MED is not the only noise register which contributes data which fulfils MSFD requirements. An international noise register for gathering data relating to impulsive noise events in the North East Atlantic and the Baltic Sea has also been developed by the International Council for the Exploration of the Sea (ICES) under the Regional Seas Conventions OSPAR (the Convention for the Protection of the Marine Environment of the North-East Atlantic) and HELCOM (the governing body of the Convention on the Protection of the Marine Environment of the Baltic Sea Area)<sup>12</sup>. The impulsive noise event registry for OSPAR and HELCOM includes data of licensed events such as pile driving and controlled explosions from naval operations and provides information for regional assessments and MSFD Descriptor 11.1.1 (low and mid frequency impulsive noise) reporting<sup>13</sup>. The INR-MED<sup>14</sup> should also help EU Member States reporting to Descriptor 11 of the Marine Directive and non-EU

<sup>7</sup> [https://ec.europa.eu/environment/marine/good-environmental-status/index\\_en.htm](https://ec.europa.eu/environment/marine/good-environmental-status/index_en.htm)

<sup>8</sup> [https://ec.europa.eu/environment/marine/good-environmental-status/descriptor-11/index\\_en.htm](https://ec.europa.eu/environment/marine/good-environmental-status/descriptor-11/index_en.htm)

<sup>9</sup> United Nations Environment Programme/Mediterranean Action Plan – Convention for the Protection of the Marine Environment and the Coastal Region of the Mediterranean (Barcelona Convention) which was adopted in 1995. The Contracting Parties include 21 Mediterranean countries and the European Union.

<sup>10</sup> <https://www.unep.org/unepmap/what-we-do/ecosystem-approach>

<sup>11</sup> [https://wedocs.unep.org/bitstream/handle/20.500.11822/7320/12ig20\\_8\\_annex2\\_20\\_04\\_eng.pdf](https://wedocs.unep.org/bitstream/handle/20.500.11822/7320/12ig20_8_annex2_20_04_eng.pdf)

<sup>12</sup> <http://ices.dk/data/data-portals/Pages/underwater-noise.aspx>

<sup>13</sup> <http://ices.dk/data/data-portals/Pages/underwater-noise.aspx>

<sup>14</sup> INR-MED is available at: [http://80.73.144.60/CTN\\_Geoportal/home/](http://80.73.144.60/CTN_Geoportal/home/)

member states reporting to the Ecological Objective 11 of the Ecosystem Approach Process (EcAP) led by the Barcelona Convention (QuietMED, 2018).

With the important ongoing work addressing anthropogenic underwater noise pollution, both globally and regionally, there is a continued need to better understand the types of activities conducted at sea which generate noise, the frequency range, source intensity and the location of such activities. In the absence of such information, it is difficult to identify the nature of the impacts of underwater noise and to pinpoint the exact location of both the origin of the source as well as its impact. ACCOBAMS commissioned a first overview of noise hotspots and areas of potential conflict with cetacean conservation in 2015. The first report ('First Hotspots Report')<sup>15</sup> gathered baseline knowledge of noise-generating activities in the Mediterranean Sea from 2005 to 2015. The project aimed at making an inventory of noise-producing human activities<sup>16</sup>, to map areas where such activities are carried out, and to recommend a methodology to monitor noise from human pressures and noise sources over time (ACCOBAMS, 2016). The project focused on the Mediterranean and revealed noise hotspots overlapping with important cetacean habitat in the Pelagos Sanctuary, the Strait of Sicily, and the upper portion of the Hellenic Trench.

The present study, therefore, forms a part of wider efforts to monitor, assess, and manage anthropogenic underwater noise pollution. In particular, it is meant to achieve the objective of ACCOBAMS Conservation Action CA 2b annexed to Resolution 7.6 Work Programme and Budget for the Triennium 2020-2022, which calls for a revision/completion of the impulsive noise hotspots maps of the Agreement area, and, hence, the main task is to provide an inventory of human-generated noise activities through coastal construction (e.g., harbour extensions) and geophysical surveying activities (i.e., by using seismic airguns). This project is tasked with identifying the location of where such activities have taken place, and to indicate, if possible, where such activities are planned in the future, as well as to provide an indication of where such activities overlap with areas of special importance for cetaceans or other area-designations (e.g., Specially Protected Areas of Mediterranean Interest- SPAMIs, Cetacean Critical Habitats as identified by ACCOBAMS and Important Marine Mammal Areas- IMMAs ). Based on the findings, the report closes with the main conclusions and provides recommendations for the way forward.

## II. METHODOLOGY

The main anthropogenic underwater noise sources are commercial shipping, geophysical surveying for oil and gas exploration, military/naval sonar use and noise generated by offshore (or close to shore) construction work. In the case of commercial shipping, noise is generated by engines and propellers and, in the case of geophysical surveying, noise is produced by seismic airguns (see 1. Seismic data below). Regarding military/naval activities, noise is generated by low and mid-frequency active sonar, explosions, and naval exercises, while offshore construction work involves pile driving, drilling operations and underwater detonations.

<sup>15</sup> The Report is available at: [https://accobams.org/wp-content/uploads/2020/01/MOP6.Doc28Rev1\\_Overview\\_noise\\_hot\\_spots\\_-\\_ACCOBAMS\\_area\\_Part\\_Mediterranean.pdf](https://accobams.org/wp-content/uploads/2020/01/MOP6.Doc28Rev1_Overview_noise_hot_spots_-_ACCOBAMS_area_Part_Mediterranean.pdf)

<sup>16</sup> Regarding impulsive noise sources the First Hotspots Report focused on harbour developments, renewable energy projects (wind farm construction and operation), oil and gas platform operations, seismic surveys and military operations. The main attention was placed on these sources as they are believed to be of primary concern for cetacean conservation.

For practical reasons, as well as due to the limited resources available and allocated to the project, it was decided that data-gathering should focus on activities in the Mediterranean Sea. The Black Sea region, the Atlantic Area, and other areas that fall under the scope of the Agreement are not considered. In contrast to the First Hotspots Report, the current report does not take into account continuous noise sources, which include commercial shipping and recreational boating.

The impulsive noise data that builds the foundation for this project was collected and collated by SINAY Maritime Data Solutions based on public information and on information provided by relevant stakeholders. During the research process, researchers consulted a number of databases, including the European Marine Observation and Data Network (EMODnet) Human Activities portal<sup>17</sup> and the Impulsive Noise Register in the Mediterranean Sea Region (INR-MED). Relevant ministerial websites were also consulted, as were agencies tasked with overseeing licensing and exploration rights for hydrocarbon resources, private geophysical companies, as well as information made available by port authorities or investor-groups/companies of the respective ports. The data collection process was complemented by contacting ACCOBAMS Focal Points, Partners and other relevant stakeholders, requesting information concerning noise-generating activities since 2016 (see Appendix E for the request of information). The aim was to request specific information concerning offshore, inshore, or onshore construction activities, naval exercises involving sonar use and seismic surveying activities, as well as frequency range, source intensity, and location of the activity in question (see Appendix F for the questionnaire provided to stakeholders). The information received from stakeholders, including both Focal Points and ACCOBAMS Partners, was stored and presented in an MS Excel file and complemented the data already identified from extensive internet research.

Based on the information gathered and provided by stakeholders, an MS Excel database of impulsive noise activities in the Mediterranean was created by compiling data relating to construction at ports and harbours (including dredging, pile driving, explosions and drilling) and seismic survey data. No data were received or included relating to offshore construction work.

MS Excel was chosen for several reasons. Firstly, it was the tool used for the First Hotspots Report and, equally importantly, it is a well-known tool that allows for large volumes of data to be organised and presented. Using MS Excel as the primary tool meant it was possible to collate and prepare the dataset for input into more complex software tools that played a key role in preparing graphical presentation of the findings, such as QGIS.

The data collected were found and/or provided in different formats, including in PowerPoint presentations, press releases, shapefiles, text files and CSV files. Consequently, some of the data included in the study were incomplete, including in many cases the exact date and location of the respective activity.

All maps were created with the geographic information system application QGIS. The data included that could be processed were those available in shapefile format which could be processed in QGIS. As some shapefiles were missing, or lacked adequate content necessary for map-creation, the full list of data points (file 'complete') was exported from Excel and converted in CSV format. This was necessary to display the coordinates. A 40 by 40-kilometre grid was then laid over the entire region and the number of events within each spatial distribution (40 by 40) tile was determined for the respective time periods. The final maps represent the number of noise-producing human activities per tile in each time period, but they exclude those data points where not enough

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<sup>17</sup> For further information on the EMODnet database see: <https://www.emodnet-humanactivities.eu/view-data.php>

information was available, although these data are still considered in the respective tables (see Table 1 and Table 2).

## 1. Seismic surveying data

Seismic exploration is a sound energy-based technique used to explore for offshore oil and gas resources below the seabed. During a seismic survey, exploration vessels pull large arrays of so-called airguns that release pressurized blasts or “shots” into the ocean, penetrating deep into the seafloor. These shots are repeated as often as every 10 seconds for days, weeks or months at a time. This method of exploration is deployed for both scientific and commercial purposes and is commonly conducted by private companies commissioned by either the public sector or private companies with an interest in exploiting hydrocarbon reservoirs.

The seismic surveying data gathered for the purpose of this study were identified through extensive internet research which involved locating relevant information on government and ministry websites as well as on the respective websites of hydrocarbon energy agencies tasked with overseeing the countries’ licensing, exploration, and exploitation activities, and by contacting relevant stakeholders. As far as possible, the information was corroborated and amended through environmental impact assessment and debriefing reports to identify the type of seismic survey conducted, the duration and the actual routes of the surveying vessel. Such reports are, however, only seldomly available, difficult to find and often only available in the respective official national languages of the Range States, making it difficult for them to be assessed by the researchers. Data concerning licensing blocks were predominantly found on ministry websites and as noted above, included potential as well as active licenses for exploration activities. Useful information was also accessed by reviewing news reports and sector/industry-specific newsletters and other publications. Finally, information was also requested by consulting scientific institutions and by reaching out to non-government organisations working in a related subject area.

## 2. Coastal work data

Coastal work includes projects related to harbour developments, such as port terminal construction, extension of ports, the construction of new ports and container terminals. Noise-generating activities most commonly associated with harbour developments are dredging, pile driving, explosions, and drilling. The data accumulated for this portion of the database were collected through extensive internet searches, consulting approval documents awarded by respective authorities, information provided by port authorities and investor-related documents that provided some context to the expansion plans of the harbours.

The type of data accessed varied and included documents where geographical and temporal information was available, including background information on the timeframe of the respective activities. Thanks to a partnership<sup>18</sup> and existing databases it was possible to identify the coordinates and position of harbours – both marinas and ports – in the Mediterranean. We emphasize that information concerning some of the data and whether dredging, explosions or pile driving actually took place, cannot be confirmed. This part of the database therefore includes data points for confirmed and likely activities, although at times the activity can be inferred based on the nature of the work being carried out.

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<sup>18</sup> In the context of the First Hotspots Report, ACCOBAMS had a formal exchange of letters in 2015 with REMPEC in order to access the data on ports accessible through the MEDGIS-MAR (Mediterranean Integrated Geographical Information System on Marine Pollution Risk Assessment and Response). This has allowed for a near comprehensive list of relevant ports.

### III. LIMITATIONS

Although every effort was taken to design and execute the data collection process as rigorously and comprehensively as possible, several limitations remain. At the centre of these limitations lies the problem of data availability and the nature, detail and scope of the information that forms the basis of this research endeavour. On that note, it is also important to emphasise that an overview of noise-hotspots in the Mediterranean needs to consider continuous noise as well, which this investigation has purposefully neglected for practical reasons. Other impulsive noise-related activities, such as oil and gas extraction and military/naval sonar are, likewise, significant emissions of noise and need to be considered in future research, as they are not covered here.

Some difficulties associated with the seismic data collected warrant further observation. A complete dataset on the type of seismic survey, frequency levels, exact start and end dates are seldom available. This challenge can partially be overcome by considering the start and end dates of the respective license for exploration activity. In doing so, and as was done in the First Hotspots Report, this current report was able to paint a more comprehensive picture of the noise generated by airguns, although it must be recognised that a valid exploration license can be awarded for an extended period therefore leaving researchers to guess when (and if) a seismic survey actually took place. Consequently, the information included in the Excel database on the seismic surveying activity represents the validity of the licenses rather than the actual dates of the surveys. Such gaps in knowledge will persist while data is not being added to the INR-MED by ACCOBAMS Parties.

Similar shortcomings are also present regarding construction work at ports. In particular, it was inherently difficult to conclude exactly when an activity had taken place and to confirm whether dredging, pile driving, explosions or drilling were involved. This was further compounded by the fact that many of the sources and the information identified were not available in languages the researchers understood.

One significant source of impulsive underwater noise stems from sonar use during military/naval activities. Given the confidential or classified nature of the information surrounding military exercises, public information on such activities is rare and often unconfirmed. While, at times, military exercises are reported, the exact duration, noise-relevant aspect of the activities and other details are not shared with the public, and it is not necessarily clear whether sonars were deployed or not. Such data have therefore been excluded from the scope of this current report, also partially due to the recognition that identifying such data takes time and was not possible within the timeframe allocated for this report.

Finally, as outlined in more detail above, this project focuses on impulsive noise generated by geophysical surveying and coastal work, including pile driving, dredging, explosions, and drilling. Although noise emission stemming from commercial shipping (and recreational vessels) plays an increasingly important role (see current efforts by the IMO to revise noise Guidelines addressed above), this study has fallen short of addressing such activities. Considering the increasing evidence of the impact of continuous noise on marine mammals and other marine life (see for example, Slabbekoorn et al., 2010; Southall et al., 2019) and, equally important, the co-benefits of vessel speed reduction, namely greenhouse gas (GHG) emission reduction, reduction of ship strikes on whales, and the reduction of underwater noise (see Leaper, 2019), noise generated by maritime traffic ought to also be considered within a climate change mitigation context and vessels speeds should be reduced.

Despite these shortcomings, this research project nevertheless contributes to improving our understanding of what kind of impulsive noise-generating activities have taken place in the Mediterranean and where these overlap with important areas of interest/concern for cetaceans. Furthermore, this report is an important basis on which future research can build. Regarding the impulsive noise-generating activities addressed in this report, it has to be reiterated that the data presented is not complete and, therefore, only provides the minimum-information dataset available.

#### IV. RESULTS

The data gathering process, which included information received from ACCOBAMS Parties and ACCOBAMS Partners and independent research, yielded approximately 400 data points. Most of the information used for analysis was generated by independent internet research, while some information regarding seismic surveying activities was provided by Parties and Partners. The nature of the information received and identified does not allow for all data points to be plotted in the respective maps below (for example, no map for 2016 has been generated). The tables below include all of the information identified, while the maps are more of a snapshot and only include the information that was complete enough to be mapped.

From the approximately 164 stakeholders contacted, nine responses were received, which is a return rate of slightly over 5%. From these nine responses five answers were given by ACCOBAMS Focal Points. The remaining four responses were received from ACCOBAMS Partners or stakeholders (see Appendix G for a list of stakeholder responses)

##### Seismic surveys

Twenty-five confirmed seismic surveys were identified (see Table 1). The majority of these took place in the Eastern Mediterranean, with Egypt and Israel accounting for 10 of the 25 confirmed surveys. The 26 seismic survey activities listed as “likely” refer to those where licenses were issued but it has not been confirmed whether seismic surveying operations have actually taken place. Twenty-four of these were in Italian waters. This however only represents a minimum-level of data and there are likely more activities that need to be accounted for. Appendix H includes a number of maps (figures 10-13) that identify areas where seismic surveying may have taken place but where it is difficult to confirm this.

Table 1: Confirmed and likely seismic survey activities 2016 - 2024

Country		Confirmed seismic survey	Likely seismic survey
AL	Albania	-	-
CY	Cyprus	2	1
DZ	Algeria	-	1

EG	Egypt	5	-
ES	Spain	-	-
FR	France	-	-
GR	Greece	3	-
HR	Croatia	-	-
IL	Israel	5	-
IT	Italy	-	24
LB	Lebanon	2	-
LY	Libya	1	-
MA	Morocco	-	-
MC	Monaco	-	-
ME	Montenegro	2	-
MT	Malta	-	-
SI	Slovenia	-	-
SY	Syria	-	-
TN	Tunisia	-	-
TR	Turkey	5	-
<b>TOTALS</b>		<b>25</b>	<b>26</b>

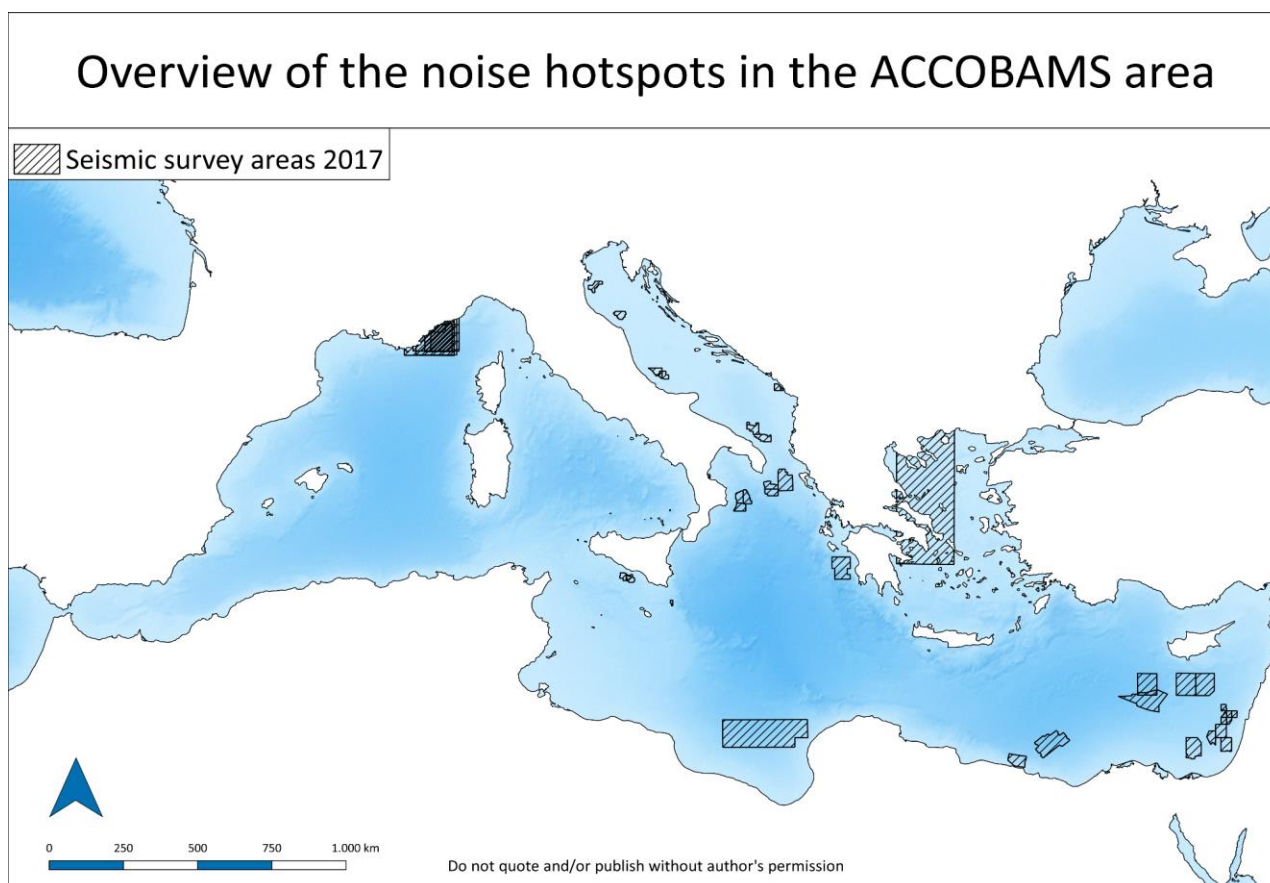


Figure 1: Seismic surveying areas 2017

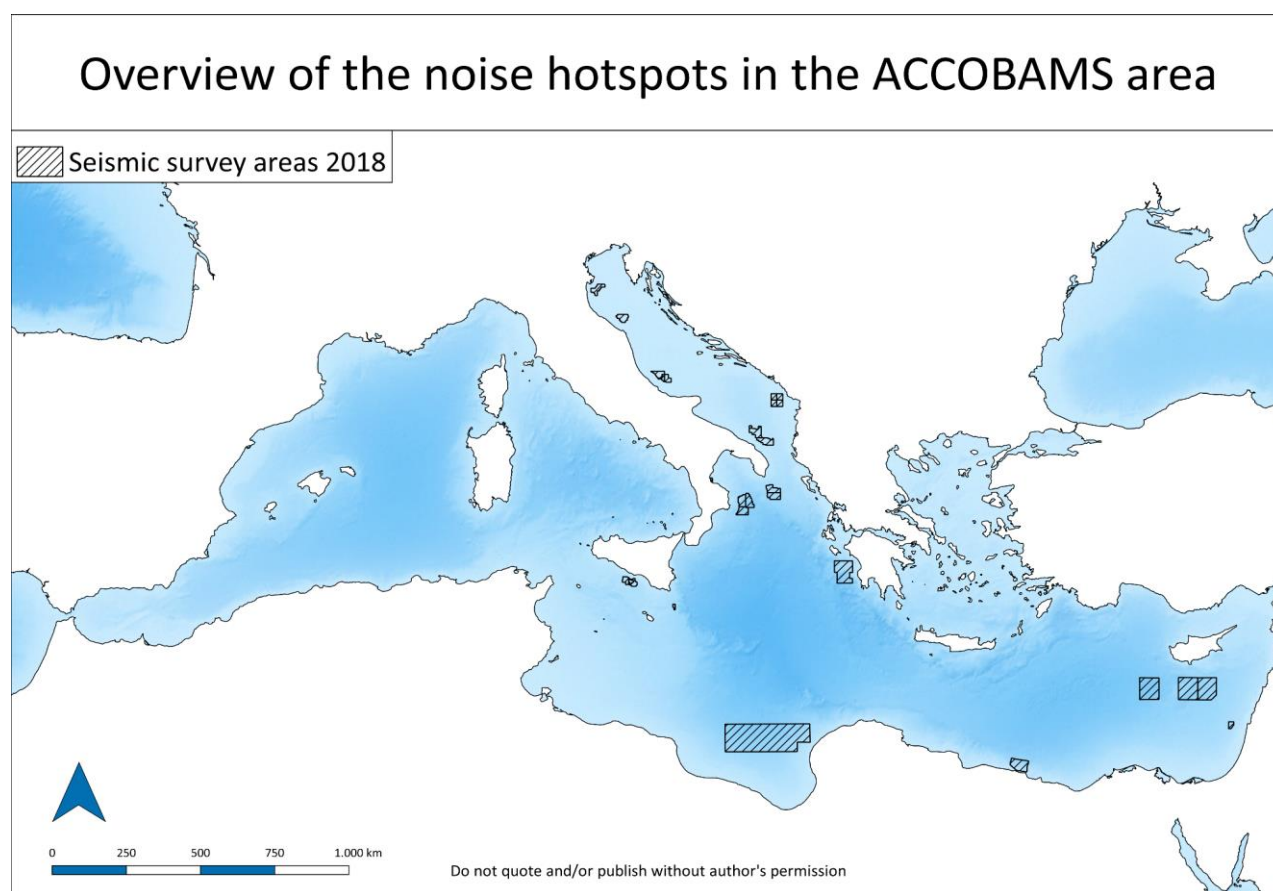


Figure 2: Seismic surveying areas 2018



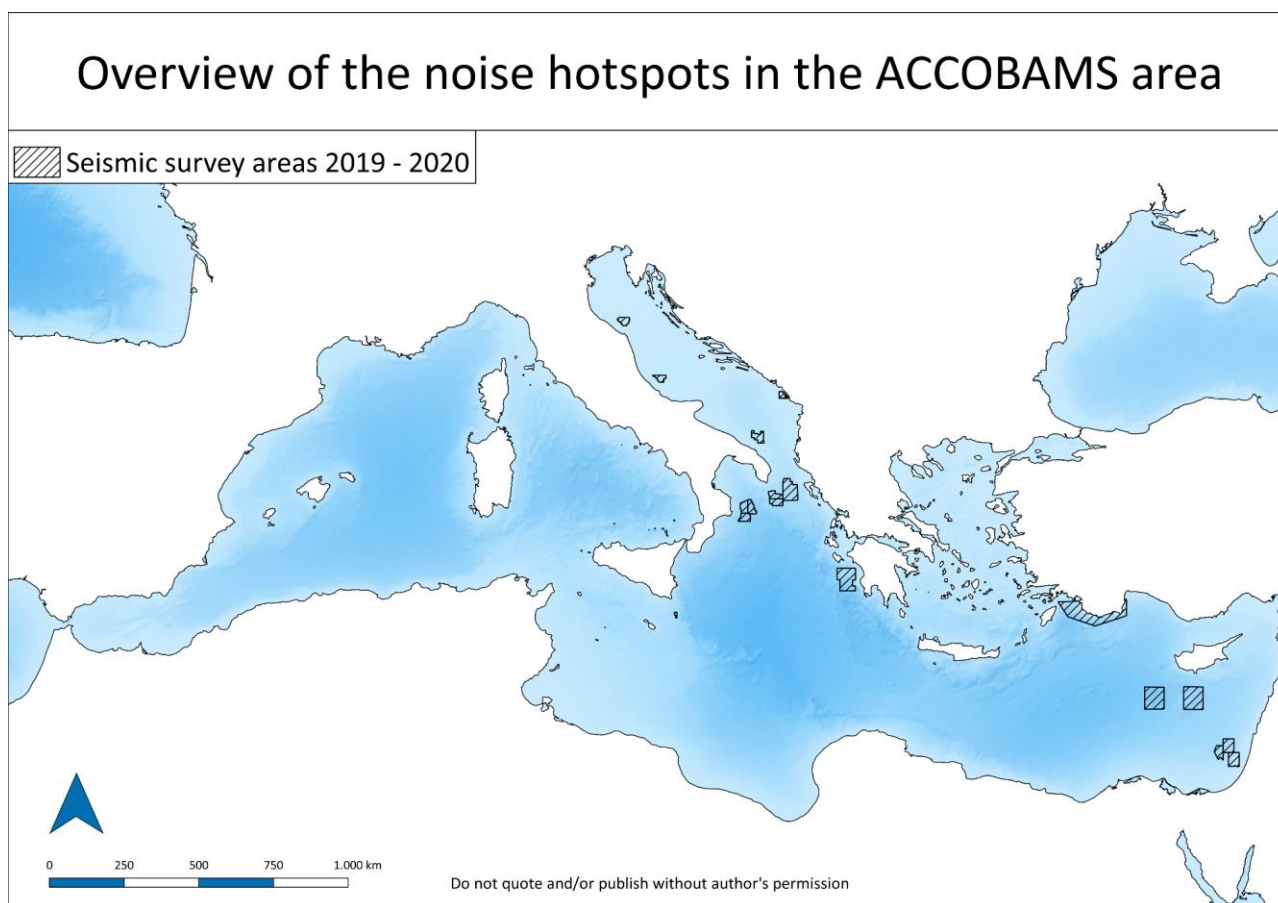


Figure 3: Seismic surveying areas 2019-2020

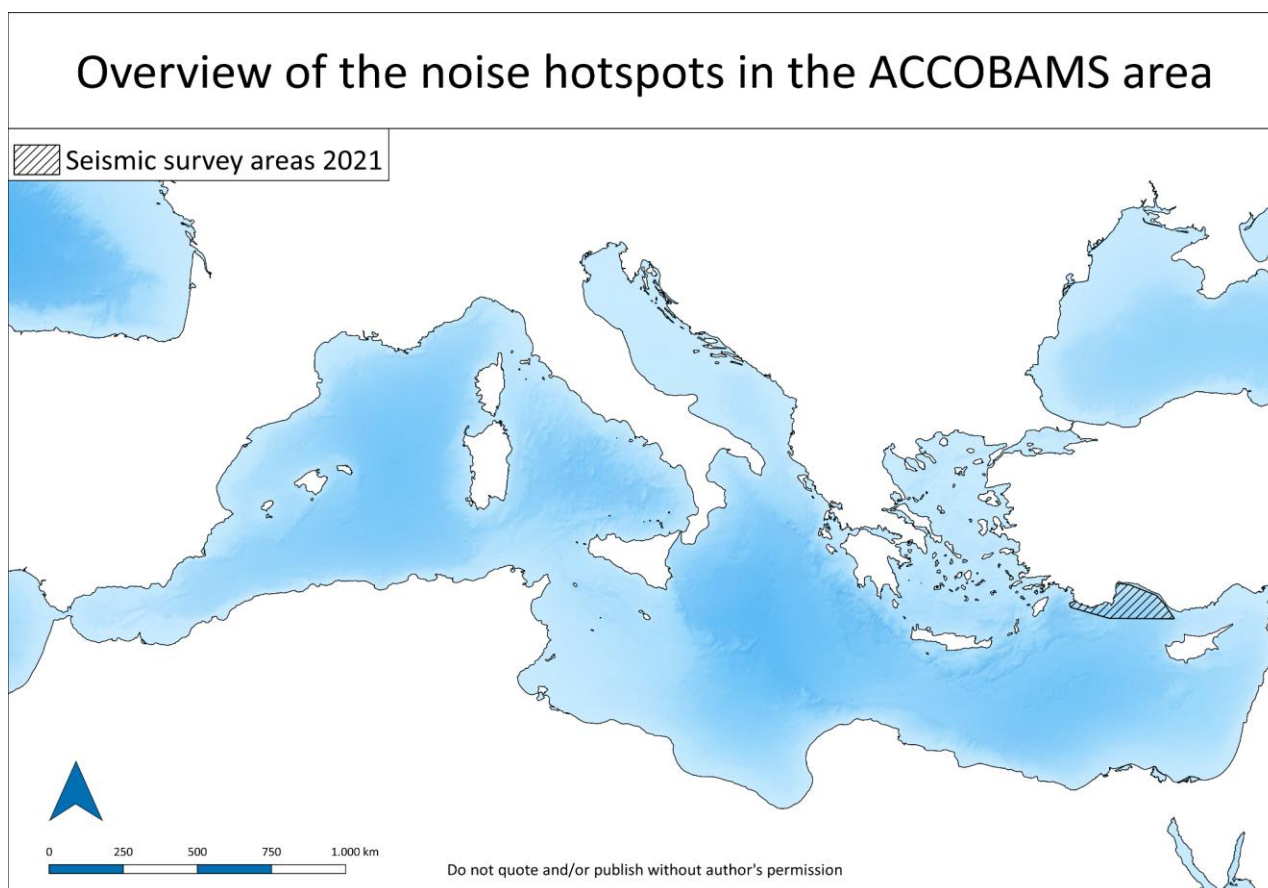


Figure 4: Seismic surveys 2021

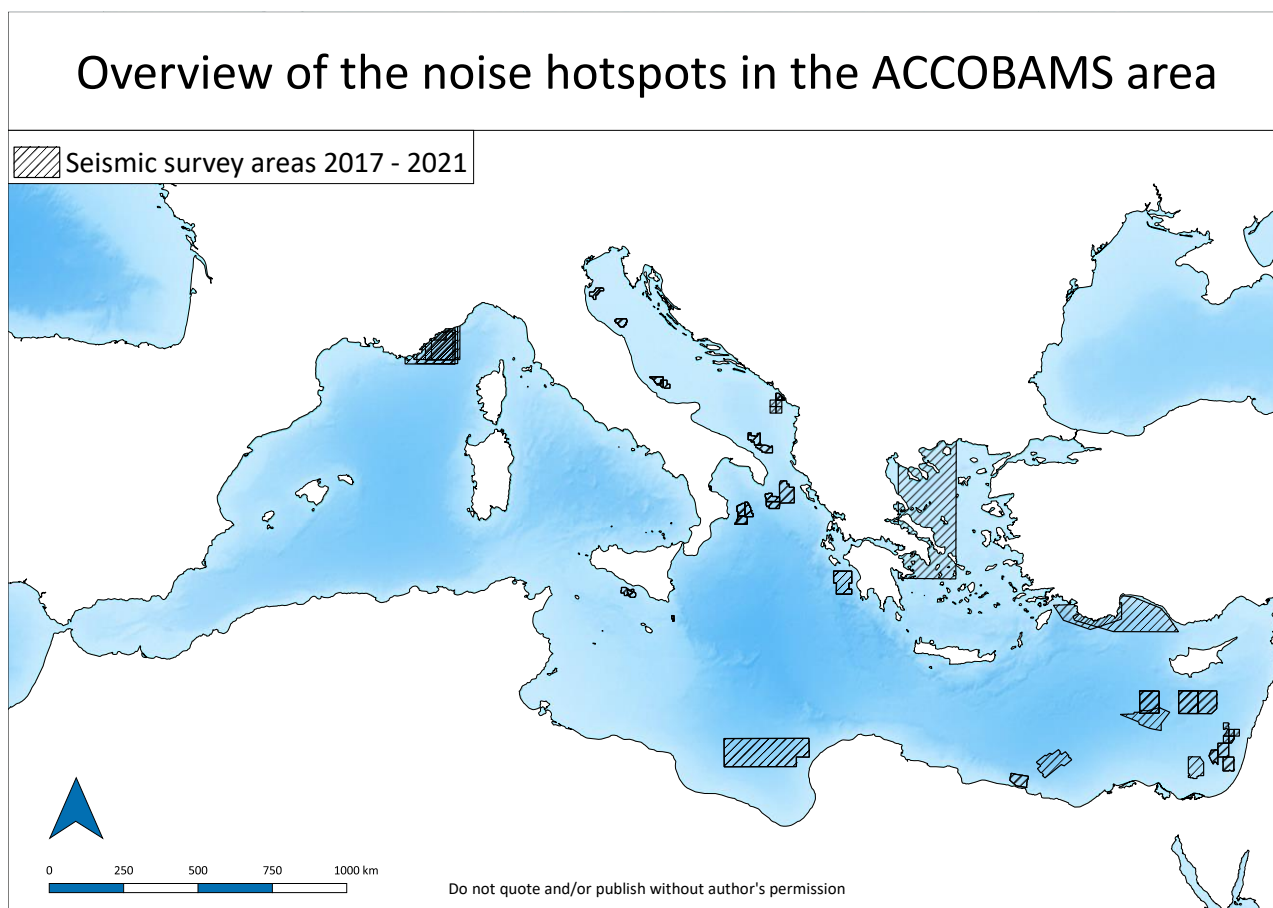


Figure 5: Seismic surveying areas 2017-2021<sup>19</sup>.

In 2017, seismic surveys potentially took place in various locations, including off the French coast, in the Adriatic and Ionian Seas, off Sicily, around Greece, off the coast of Libya and in the waters off Israel in the Levantine Sea (Figure 1). In 2018, similar areas potentially had seismic surveys though not as many areas are highlighted as for 2017 (Figure 2). In the period 2019-2020, seismic surveys potentially took place in the Ionian Sea, close to the coast of Israel and near Greece and Turkey (Figure 3). Figure 4 shows that seismic surveying took place off the coast of Turkey in 2021. However, this map does not contain data relating to other areas of the Mediterranean because most of the data collected for this report was for the period up to and including 2020. Some data received from a partner was deemed interesting to include here, though, hence the inclusion of only one data point in this map. Figure 5 shows that some areas were subjected to repeated seismic surveys during the period 2017-2021 (though it is possible that some of this activity may have taken place before 2017 - see Footnote 17).

### Coastal work

A list of 293 ports / harbours was made and data relating to impulsive activities were gathered where available (see Table 2). Of these 293 harbours, 152 had at least one impulsive noise activity confirmed or likely to have

<sup>19</sup> In some cases, the data used to create this map covered the years preceding 2017 but uncertainty regarding when the activity actually took place, means that it was included anyway.

taken place. Dredging was the most common activity with 87 harbours recorded as having at least one dredging activity confirmed or likely to have taken place. Of these 87 harbours, 61 of them had at least one confirmed dredging activity (some of them had more than one confirmed activity or both confirmed and likely activities). A further 27 harbours had one or more likely dredging activities. Pile driving was confirmed or likely to have been carried out at 54 harbours. Explosions were only recorded as likely to have happened at two harbours and at two ports.

Table 2: Number of harbours where impulsive noise activities (dredging, pile driving, explosions, drilling) are confirmed, likely to have taken place or planned 2016-2022

		Number of harbours with impulsive noise activities confirmed or likely*				
Country		Number of harbours assessed	Dredging	Pile driving	Explosion	Drilling
AL	Albania	4	2	1	-	1
CY	Cyprus	8	1	1	-	-
DZ	Algeria	15	7	7	-	-
EG	Egypt	8	4	2	1	-
ES	Spain	30	12	4	-	2
FR	France	19	9	7	-	1
GR	Greece	49	8	7	1	1
HR	Croatia	13	3	3	-	-
IL	Israel	4	2	2	-	1
IT	Italy	77	26	10	-	1
LB	Lebanon	6	2	1	-	-
LY	Libya	14	-	-	-	-
MA	Morocco	2	2	2	-	1
MC	Monaco	1	-	-	-	-
ME	Montenegro	2	-	-	-	-

MT	Malta	2	-	-	-	-
SI	Slovenia	3	1	1	-	1
SY	Syria	3	-	-	-	-
TN	Tunisia	11	3	2	-	-
TR	Turkey	22	5	4	-	-
<b>TOTALS</b>		<b>293</b>	<b>87</b>	<b>54</b>	<b>2</b>	<b>9</b>

\*Note that some harbours had activities listed for more than one year / for different projects. Where no number is given, it was unknown whether the activity took place in the harbours assessed.

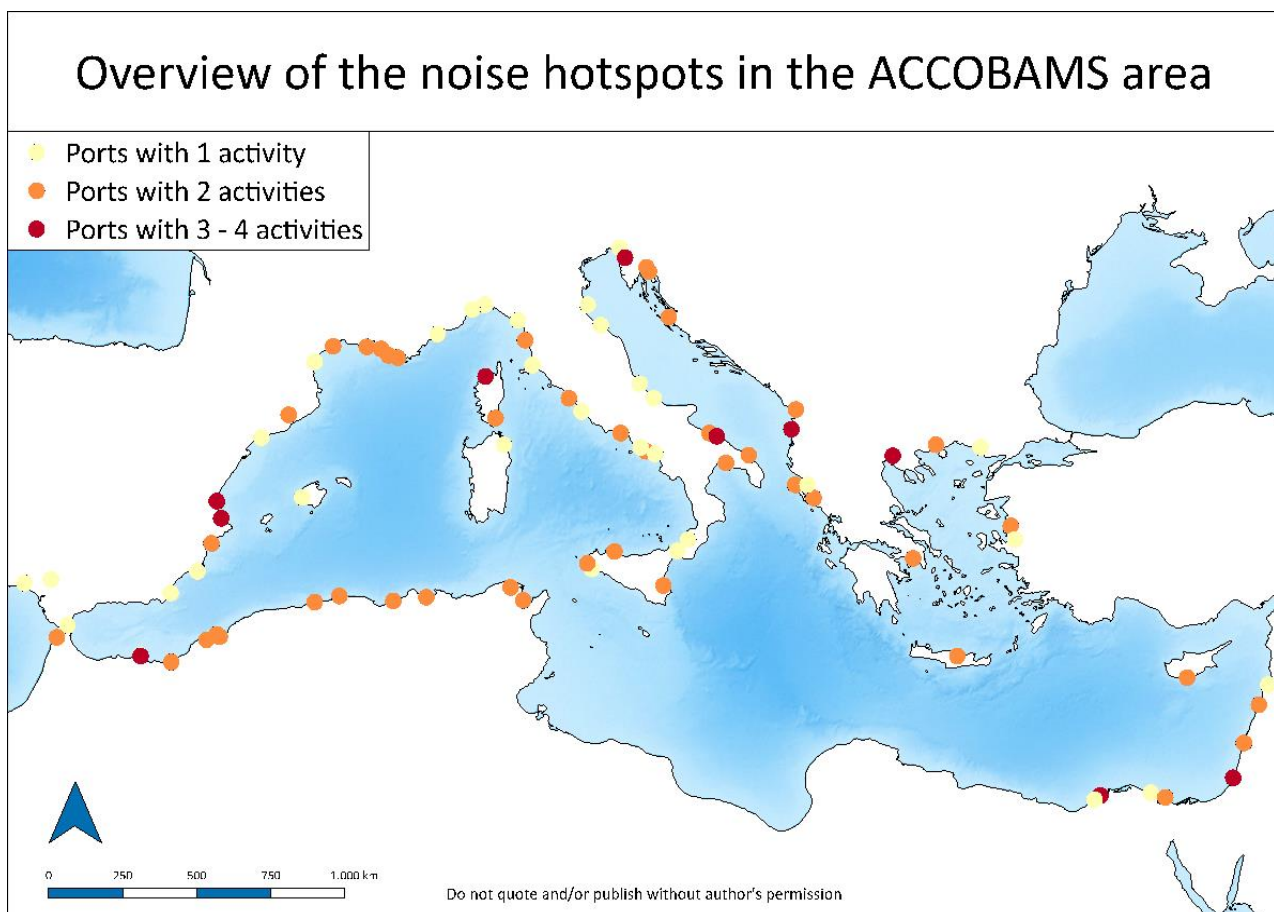


Figure 6: Ports where noise was generated from dredging, pile driving, explosions and/or drilling (2016-2020).

Figure 6 shows the ports where impulsive noise activities are reported as having taken place. Ten ports had at least 3 impulsive noise producing activities (dredging, pile driving, explosions and/or drilling). The data on the map does not entirely coincide with the data in Table 2 because of differences in the format in which the data were provided and the information contained in the respective files used for mapping purposes.

## V. ANALYSIS

As with the First Hotspots Report, this report has found that impulsive noise generating activities are regularly carried out in Mediterranean ports and harbours.

When comparing the geographical location of seismic surveys reported in the First Hotspots Report (2005-2015) to this current report (2016-2020), it appears that seismic surveys are less widespread but that some new areas have been subjected to seismic surveys in recent years which had not been reported as having been surveyed in the previous report e.g., the Aegean Sea and off the coast of Libya. The absence of seismic surveying areas compared to the First Hotspots Report may also be due to the absence of complete information and changes in national legislation that placed a moratorium or a ban on new hydrocarbon exploration activities. For example, a moratorium was put in place in Italy in 2019 for 18 months, while Spain and France have adopted legislation that prohibits new oil and gas exploration licenses in 2021 and 2017, respectively. In the case of Spain, the country adopted a climate change and energy transition bill which, *inter alia*, stipulates that it will no longer issue new permits and hydrocarbon concessions for exploring or producing fossil fuels in its territories.

### Noise-generating activities and important areas for marine mammals

The preceding discussion has provided an indication of the number of noise-generating anthropogenic impulsive noise activities on a 40 by 40km spatial grid. Some of the areas showing the highest number of noise activities are in the central and eastern Mediterranean. To better understand the interaction between ocean noise pollution and areas of importance to marine mammals, Figure 7 indicates Cetacean Critical Habitats (CCH) as identified by ACCOBAMS<sup>20</sup> and adopted in Resolution 4.15 (see Appendix B for a full list). Figure 8 shows areas that have been identified as Important Marine Mammal Areas (IMMAs), defined as “discrete portions of habitat, important to marine mammal species, that have the potential to be delineated and managed for conservation.”<sup>21</sup> Figures 7 and 8 show that many of the CCHs and IMMAs coincide with areas where noise generating activities have taken place.

<sup>20</sup> <https://accobams.org/conservations-action/protected-areas/>

<sup>21</sup> IMMA definition available at: <https://www.marinemammalhabitat.org/immas/>



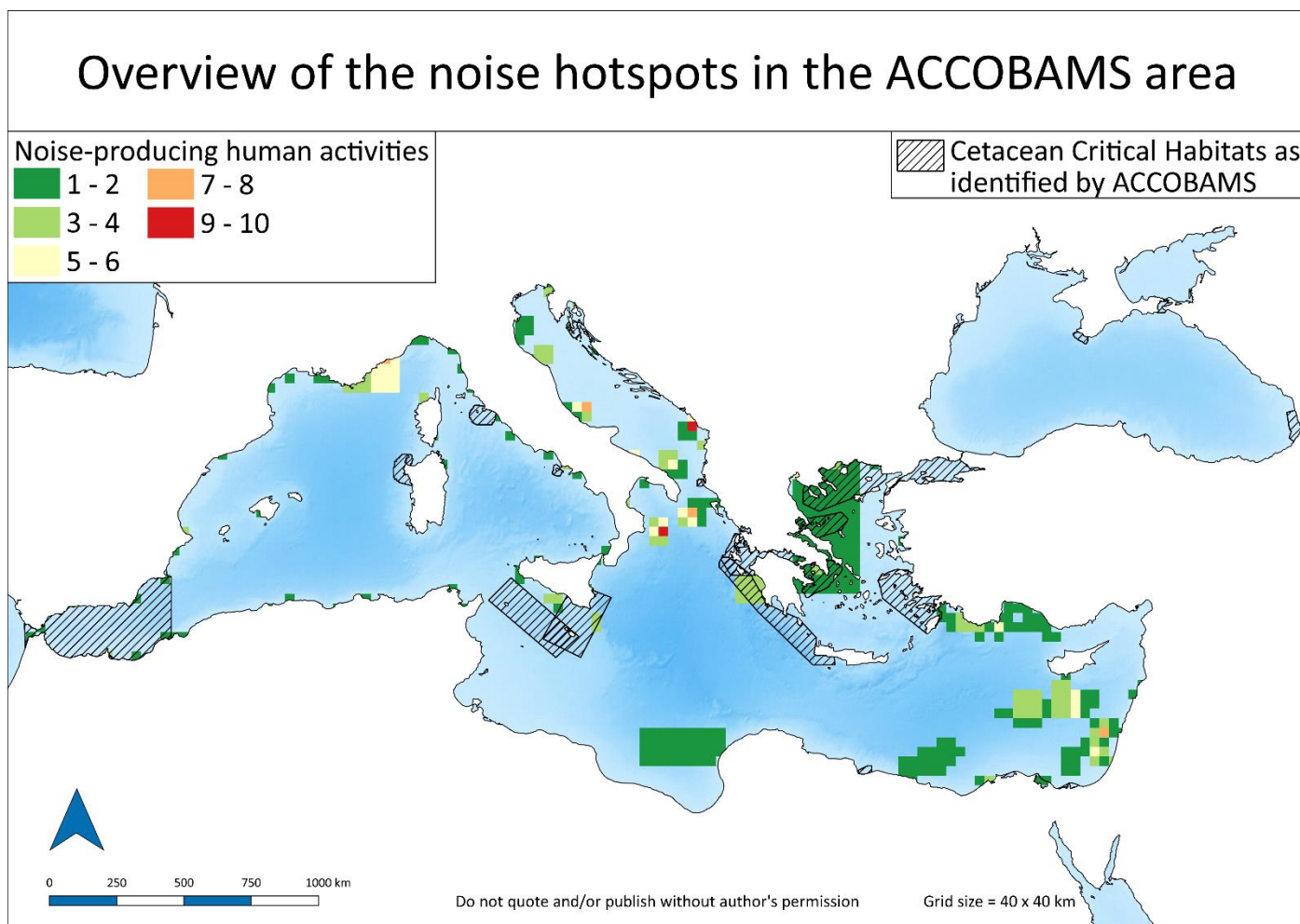


Figure 7: Cetacean Critical Habitats as adopted in ACCOBAMS Resolution 4.15 and seismic surveys

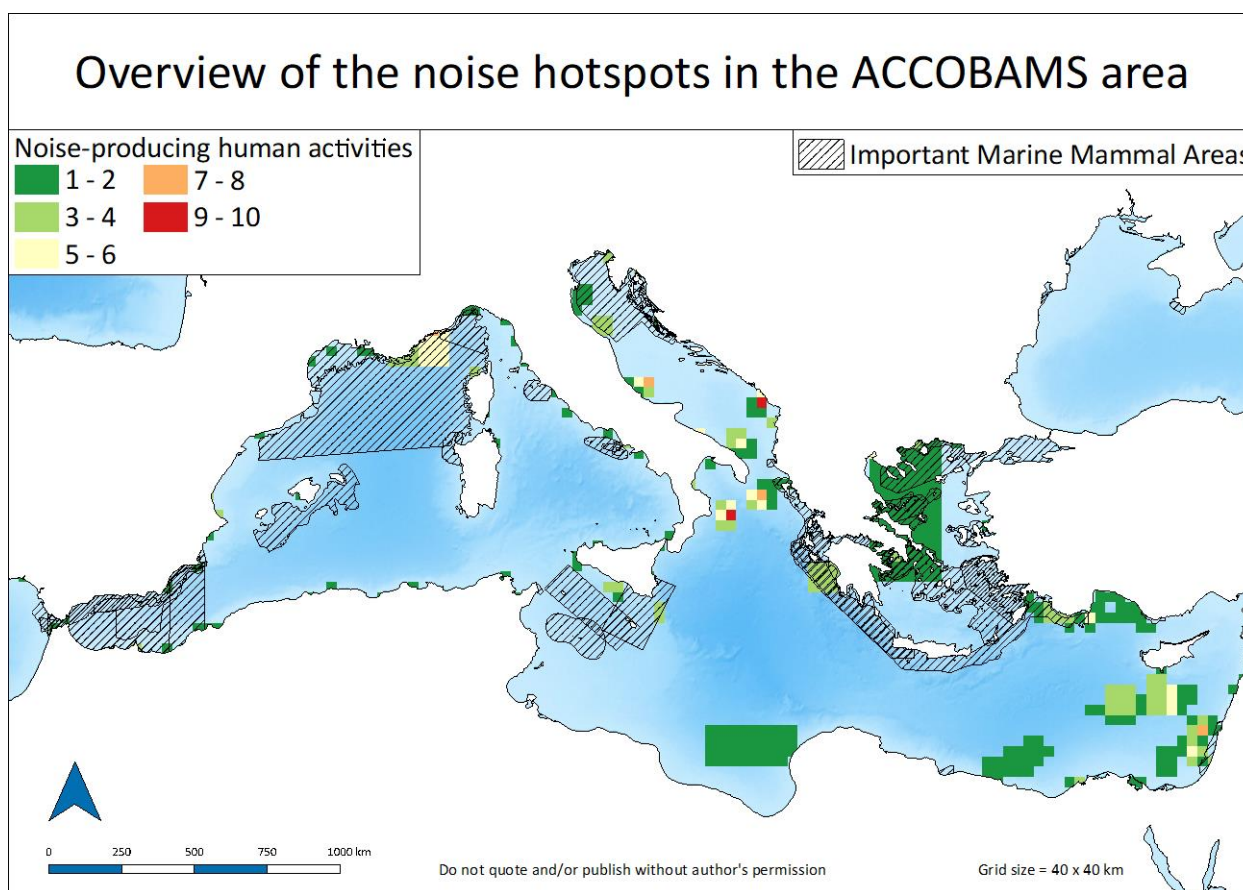


Figure 8: Important Marine Mammal Areas and seismic surveys<sup>22</sup>

At the first IMMA<sup>23</sup> Regional Workshop for the Mediterranean in 2016, 41 candidate Important Marine Mammal Areas (cIMMAs) were identified as well as 37 Areas of Interest (Aols) (IUCN Marine Mammal Protected Areas Task Force, 2017). The workshop was organised by the Marine Mammals Protected Areas (MMPA) Task Force with ACCOBAMS collaborating as a partner as well as contributing to the organisation of the workshop alongside the Tethys Research Institute. Following the workshop, the cIMMA submissions were independently reviewed and 26 IMMAs were accepted for full status, whilst five cIMMAs were confirmed for later assessment. A list of the 26 IMMAs, five cIMMAs and 39 Aols is given in Appendix C.

On the basis of the information identified and made available, it becomes evident that many areas where noise has been generated coincide with IMMAs e.g. the North West Mediterranean Sea, Slope and Canyon System IMMA, the Shelf of the Gulf of Lion IMMA, the Western Ligurian Sea and Genoa Canyon IMMA, the Northern Adriatic IMMA, the Ionian Archipelago IMMA, the Hellenic Trench IMMA, the Central Aegean IMMA, the Gulf of Corinth IMMA, the Northern Sporades IMMA, the Northern Coast and Islands of the Thracian Sea IMMA, and the South East Levantine Sea Aol (see Figure 8).

<sup>22</sup> The Shapefiles to identify IMMAs for this report have been made available by the Marine Mammal Protected Areas Task Force.

<sup>23</sup> “Important Marine Mammal Areas — referred to as ‘IMMAs’ — are defined as discrete portions of habitat, important to marine mammal species, that have the potential to be delineated and managed for conservation. IMMAs may merit place-based protection and/or monitoring, or simply reveal additional zoning opportunities within existing MPAs,” (IUCN Marine Mammal Protected Areas Task Force, 2017)

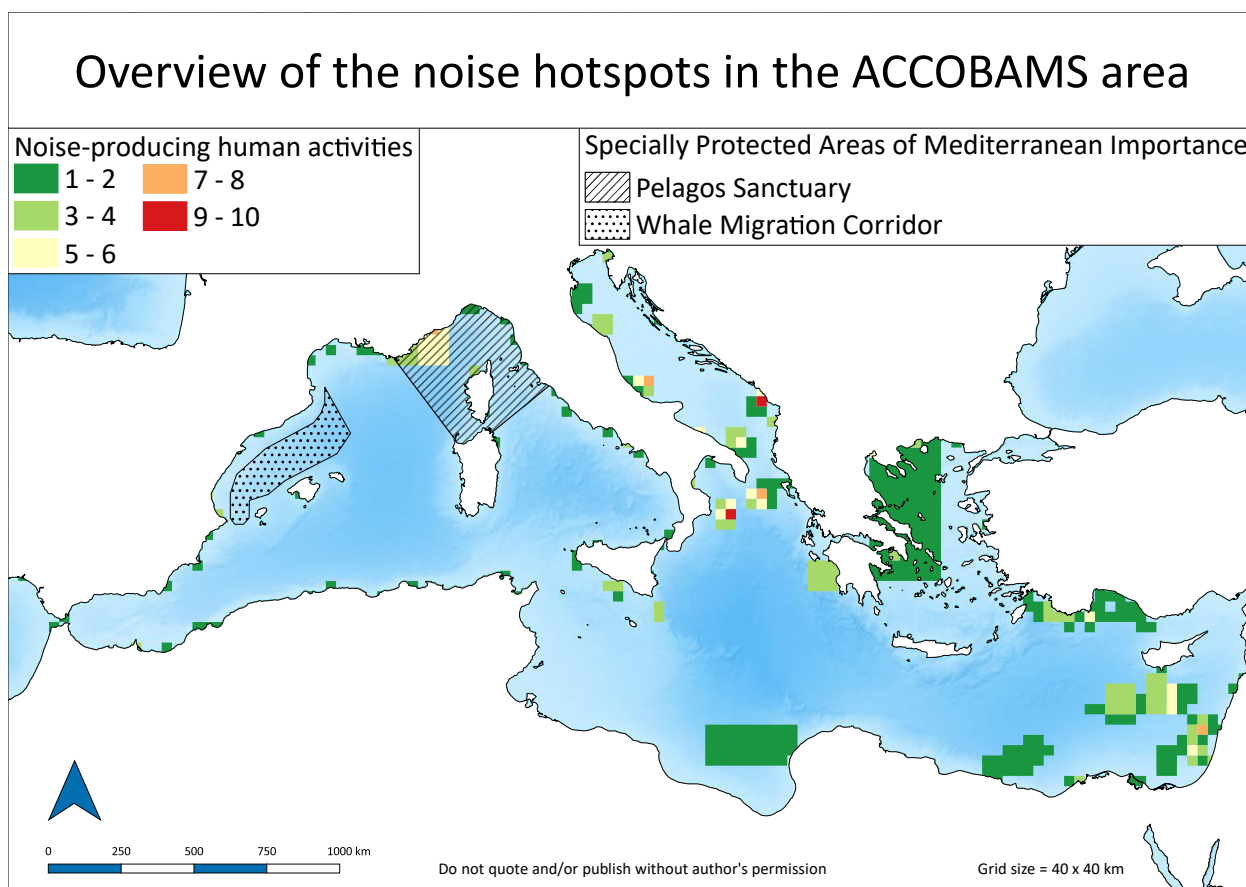


Figure 9: The Mediterranean Cetacean Migration Corridor SPAMI and the Pelagos Sanctuary for Marine Mammals SPAMI and seismic surveys

A number of Specially Protected Areas of Mediterranean Importance (SPAMIs) have cetaceans present. Here we focus on two which are of particular relevance for cetacean conservation and which cover significant areas (see Figure 9). The Mediterranean Cetacean Migration Corridor is a marine protected area which covers an area of 46,385.7 km<sup>2</sup> between mainland Spain and the Balearic Islands<sup>24</sup>. It was designated as a SPAMI in 2019<sup>25</sup>. As the SPAMI does not touch the coast, it does not include any ports or harbours, though any impulsive noise generated in nearby ports e.g., Barcelona or Tarragona will potentially have an impact on wildlife in the SPAMI. No seismic surveys are reported to have taken place in the Cetacean Migration Corridor SPAMI, however it should be remembered that seismic activity can have an impact over many kilometres and so the animals in the protected area could be disturbed or otherwise affected by distant seismic surveys.

The Pelagos Sanctuary for Mediterranean Marine Mammals covers 87,500 km<sup>2</sup> in the Corso-Liguro-Provençal Basin and includes 2,022 km of coast<sup>26</sup>. It was established through a Tripartite Agreement between France, Italy and Monaco in 1999 and was declared a SPAMI in 2002. Figure 9 shows that some seismic survey activity may have taken place within the area of the Pelagos Sanctuary in 2017. A number of ports in the Pelagos Sanctuary generated impulsive noise during the study period (see Figure 6).

It is of great concern that key habitat for cetaceans is being subjected to impulsive noise generating activities.

<sup>24</sup> <http://www.rac-spa.org/node/1679>

<sup>25</sup> <http://www.rac-spa.org/spami>

<sup>26</sup> <https://www.sanctuaire-pelagos.org/en/about-us>



## VI. CONCLUSION AND RECOMMENDATIONS

The information identified and provided by relevant stakeholders builds an important further step in understanding where impulsive noise is generated in the Mediterranean Sea and, equally importantly, where it overlaps with important marine mammal habitats. The maps included in this report, while certainly incomplete, demonstrate that a large part of the Mediterranean Sea is exposed to anthropogenic underwater noise pollution. It is also worth recalling that due to the transboundary nature of underwater noise the impacts of noise-generating activities can have an impact far from the source of origin. The above assessment also serves as an indication that different parts of the Mediterranean are subject to different forms of impulsive noise-generating activities. For example, while most of the underwater noise generated by ports is located in the central and western Mediterranean, seismic exploration activities appear to be mainly located in the Adriatic Sea and the eastern Mediterranean. This is a finding that has remained consistent with the conclusions drawn in the First Hotspots Report.

Some areas deserve specific attention, as they are exposed to multiple noise-producing activities. As already highlighted in the findings in the First ACCOBAMS Hotspots Report, these areas include the Italian portion of the Adriatic Sea, the and the Strait of Sicily. It has also become evident that impulsive noise-generating activities have taken place in Important to Marine Mammal Areas (IMMAs), in Specially Protected Areas of Mediterranean Importance (SPAMIs) and in Cetacean Critical Habitats (CCHs) as identified by ACCOBAMS in Resolution 4.15.

As frequently noted throughout this assessment information was only partially accessible. While some information was received from ACCOBAMS Parties and ACCOBAMS Partners, response rates have been low. Given the lack of data being added by Parties to the INR-MED centralised registry, and the inherent difficulty of identifying where, when and what type of impulsive noise activities have taken place, the findings only provide a limited and, at times, not entirely accurate representation of the actual impulsive noise-producing activities in the study area. It is, moreover, important to note that some seismic surveying activities are not reflected in the current study but are likely to take place in the future. In particular, the ongoing COVID-19 crisis has compelled companies to postpone such activities, as has been the case for the two offshore blocks south and west of Crete which are likely to be subjected to exploration activities at the end of 2021 or beginning of 2022.<sup>27</sup> Similarly, Italy established an 18-month moratorium in 2019 for oil and gas exploration, so seismic surveying activities could commence again soon.

This analysis has included information pertaining to both actual surveys conducted and areas that are under exploration licenses, which may remain valid for a number of years. In these cases, we cannot know whether and when an actual survey has taken place. Despite these limitations, **it is nevertheless clear that a great portion of the Mediterranean Sea appears to be exposed to impulsive underwater noise pollution.**

1. One of the most important findings that has emerged from this report is that while some data on impulsive noise-generating activities in the Mediterranean area are available, the data collated are incomplete and, at times, difficult to interpret. There is, therefore, a need for better data accessibility and

<sup>27</sup> See energy express ‘Total, ExxonMobil, ELPE delay Crete surveys for next winter’, available at: <https://energypress.eu/total-exxonmobil-elpe-consortium-delays-crete-survey-for-next-winter/>

more complete data, including information on the exact location, duration and scope of past, present and future activities.

2. More time and means should be allocated to better address the ambitious goal of carrying out a basin-wide assessment of impulsive noise-producing human activities.
3. Clearly, there is a need for better data accessibility, archiving and closer cooperation with ACCOBAMS stakeholders. It is especially important to highlight the need for much more collaboration/participation by industry and the military in addressing this regional and global issue. Enhancing the cooperation with industry and military authorities of ACCOBAMS Contracting Parties has the potential to improve results and enable a good management framework of the acoustic pollution caused by industrial development and naval exercises.
4. Seismic surveying is a technique predominantly used to explore the seabed for hydrocarbon resources and, therefore, relates to the continued exploration and exploitation of fossil fuels. Considering the overwhelming contribution of fossil fuels to climate change, it is critical for region-wide knowledge to be shared transparently about where seismic surveys are planned or are taking place as it becomes more urgent that fossil fuels remain unexploited to limit climate change.
5. This report has not reviewed the application of noise mitigation measures in the course of exploration activities. Future research should take mitigation measures into consideration.

Sources of continuous noise have not been assessed in this report. As maritime transport plays an important role in global trade, allowing for the shipment of large volumes of goods at relatively low costs, it is perhaps fair to assume that commercial shipping will continue to produce continuous noise in the ACCOBAMS Area in the years to come. Future research will need to address this growing challenge to cetaceans and other marine life.

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## VIII. APPENDICES

## A. ACCOBAMS Resolutions on anthropogenic underwater noise

Table A: ACCOBAMS Resolutions relating to underwater noise

Resolution		Year
2.16	Assessment and impact assessment of man-made noise	2004
3.10	Guidelines to address the impact of anthropogenic noise on marine mammals in the ACCOBAMS area	2007
4.17	Guidelines to address the impact of anthropogenic noise on cetaceans in the ACCOBAMS area	2010
5.13	Conservation of Cuvier's Beaked Whales in the Mediterranean	2013
5.15	Addressing the impact of anthropogenic noise	2013
6.17	Anthropogenic noise	2016
6.18	Implementation of an ACCOBAMS certification for highly qualified marine mammal observers	2016
7.13	Anthropogenic noise	2019

Table B: Projects relating to underwater noise that ACCOBAMS has been involved in

Project	Dates
A basin-wide strategy for underwater noise monitoring in the Mediterranean (EO 11) <sup>28</sup>	2015
Overview of the Noise Hotspots in the ACCOBAMS area (ACCOBAMS, 2016)	Report published 2016
Guidance on underwater noise mitigation measures <sup>29</sup>	Updated in 2019
Joint programme for GES assessment on D11 – noise in the Mediterranean Marine Region - quietMED <sup>30</sup>	2017-2019
quietMED2 <sup>31</sup>	2019-2021

<sup>28</sup>[https://wedocs.unep.org/bitstream/handle/20.500.11822/5747/15wg417\\_inf22\\_eng.pdf?sequence=1&isAllowed=y](https://wedocs.unep.org/bitstream/handle/20.500.11822/5747/15wg417_inf22_eng.pdf?sequence=1&isAllowed=y)

<sup>29</sup> [https://accobams.org/wp-content/uploads/2019/04/MOP7.Doc31Rev1\\_Methodological-Guide-Noise.pdf](https://accobams.org/wp-content/uploads/2019/04/MOP7.Doc31Rev1_Methodological-Guide-Noise.pdf)

<sup>30</sup> <http://www.quietmed-project.eu/quietmedmore/>

<sup>31</sup> <https://quietmed2.eu/>

## B. Areas identified by ACCOBAMS as Cetacean Critical Habitats (CCH)<sup>32</sup>

### *Areas of special importance for the common dolphin and other cetaceans*

1. Kalamos (Greece)
2. The Alborán Sea
3. Waters surrounding the island of Ischia (south-eastern Tyrrhenian Sea, Italy)
4. Waters surrounding the island of Malta and south-eastern Sicily, Italy
5. The eastern Ionian Sea and the Gulf of Corinth (Greece)
6. The Sazan Island – Karaburun Peninsula (Adriatic and Ionian Sea, Albania)
7. The Gulf of Saronikos and adjacent waters (Argo-Saronikos and southern Evvoikos Gulf, Greece)
8. Waters surrounding the northern Sporades (Greece)
9. The northern Aegean Sea (Greece)
10. Waters surrounding the Dodecanese (Greece)

### *Areas of special importance for Black Sea cetaceans*

11. The Kerch Strait for the bottlenose dolphin and the harbour porpoise (Russian Federation, Ukraine)
12. Cape Sarych to Cape Khersones for bottlenose and common dolphins and the harbour porpoise (Ukraine)
13. Cape Anaklia to Sarp for the common dolphin and the harbour porpoise (Georgia)

### *Areas of special importance for the bottlenose dolphin*

14. The Amvrakikos Gulf (northwestern Greece)
15. Waters along east coast of the Cres-Lošinj archipelago
16. The Turkish Straits system (also used by all Black Sea cetacean species)
17. North western area of Sardinia (Italy)
18. Tuscany archipelago (Italy)

### *Area of special importance for the sperm whale*

19. Southwest Crete and the Hellenic Trench (Greece)

### *Areas of special importance and diversity for various cetacean species*

21. The Alborán Sea and the Strait of Gibraltar
22. The Strait of Sicily for fin whales and common, bottlenose and striped dolphins
23. Sallum marine protected area (Egypt)

## C. Current (July 2017) list of IMMAs, cIMMAs and Aols from IUCN Marine Mammal Protected Areas Task Force (2017)

### 26 IMMAs

- Akamas and Chrysochou Bay IMMA
- Akrotiri IMMA
- Alborán Corridor IMMA
- Alborán Deep IMMA
- Alborán Sea IMMA
- Balearic Islands Shelf and Slope IMMA
- Campanian and Pontino Archipelagos IMMA
- Central Aegean Sea IMMA
- Chios and Turkish Coast IMMA
- Cilician Basin IMMA
- Coastal Shelf Waters of the Southeast Levantine Sea IMMA
- Gulf of Ambracia IMMA

<sup>32</sup> <https://accobams.org/conservations-action/protected-areas/>

- Gulf of Corinth IMMA
- Hellenic Trench IMMA
- Ionian Archipelago IMMA
- Kélibia IMMA
- Lampedusa IMMA
- North Western Mediterranean Sea, Slope, and Canyon System IMMA
- Northern Adriatic IMMA
- Northern Coast of Cyprus IMMA
- Northern Coast and Islands of the Thracian Sea IMMA
- Northern Sporades IMMA
- Shelf of the Gulf of Lion IMMA
- Straits of Gibraltar and Gulf of Cadiz IMMA
- Waters of Ischia and Ventotene IMMA
- Western Ligurian Sea and Genoa Canyon IMMA

#### **5 cIMMAs**

- Central South Coastal Adriatic Sea cIMMA
- Central Tyrrhenian Sea cIMMA
- East Sicily and Strait of Messina cIMMA
- North East Ionian Sea cIMMA
- Waters surrounding the Maltese Islands cIMMA

#### **39 Aols (Areas of Interest)**

- Al Hoceima
- Al-Bassit
- Al-Kouf and Adjacent Area
- Antalya Bay
- Antalya Canyon
- Balearic Islands and Shelf
- Bay of Bizerte
- Caprera Canyon
- Central Eastern Levantine Sea
- Coastal Area and Waters of Crete
- Contiguous Western Mediterranean
- Damietta
- Egadi Islands
- Entrance of Çanakkale Strait
- Gulf of Bomba
- Gulf of Bomba to Marsa Matrouh
- Gulf of Gabès
- Gulf of Lion Canyon System
- Gulf of Vera
- Herodotus Trench and Seamount

- Istria Kvarner
- Karaburun
- Kythira and Antikythira
- Lampedusa Adjacent Area
- Latakia Ibn Hani
- Lebanese Coast
- Myrtoon Sea
- Nile Delta Fan
- Northern Dodecanese
- Orosei Gulf
- Rawchy of Beirut
- Rosh Hanikra
- Sallum
- South East Levantine Sea
- Southern Adriatic
- Strait of Messina
- Thracian Sea and North Aegean
- Tiber River Estuary
- Tuscan Archipelago

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## E. Letter requesting information

Dear ACCOBAMS Focal Points, Dear ACCOBAMS Partners, Dear colleagues,

In 2015, the Agreement on the Conservation of Cetaceans of the Black Sea, Mediterranean Sea and Contiguous Atlantic Area (ACCOBAMS) commissioned the first overview of the noise hotspots in the Agreement Area, which made an inventory of anthropogenic noise-producing activities and identified and mapped the location of such activities.

At the Seventh Meeting of ACCOBAMS Parties (5-8 November 2019 in Istanbul, Turkey), Parties reaffirmed the recognition that cetaceans, other marine mammals and fish species are vulnerable to noise disturbances and adopted in its Work Programme and Budget for the Triennium 2020-2022 (Resolution 7.6) a plan to revise the impulsive noise hotspots maps of the ACCOBAMS Area.

Related to this effort, it is worth recalling the UNEP/MAP Ecosystem Approach Process (EcAP) aimed at managing human activities with a view to manage land, water and living resources to conserve natural marine heritage and protecting vital ecosystem services so as to reach good environmental status, as noted in ACCOBAMS Resolution 6.12 “Implementation of the EU Marine Strategy Framework Directive (MSFD) and Relevant Ecosystem Approach Process (EcAP). To reach these goals, Contracting Parties to UNEP/MAP adopted Decision IG.22/7 “Integrated Monitoring and Assessment Programme of the Mediterranean Sea and Coast and Related Assessment Criteria” where impulsive noise represents an important topic for the monitoring and assessment processes.

In this context, the ACCOBAMS Secretariat commissioned experts on anthropogenic underwater noise to carry out an update of the first overview hotspots report. The aim of the review is to, amongst [others, identify location, timing, frequency range, source type and to produce knowledge on the spatial extent of impulsive underwater noise in the ACCOBAMS Area](#). The objective of the updated report is to serve as a guide for future discussions about effective management linked to the impact of underwater noise on Cetaceans. The success of this endeavour is contingent on the support of all relevant stakeholders, which includes both governmental and non-governmental entities.

With this in mind the ACCOBAMS Secretariat is seeking your collaboration to collect available data, ranging from the types of activities, start and end date, frequency range, to source level and location of the relevant noise activity. You will find here attached a more detailed overview of the information required in the framework of this initiative.

Kindly provide any relevant information by the 30<sup>th</sup> of July 2021 to the ACCOBAMS Secretariat ([secretariat@accobams.net](mailto:secretariat@accobams.net) and [msalivas@accobams.net](mailto:msalivas@accobams.net)).

We appreciate your collaboration and would be grateful for your efforts in contributing to this important process.

Yours sincerely,

The ACCOBAMS Secretariat

## F. Questionnaire provided to stakeholders

### Project: UPDATE OF OVERVIEW OF THE NOISE HOTSPOTS IN THE ACCOBAMS AREA

Aim of the 2. Noise Hotspots Report: Identifying zones with high concentration of noise-producing human activities since 2016 and assessing potential zones of interactions (hotspots) with cetaceans.

Aim of the questionnaire: receive information concerning impulsive noise-generating activities in the Agreement Area since 2016-present.

### INTRODUCTION TO THE QUESTIONNAIRE

In the framework of this project, launched by the ACCOBAMS Secretariat, stakeholders are contacted to collect information on the location and timing of impulsive noise-generating activities at sea and to provide an update of information on noise hotspots in the ACCOBAMS Area.

### ACTIVITIES OF INTEREST

Activities of interest are those realised since 2016 as well as ongoing activities and those planned for the near future. The aim is to build on the existing information provided by the 1. Noise Hotspots Report and to review the concentration of impulsive noise sources across the Mediterranean. Of utmost relevance are human activities, including but not limited to geological surveys (either for Oil & Gas research, other industry research or scientific research), offshore platform constructions (Marine Renewables, Oil Gas, etc.), harbour extensions, zones where naval exercises are carried out, and any other human works generating impulsive noise at sea.

### INFORMATION OF INTEREST

The table below summarises the information requested to feed the database

Information to be collected	Details
Activity type	Offshore, inshore or onshore constructions, seismic surveys, naval exercises involving sonar use
Source type	Pile driver, Explosive, Sonars (naval sonars, Sparkers, Boomers, Sub-bottom profilers etc.), Airgun, Generic impulsive source
Frequency range	Low freq (10 Hz – 1kHz) or Mid freq (1 – 10 kHz)
Source level	dB SEL, dB SPL rms, dB SPL peak, other proxy (kg for explosives, Joules for Pile drivers)
Location	Spatial data in any exploitable format (lists of coordinates, polygons, lines, points)
Start of project	Date
End of project	Date
Nb of days of noise over the period (frequency)	Number of days in which the noise source was/is/will be active
References	<b>Any kind of reference: scientific papers, grey literature, websites, web databases, contact details of persons for personal communications etc.</b>
GIS_layers	Shapefiles or spatial data in other formats (e.g kml)

Please kindly provide information until the **30th June 2021** to the ACCOBAMS Secretariat [secretariat@accobams.net](mailto:secretariat@accobams.net)

## G. List of stakeholder responses

On the 9<sup>th</sup> of July 2021 the ACCOBAMS Secretariat approached ACCOBAMS Focal Points and ACCOBAMS Partners, as well as other relevant stakeholders providing a description of the type of information that would be helpful to produce the Second Hotspots Report. On the 2<sup>nd</sup> of August 2021 the ACCOBAMS Secretariat sent out a gentle

reminder and called on the above-mentioned stakeholders to provide relevant information. The results of the outreach are as follows:

Stakeholder	Status of response
ACCOBAMS FOCAL POINTS 24 Focal Points contacted Full list of Focal Points: <a href="https://accobams.org/wp-content/uploads/2021/09/Web_ACCOBAMS-Focal-Points-as-of-September-2021.pdf">https://accobams.org/wp-content/uploads/2021/09/Web_ACCOBAMS-Focal-Points-as-of-September-2021.pdf</a>	Response received from 5 Focal Points. Data provided by 3 Focal Points.
ACCOBAMS Partners (other stakeholders) 36 Partners contacted Full list of Partners: <a href="https://accobams.org/wp-content/uploads/2020/07/ACCOBAMS-Partners-July-2020.pdf">https://accobams.org/wp-content/uploads/2020/07/ACCOBAMS-Partners-July-2020.pdf</a>	Response received from 3 Partners or other stakeholders Data provided by 2 Partners or other stakeholders

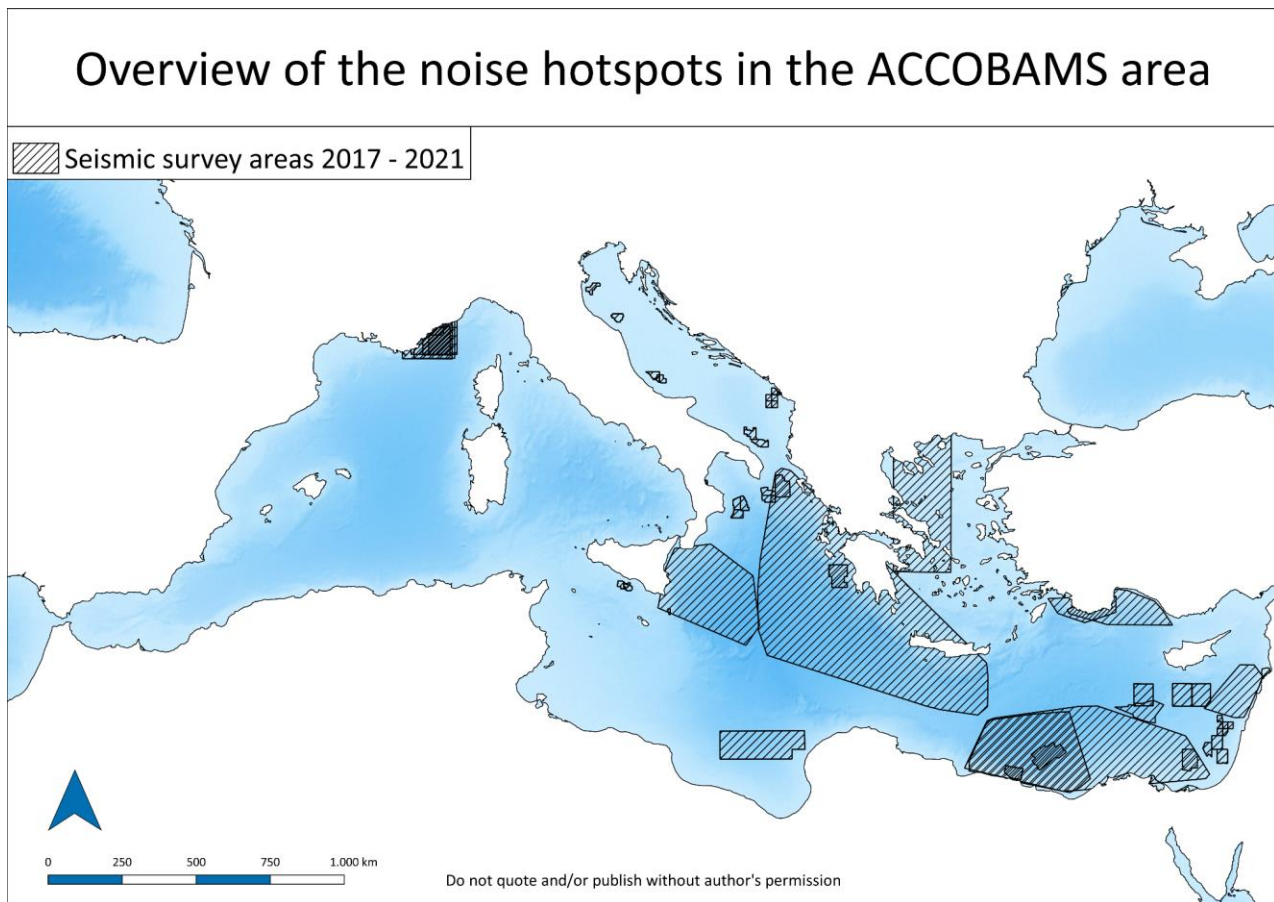
**H. Additional maps which indicate seismic surveying activities where the data was incomplete**

Figure 10: Seismic surveying areas 2017-2021 with additional unconfirmed data set

## Overview of the noise hotspots in the ACCOBAMS area

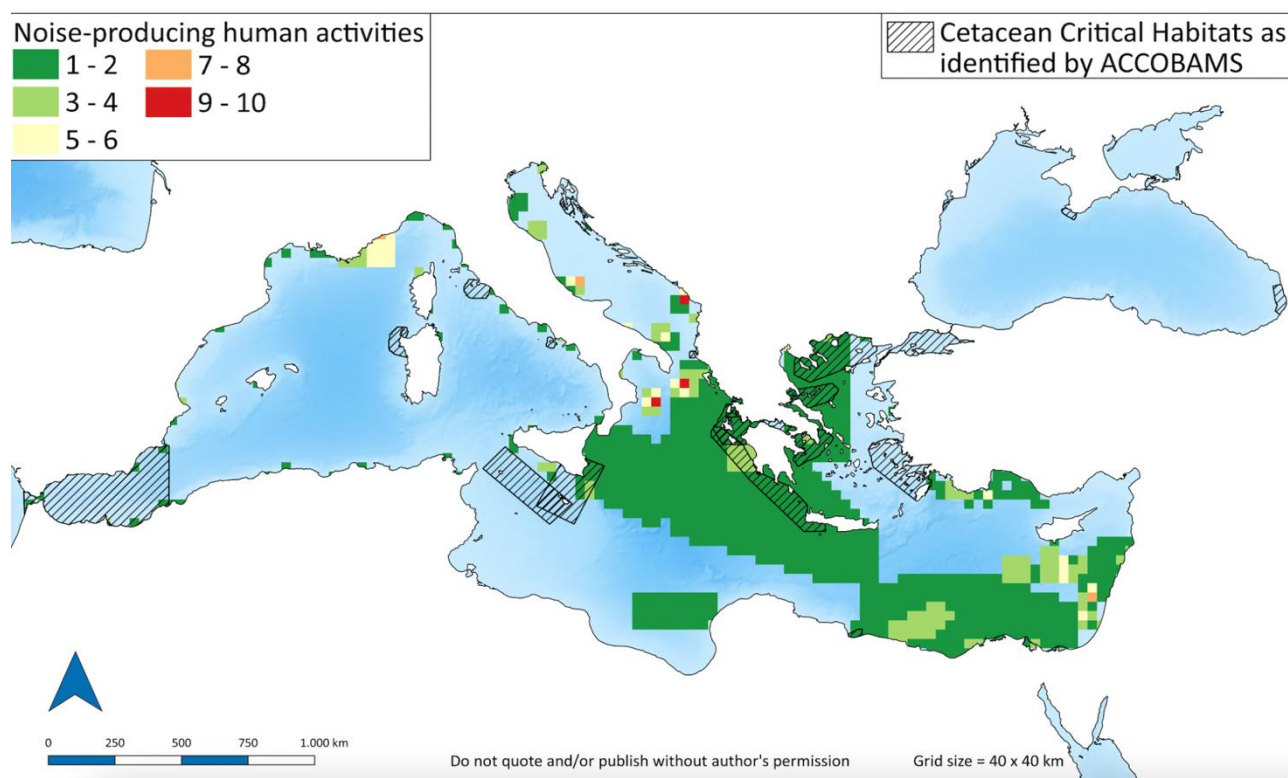


Figure 11: Cetacean Critical Habitats and seismic surveys with additional unconfirmed data set



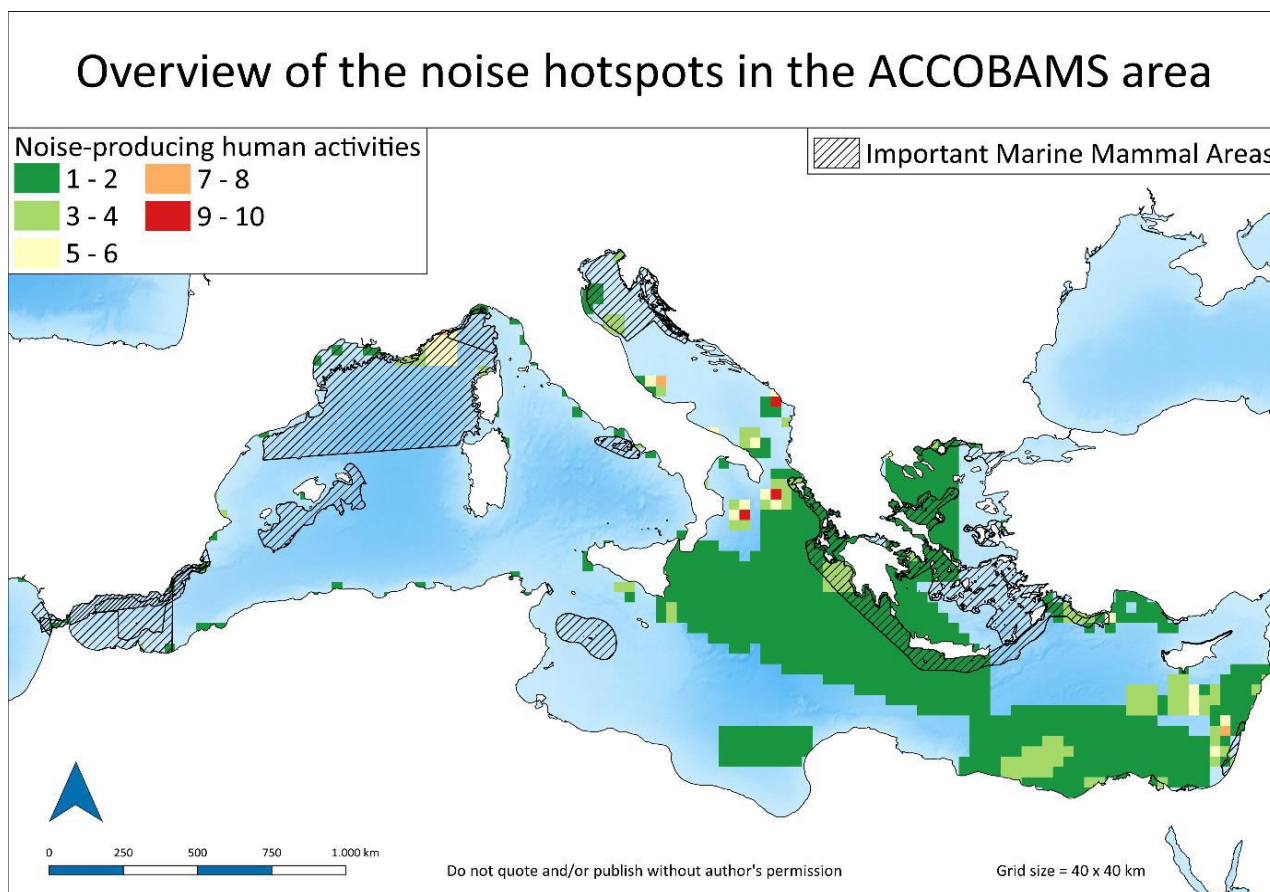


Figure 12: Important Marine Mammal Areas and seismic surveys with additional unconfirmed data set

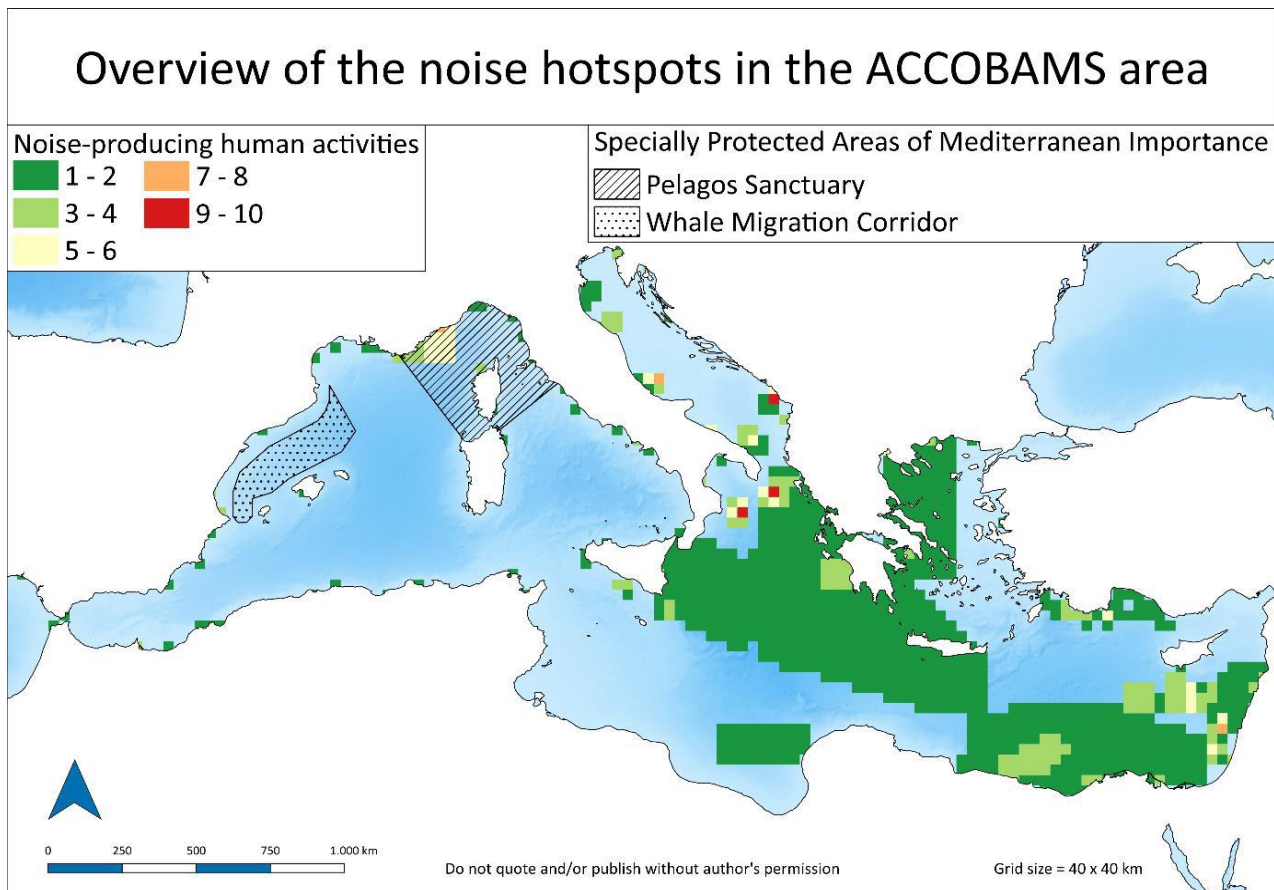


Figure 13: The Mediterranean Cetacean Migration Corridor SPAMI and the Pelagos Sanctuary for Marine Mammals SPAMI and seismic surveys with additional unconfirmed data set