Ocean Governance Important Marine Mammal Area (IMMA) Report
In support of the Twinning on Marine Mammals' Protection, a way to enhance transatlantic cooperation between MPAs

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EXECUTIVE SUMMARY

Over the past five years since 2016, the IUCN Marine Mammal Protected Areas Task Force has developed a user-friendly tool to identify marine mammal habitats. Now covering one third of the global ocean, the Task Force has identified 159 IMMAs. In addition, 24 areas have achieved the lesser status of candidate IMMAs (cIMMAs) and 128 have become areas of interest (AoI). With additional research, these lesser areas may also become IMMAs in the future.

An Important Marine Mammal Area, or IMMA, is defined as *a discrete portion of habitat, important for marine mammal species, which aims to have the potential to be delineated and managed for conservation.* The intention is that the identification of IMMAs through a consistent expert process, independent of any political and socio-economic concerns, will provide valuable inputs about marine mammals and their habitat, which will contribute to existing national and international conservation initiatives.

IMMAs have no legal standing as MPAs but are intended to be used in conservation planning by a variety of stakeholders, including *inter alia*, governments, intergovernmental organisations, conservation groups, and the general public. In application, IMMAs may merit specific place-based protection and/or monitoring and, in some cases, reveal additional zoning opportunities within existing MPAs. By pointing to the presence of marine areas of particular ecological value, IMMAs can serve the function of promoting the conservation of a much wider spectrum of species, biodiversity and ecosystems, well beyond the specific scope of conserving marine mammals.

The identification of IMMAs can also help to spotlight marine areas valuable in terms of biodiversity during the process of marine spatial planning (MSP). Marine mammals are indicators of ocean ecosystem health and thus, the identification of IMMAs supports the Convention on Biological Diversity (CBD) marine portfolio of Ecologically or Biologically Significant Areas (EBSAs) (Johnson et al. 2019). IMMA workshopss are also encouraging the creation of Key Biodiversity Areas (KBAs) identified through the IUCN KBA Identification Standard. Finally, IMMAs can contribute to the designation of International Maritime Organisation (IMO) Particularly Sensitive Sea Areas (PSSAs) and other shipping directives related to the hazards of ship-strikes on whales and increasing noise in the ocean (Notarbartolo di Sciara et al. 2016).

The value of IMMAs to the Ocean Governance project includes the following:

- IMMAs provide an up to date scientific assessment of marine mammal habitat use which can be harnessed for various purposes;
- IMMAs can help build more extensive spatial conservation networks set up originally as MPA networks only; and
- IMMAs enable the monitoring of threats to marine mammals and biodiversity.

The Task Force is currently planning to begin identifying IMMAs in the North and South

Atlantic as early as 2022-23. There will be five separate regional work plans each with its own expert week-long workshop as part of the 12 month process needed in each region to identify the IMMAs, cIMMAs and AoI and to put them on the IMMA e-Atlas with accessible materials for download.

What can researchers, MPA managers, conservation NGOs and others do to prepare for future IMMA regional projects and workshops?

- Identify potential AoI and gather the data supporting one or more criteria to be submitted to the process, once it becomes active, leading up to the workshop.
- Determine knowledge gaps and attempt to fill these gaps with systematic effort-based research. Explore new techniques for gathering data on the high seas including satellite photographic analysis, stationary hydrophone networks and wave gliders.
- Assist the Task Force by preparing a list of experts, giving special attention to those who have an overview and connections and cooperation with a wide group of researchers, and prepare to suggest them for the IMMA region (invited) workshop, or to be available for consultation.
- Organize data sets to make them accessible; assemble links to published and unpublished data sources to support nominations of Areas of Interest (AoI).
- Become familiar with hands-on mapping programs like SeaSketch, GoogleEarth or the open source QGIS used by the IMMA process.
- Study the IMMA Guidance document, IMMA Q & As and existing IMMA entries, along with the criteria and supporting examples, in order to support the nomination of new AoI toward becoming cIMMAs (all available on marinemammalhabitat.org).

Once the IMMAs are announced in a given region such as one of the five regions of the North and South Atlantic, the task list changes dramatically, just as it does when a marine protected area after years of stakeholder meetings and campaigning is finally approved. The transition to an accepted IMMA can result in some euphoria followed by let-down and complacency. Really, this is only the start of the process to create something that makes a difference for conservation, both in the case of IMMAs and MPAs.

Following is a summary list of actions to be taken by researchers and stakeholders once a region has IMMAs approved:

- work with regional coordinators to inform the regional Task Force group about their plans;
- adopt a particular championed IMMA, publicizing it by informing government and ocean users;
- prepare a monitoring plan for their IMMA, initially to set down baseline information against which future monitoring can be judged (this is important whether or not the IMMA becomes an MPA);
- prepare to expand the MMPA networks beyond only MPAs to include IMMAs, cIMMAs and AoI as well as other potential marine mammal habitats that may qualify as IMMAs in future; and
- Prepare and execute research plans to collect systematically data for each cIMMA and AoI. cIMMAs may need only presentation of existing information but AoI can require substantial research to define the area and its potential importance for marine mammals. cIMMAs can move up to IMMAs with a further review at any time, but AoI require an expert workshop to become a cIMMA and then, only with review, they can become an IMMA.

INTRODUCTION

Over the past five years since 2016, the IUCN Marine Mammal Protected Areas Task Force has developed a user-friendly tool to identify marine mammal habitats and to incorporate them into spatial conservation as part of ocean zoning, marine spatial planning, marine protected areas, International Maritime Organisation (IMO) shipping directives and other measures. Called Important Marine Mammal Areas, or IMMAs, this new tool draws inspiration from Important Bird and Biodiversity Areas, the IBAs, which have been used successfully for bird habitat conservation around the world. Compared to birds and many land-based species, however, whales, dolphins and other marine mammals have been slow to receive protection through spatial habitat conservation measures (Hoyt 2011, 2018, Notarbartolo di Sciara & Hoyt 2020). This has been due to the more recent advent of spatial research on marine mammals and the fact that this research used disparate methodologies (e.g. acoustics, sighting data, aerial and boat transects, photo-ID, strandings, spatial habitat modeling, and so on). The data were often inconsistent or incompatible in terms of meeting the standards needed for use in national and international fora. Moreover, much of the data remains unpublished—parked somewhere in grey literature, theses, or kept as raw data.

In 2004 and again in 2011, all the MPAs worldwide with whale and dolphin habitat were evaluated (Hoyt 2011) (Table 1). The number and size of MPAs for marine mammals have clearly grown since the first ones were established in the early 1970s. Yet with few exceptions these MPAs have not represented the most important areas for marine mammals (Hoyt 2011, 2018). In some cases, these MPAs were established for reasons other than protecting marine mammals; in other cases the protection may have started with the idea of marine mammal habitat protection but political and socioeconomic realities altered the size and dimensions. Their size did not correspond to marine mammal habitats and ecosystems supporting marine mammal species. Standing back from the map, it became clear that the whale and marine mammal MPAs hugged the coastlines of continents and around islands but didn't extend into pelagic waters and out to the high seas (Fig. 1). Most of the ocean was not even being considered for marine mammal habitat protection.

Table 1. Marine protected areas featuring or including cetacean and other marine mammal habitat

Year	MPAs with marine mammals (MMPAs)	Proposed MPAs with marine mammals	Source
2004	358	176	Hoyt 2011
2011	570	138	Hoyt 2011
2018	650	200	Hoyt 2018; http://www.cetaceanhabitat.org

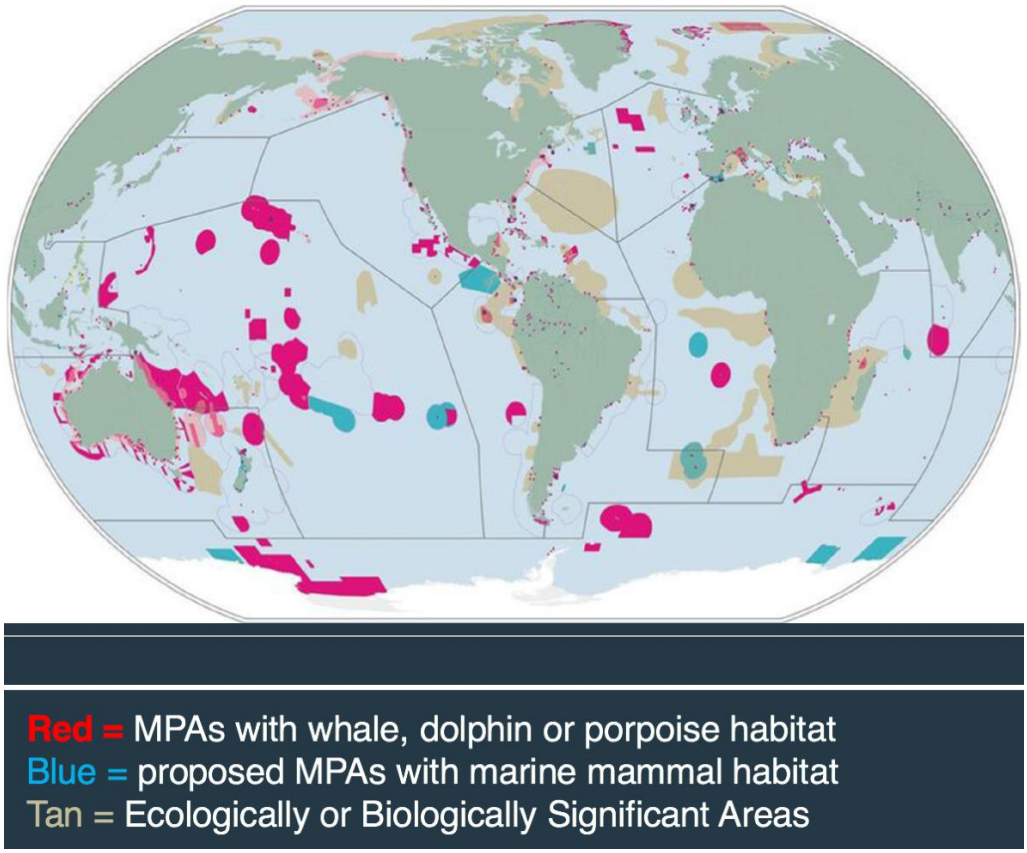

Fig. 1. Map of MMPAs, proposed and existing, and EBSAs (2017)

At the same time, the Convention on Biological Diversity (CBD) has been working since 2012 through regional scientific workshops to identify ecologically or biologically significant areas (EBSAs) mainly on the global high seas. In these workshops, representatives nominated by governments were invited to recommend the most biodiverse areas in the ocean. However, the available data sets focused more on birds and other marine life, while marine mammal data were comparatively less represented. Of 206 EBSAs described up to 2014 only 12 EBSAs were primarily focused on marine mammals, 121 sites noted only the presence of marine mammals, while 73 sites had no marine mammal data at all (Kot et al. 2014).

The IMMA tool thus aims to provide a valuable service for conservation by forging a robust scientific approach, free from socioeconomic or political bias, highlighting the most important marine mammal habitats in the sea. The selection of habitat to put forward to the reviewers hinges on eight criteria or subcriteria, which largely align with the CBD EBSAs, BirdLife's IBAs and the IUCN key biodiversity areas (KBAs) (Corrigan et al. 2014, Hoyt & Notarbartolo di Sciara 2014). Yet this work goes beyond the identification and protection of marine mammal habitats and trying to see if the data supports the selection of the various criteria. Marine mammals, due to their size and need to come to the surface to breathe, act as indicators for biodiversity and enable monitoring of the overall health of the seas. Marine mammals are also charismatic species that are magnets for attracting public interest in the ocean and marine conservation (Notarbartolo di Sciara & Hoyt 2020).

The strength of the IMMA tool can be measured in how close it comes to what the whales themselves would select as their protected habitat if they were able to do so. Of course, we

don't know that; instead we must rely on groups of field scientists using their own and other data sets as part of a robust, peer review process to determine IMMAs.

After three years of preparation (2013-mid-2016), followed by four intensive years of IMMA regional identification projects (mid-2016-2020), IMMAs now cover 34% of the global ocean (Fig. 2). The six IMMA workshops of the Task Force to date have identified 159 IMMAs. In addition, 24 areas have achieved the lesser status of candidate IMMAs (cIMMAs) and a further 129 have become areas of interest (AoI) (Table 2) (Fig. 3). With additional research, these lesser areas may also become IMMAs in future. Meanwhile, more ocean regions are being planned with the goal of completing the world ocean by the end of the decade. At that point, the earlier regions will need to be revisited, one by one, to nominate new IMMAs and promote cIMMAs and eligible AoI to IMMA status, as well as to adjust the boundaries of existing IMMAs.

But the identification of IMMAs is only the beginning of the work. The success of the IMMA tool will be in how much it advances marine mammal and wider biodiversity conservation. Will IMMAs be used as layers in marine spatial planning? How much are MPA managers using IMMAs to look at zoning, expansion or for developing networks? Will IMMAs be increasingly used to create new MPAs or special travel zones with reduced speeds through the International Maritime Organisation (IMO)? Can IMMAs be harnessed to evaluate and reduce threats to marine mammals (bycatch, shipstrike, noise)? All IMMAs must be monitored for change—habitat degradation, as well as signs of species population changes and overall ecosystem health.

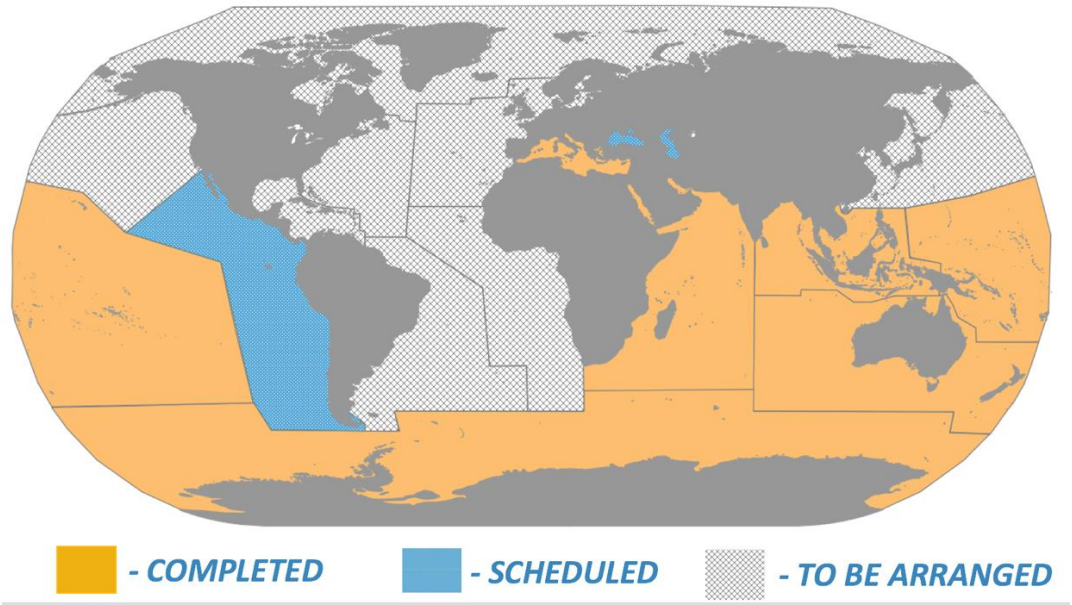

Fig. 2. IMMAs now cover 1/3 (34%) of the Global Ocean. In 2021, the Task Force will identify IMMAs in the Black and Caspian Seas and the South East Tropical and Temperate Pacific Ocean.

Table 2. Important Marine Mammal Areas (IMMAs), candidate IMMAs (cIMMAs) and Areas of Interest (AoI) identified in each region

Marine Region	Extent	IMMAs	cIMMAs	AoI	Workshop Location
MR1	Mediterranean	26	7	34	Chania, Greece
MR2	Pacific Islands	20	4	20	Apia, Samoa
MR3	North East Indian Ocean and South East Asian Seas	30	7	32	Kota Kinabalu, Borneo, Malaysia
MR4	Extended Southern Ocean	13	1	7	Brest, France
MR5	Western Indian Ocean and Arabian Seas	37	3	23	Salalah, Oman
MR6	Australia-New Zealand and South East Indian Ocean	31	2	13	Perth, Australia
Monk seal workshop	African Atlantic	1	0	0	La Spezia, Italy (special monk seal workshop)
Monk seal workshop	European Atlantic	1	0	0	La Spezia, Italy (special monk seal workshop)
MR7	Black Sea and Caspian Sea	—	—	—	In process – Online 2.21
MR8	South East Tropical and Temperate Pacific Ocean	—	—	—	In process planned for Costa Rica 9.21
Total	Total to date	159	24	129	

Ref: https://www.marinemammalhabitat.org/immas/summary-of-current-immas/

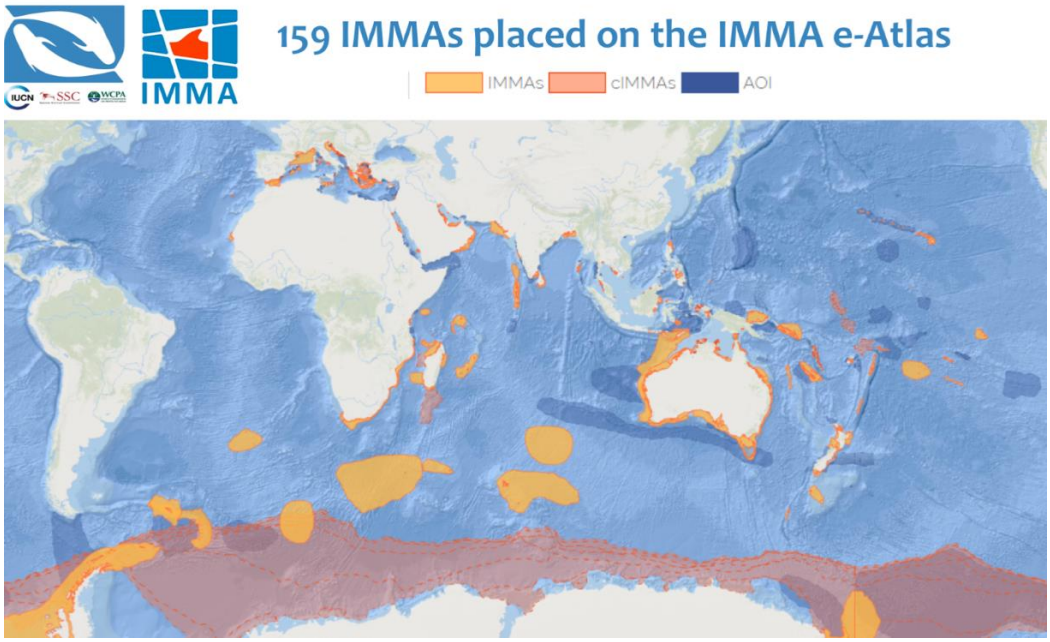

Fig. 3. 159 IMMAs on the e-Atlas (Dec. 2020)

WHAT IS AN IMMA AND WHAT IS THE PROCESS FOR CREATING IMMAS?

An Important Marine Mammal Area, or IMMA, is defined as *a discrete portion of habitat, important for marine mammal species, which aims to have the potential to be delineated and managed for conservation* (IUCN Marine Mammal Protected Areas Task Force 2018). The IMMA initiative was developed by the IUCN Joint SSC[1]/WCPA[2] Marine Mammal Protected Areas Task Force (the "Task Force"). The intention is that the identification of IMMAs through a consistent expert process, independent of any political and socio-economic concerns, will provide valuable inputs about marine mammals and their habitat, which will contribute to existing national and international conservation initiatives. The application or implementation process is separate from and occurs later than the identification process (Hoyt 2015).

IMMAs are an advisory, expert-based classification. They have no legal standing as MPAs but are intended to be used in conservation planning by a variety of stakeholders, including *inter alia*, governments, intergovernmental organisations, conservation groups, researchers, industry, and the general public. In application, IMMAs may merit specific place-based protection and/or monitoring and, in some cases, reveal additional zoning opportunities within existing MPAs. By pointing to the presence of marine areas of particular ecological value, IMMAs can serve the function of promoting the conservation of a much wider spectrum of species, biodiversity and ecosystems, well beyond the specific scope of conserving marine mammals (IUCN Marine Mammal Protected Areas Task Force 2018).

The identification of IMMAs can also help to spotlight marine areas valuable in terms of biodiversity during the process of marine spatial planning (MSP). IMMAs are already starting to build institutional capacity at the international and national levels, to make substantial contributions to the global marine conservation agenda. Marine mammals are indicators of ocean ecosystem health and thus, the identification of IMMAs supports the Convention on Biological Diversity (CBD) marine portfolio of Ecologically or Biologically Significant Areas (EBSAs). EBSAs aim to provide a basis for promoting awareness of marine biodiversity, leading to conservation in specific areas of the world ocean. IMMAs are also supporting the creation of Key Biodiversity Areas (KBAs) identified through the IUCN KBA Identification Standard. Finally, IMMAs can contribute to the designation of International Maritime Organisation (IMO) Particularly Sensitive Sea Areas (PSSAs) and other shipping directives related to the threat of ship-strikes of whales and increasing noise in the ocean.

The week-long IMMA workshop programme brings together 20-50 marine mammal scientist experts and observers from a marine region to prepare candidate IMMAs (cIMMAs). As explained in IUCN Marine Mammal Protected Areas Task Force (2020), the general outline of the IMMA workshop programme consists of:

- a plenary session to introduce the IMMA selection criteria, present the submitted AoI, select subregion group facilitators, and discuss the proposed cIMMAs;
- a reading session of the IMMA documents including an IMMA Guidance Document, Inventory of Knowledge, and a list of the Areas of Interest (AoI) submitted in advance of the meeting by experts;

[1] Species Survival Commission (www.iucn.org/theme/species/about/species-survival-commission)
[2] World Commission on Protected Areas (https://www.iucn.org/theme/protected-areas/wcpa)

- multiple working group sessions to select and document the cIMMAs to go forward on a subregional basis; and
- a closing plenary to adopt the results of the workshop, to select one or more Task Force regional coordinators, and to discuss eventual conservation implications of the workshop results.

The Workshop is part of a three-stage process that focuses the effort to produce the final IMMAs:

STAGE 1 – Nomination of initial Areas of Interest (AoI): In the weeks and months before the meeting, AoI are proposed by the experts, via a dedicated online system (SeaSketch) or through completion of the available AoI forms, and are then summarized in the AoI report. This document is provided to the regional experts in order to evaluate the submitted AoI, along with existing marine mammal place-based conservation measures. Participants attending the workshop are also encouraged by the IMMA Secretariat to submit additional AoI by the end of the first day.

STAGE 2 – Development of cIMMAs: the expert participants are invited to use their regional knowledge to develop cIMMA proposals, based upon their review of AoI submitted in advance or proposed during the workshop. Candidate areas must start out as AoI first, and only then, after group discussion, do they have the chance to graduate to cIMMAs.
There are four categories of main criteria and eight criteria or sub-criteria, at least one of which must be met in order to propose a cIMMA (See Annex 1):

Criterion A – Species or Population Vulnerability (based on the IUCN Red List Status)
Criterion B – Distribution and Abundance
Sub-criterion B1 – Small and Resident Populations: Areas supporting at least one resident population, containing an important proportion of that species or population, that are occupied consistently.
Sub-criterion B2 – Aggregations: Areas with underlying qualities that support important concentrations of a species or population.
Criterion C – Key Life Cycle Activities: Areas containing habitat important for the survival and recovery of threatened and declining species.
Sub-criterion C1 – Reproductive Areas: Areas that are important for a species or population to mate, give birth, and/or care for young until weaning.
Sub-criterion C2 – Feeding Areas: Areas and conditions that provide an important nutritional base on which a species or population depends.
Sub-criterion C3 – Migration Routes: Areas used for important migration or other movements, often connecting distinct life-cycle areas or the different parts of the year-round range of a non-migratory population.
Criterion D – Special Attributes
Sub-criterion D1 – Distinctiveness: Areas which sustain populations with important genetic, behavioural or ecologically distinctive characteristics.
Sub-criterion D2 – Diversity: Areas containing habitat that supports an important diversity of marine mammal species.

For Sub-criterion D2, the overall average species richness for the region and IMMA subregions (based on the species richness considered via the knowledge assessment in the Inventory of Knowledge report) is provided as a baseline for participants to consider suitable

AoI for which to develop rationales for cIMMAs using the D2 criterion (IUCN Marine Mammal Protected Areas Task Force 2018, 2020).

STAGE 3 – Final review and IMMA status qualification: an independent panel chaired by Randall R. Reeves, IUCN Cetacean Specialist Group Chair, reviews the cIMMAs and decides whether they can be accepted as IMMAs (IUCN Marine Mammal Protected Areas Task Force 2020).

HOW ARE IMMAS CURRENTLY BEING USED IN THE SOUTHERN HEMISPHERE AND THE MEDITERRANEAN?

Between October 2016 and the end of 2020, the Task Force held 6 regional workshops inviting 179 experts to facilitate the creation of candidate IMMAs. Following the review panel decisions, a total of 159 IMMAs were created covering 15.7 million km^2. This represents 13% of the total examined area of 125.4 million km^2. IMMAs have been identified for 61 of the 130 marine mammal species, 17 of which were in threatened (CR, EN and VU) categories according to the IUCN Red List.

To date, the Task Force has received more than 100 requests for IMMA shapefiles and metadata. Such requests are not proof of use by the diverse stakeholders, but they indicate potential conservation action even far beyond the items listed below. Concerning requests for IMMA shapefiles and metadata, Fig. 4 and 5 show the breakdown.

Recent demonstrations of how IMMAs are being implemented include:

- In Mozambique, in May 2020 the South African SASOL company relinquished two oil & gas blocks in key habitat following its identification as the Bazaruto Archipelago to Inhambane Bay IMMA, home to the last viable African dugong population. See the Case Study sidebar in Box 1.
- In East Kalimantan, Indonesia, a long-term study helped identify Balikpapan Bay as an IMMA and this declaration coincided with the coastal zonation plans being put forward, giving international attention to protect this habitat for endangered Irrawaddy dolphins.
- IMMA identification contributed to the creation of MPAs in Bangladesh leading to the June 2019 declaration of the Nijhum Dwip MPA and National Park.
- Following a Task Force-IWC-ACCOBAMS workshop in Greece in 2019, the International Whaling Commission agreed to use IMMAs along with AIS data to address the threat to large whales from ship strikes.
- IMMA scientific workshops have utilised ecologically or biologically significant areas (EBSAs) from the Convention on Biological Diversity; in future EBSA workshops, IMMAs will help shape new and revised EBSAs.
- IMMAs have contributed to the potential identification of more than 28 IUCN key biodiversity areas (KBAs) in the Mediterranean and in Australia-New Zealand and South East Indian Ocean.
- The U.S. Navy has identified IMMAs as Offshore Biologically Important Areas relevant to the mitigation of disturbance and mortality from sonar testing.
- In meetings in London with the International Maritime Organisation, the IMO has expressed interest in considering speed restrictions and traffic separation schemes in IMMAs where marine mammal populations are sensitive to noise or face the risk of collisions.

- IMMAs were formally recognised by the Parties to the Convention on Migratory Species, by adopting a resolution endorsing IMMAs at the CMS 12th meeting in Manila, the Philippines, in 2017.

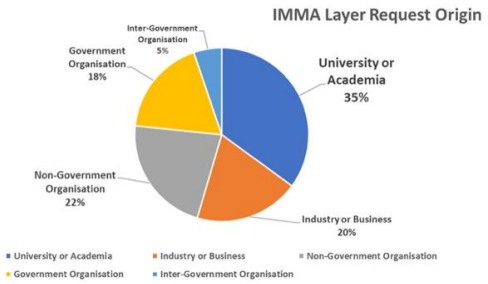

Fig. 4 The origin of the IMMA Layer request

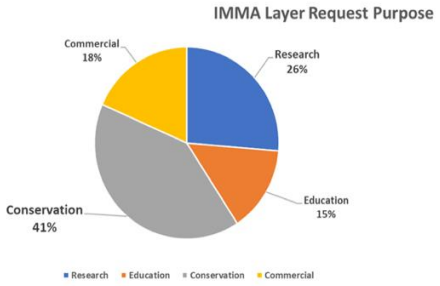

Fig. 5 The purpose of the IMMA request

IMMAs provide a marine mammal layer that can be used in marine spatial planning (MSP) as well as for future Convention on Biological Diversity (CBD) workshops to identify ecologically or biologically significant areas (EBSAs).

More than 100 countries worldwide, including the European Union and many countries bordering the Atlantic are planning or have already started MSP processes in their waters. For marine spatial planning (MSP) and MPA processes, it is essential to bring all stakeholders to the table and ensure that marine mammal and other biodiversity layers are given weight. In the past, without having marine mammal layers available, they could not be considered for MSP, but now that they are becoming available, the main challenge will be for stakeholders to insist that they be given fair consideration in the planning process.

Box 1. Case Study: Saving Africa's last 300 Dugongs in Mozambique

In November 2019, the co-chairs of the Task Force travelled to Mozambique to work with international dugong authorities Dr Victor Cockcroft and Dr Donna Kwan and to meet with local dugong scientists Dr. Almeida Guissamulo and Dr. Alima Gomes to determine the status of the recently announced Bazaruto Archipelago to Inhambane Bay IMMA (IUCN Marine Mammal Protected Areas Task Force (2019).

The dugong had been assessed as a Vulnerable species by the IUCN Red List since 1982. The results of the past three decades of research in the Western Indian Ocean had led to a comprehensive research project on the numbers and distribution of dugongs along the East African coast. Dugong hotspots in Kenya, Tanzania and Mozambique were identified through historical knowledge, fisher questionnaires and satellite telemetry. At hotspots, further questionnaires and focal group surveys were undertaken, including unpublished aerial surveys between 2007 and 2018. Overall, the results of this research indicated that dugongs persist only in small numbers in the East African region, other than in the Bazaruto Archipelago area. Thus, the Bazaruto Archipelago to Inhambane Bay IMMA represents the last stronghold in East Africa with nearly 300 dugongs remaining.

According to local researchers' work over the past 30 years, the dugong habitat of the Bazaruto Archipelago to Inhambane Bay is threatened by extractive gas & oil seismic

exploration by the South Africa-based SASOL Limited, as well as by illegal gillnetting and poaching. It is estimated that the dugongs can sustain only a maximum of two human-caused deaths of productive females per year before numbers crash; unfortunately, current mortalities are higher than that.

Hoyt and Notarbartolo di Sciara and their expert team held stakeholder meetings with tourism operators as well as open half-day sessions with local scientists, NGOs and local advisors, followed by meetings with government departments in Maputo, the Mozambique capital. Following their return, in December 2019, the activities to promote IMMA implementation in Mozambique were discussed at presentations at the World Marine Mammal Conference in Barcelona. The President of the Society for Marine Mammalogy subsequently wrote a presidential letter to the government of Mozambique which became part of a news release in early 2020. Articles appeared in Facebook and in South African newspapers, pointing out that the South African SASOL company held oil & gas leases in the region.

In July 2020, SASOL announced that it was returning its two principal oil & gas blocks located in the middle of the dugong habitat to the Mozambique government in recognition of the value of the area and the threat that exploration and oil & gas developments would have posed.

The ball is now in the government's court to decide:
(1) what measures will be taken outside of the Bazaruto National Park to protect the dugong habitat,
(2) whether African Parks which is managing the national park will be entrusted with the dugongs outside the park, and/or
(3) whether the park will simply be expanded to contain the entire range of the dugong.

HOW CAN THE TOOL OF IMMAS CONTRIBUTE TO MPAS AND NETWORKING INITIATIVES

IMMAs provide an up to date scientific assessment of marine mammal habitat use which can be harnessed for various purposes

The scientific assessment of marine mammal habitats performed through the efforts of the Task Force means that the IMMAs that are identified carry a high-profile, international, independent status which can help facilitate protection measures.

In summary, IMMAs help:

• to inform the creation and design of new MPA proposals;
• to shape proposals for expanding existing MPAs and MPA proposals;
• to highlight the potential need for making highly protected zones within existing or proposed MPAs (IMMAs for certain species may provide zoning information useful for protecting marine mammal habitats);
• to inform the periodic review process of existing MPAs (management plan review); and
• to monitor existing MPAs and known habitat areas for environmental disturbance and climate change (Agardy et al. 2019, Silber et al. 2017).

Even without becoming MPAs, IMMAs can function as a tool to evaluate and reduce human impacts on marine mammals and their habitats and ecosystems. By spotlighting important areas for particular species, it is easier to undertake targeted studies to look at ship strike, overlaying AIS and other data; to evaluate the impact of bycatch, by looking at fishing interactions; and to evaluate noise levels, with hydrophone measurements. Starting off in a known area of scientifically agreed importance for marine mammals provides a focus for the research.

In 2014 at the Shipstrike Workshop in Panama, the IWC first considered IMMAs as a potential tool that could be valuable. However, it was only through a two-day workshop in Greece in 2019 that the IWC formally adopted IMMAs as the best way to evaluate potential areas with ship strike conflicts needing attention and in some cases immediate action (International Whaling Commission 2014, 2019). Nearly 40% of the IMMAs identified up to 2019 had as primary species sperm whales or large baleen whales (including Omura's and Bryde's) which are among those most often implicated in ship strikes, although even smaller whales and dolphins, such as killer whales which often approach boats are affected by shipstrike (Raverty et al. 2020). Some IMMAs have buffers and some have indications for zones or specific areas within the IMMA which are intensively used by certain marine mammals. Sometimes these are marked on the e-Atlas but more often zoning is part of supporting material in the PDFs that accompany each entry. These and other information about threats presented in the supporting material may help to identify areas with ship strike problems (International Whaling Commission 2019).

In the International Whaling Commission (2019) report, Hoyt pointed out that any of the 8 IMMA criteria or subcriteria—after filtering by species (sperm, fin, blue, etc.) and overlaying ship traffic lanes to measure intensity—could potentially identify a place where ship strikes are an issue; there is no single criterion related to ship strike occurrence. However, Criterion A (Species or Population Vulnerability) indicates a threatened species so that could be an added reason for conservation concern. Criterion D2 on Diversity will indicate multiple species in an area, some more subject to ship strike than others, so that could be a further reason for conservation concern. Subcriteria C1 Reproductive Areas and C2 Feeding Areas may indicate more intensive use of an area than C3 Migration Routes. Species spending considerable time in a given area thus may be more susceptible to ship strike if the ship lanes go through the IMMA. Migrating baleen whales indicate seasonal use of an area; sperm and other toothed, and potentially non-migrating baleen whales may have more consistent use of an area (International Whaling Commission 2019).

IMMAs help build spatial conservation networks

Substantial work has been done to advance MPA networks (IUCN-WCPA 2008). This thinking broadly applies to networks that include not only MPAs but also other effective conservation measures (OECMs) (IUCN-WCPA 2017) (and spatial conservation tools such as key biodiversity areas (KBAs), ecologically or biologically significant areas (EBSAs), important bird and biodiversity areas (IBAs), and IMMAs.

An MPA network is defined as "an organized collection of individual MPAs operating co-operatively and synergistically, at various spatial scales and with a range of protection levels, to fulfill ecological aims more effectively and comprehensively than individual sites could

alone" (IUCN–WCPA 2008). This definition could also be used to include the other spatial tools such as IMMAs.

Thus, an MPA-IMMA and wider spatial network would imply a coordinated system of MPAs and other identified and potential conservation areas including IMMAs, cIMMAs and AoI, linked through species (such as migrating humpback whales), ecosystems (e.g., feeding areas for blue whales) and/or management commonalities (e.g., MPAs with ecotourism or similar threat issues matched to IMMAs where ecotourism occurs or where there may be similar threats). Through networks, there is much that can be learned about MPA design, finance, management and monitoring. Of course, the MPAs and IMMAs in the network must be appropriately placed, sized and spaced to function collectively within the stated management regime as an ecological network and to achieve biodiversity goals. MPA networks can help to deliver the mandate of ecosystem-based management as they allow essential ecosystem processes and the important features of complex marine ecosystems to be protected. According to Holling (1973), protecting the ecological interconnectedness between and within ecosystems through strategically placed MPAs can strengthen overall resilience and maintenance of key functions and processes, especially in the face of stresses such as climate change. An MPA-IMMA network is also envisioned as a network of people working at ends of migratory pathways together with nodes along the way to further conservation goals.

The design of comprehensive and effective ecological networks of MPAs for marine top predators including marine mammals has been described by Hooker et al. (2011) as requiring adherence to 7 principles, and these also apply to the integration of IMMAs into the network: (1) the use of wildlife-habitat modelling and spatial mapping approaches to develop testable model predictions of species distribution and abundance; (2) the incorporation of life-history and behavioural data into the development of these predictive habitat models; (3) the explicit assessment of threats in the design and monitoring process for single- or multi-species MPAs; (4) the serious consideration of dynamic MPA designs to encompass species which use well-defined but spatially dynamic ocean features; (5) the integration of demographic assessment in MPA planning, allowing provision of advice to policy makers, ranging from no to full protection; (6) the clear articulation of management and monitoring plans allowing retrospective evaluation of MPA effectiveness; and (7) the adoption of an adaptive management approach, essential in the light of ongoing and anticipated ecosystem changes and species range shifts in response to climate change.

Thus IMMAs can help to inform network design. Besides being a tool, however, IMMAs also function as a layer. An IMMA is a layer to be used with other layers (seabird, shark-ray, marine turtle and other species distribution maps, primary productivity, bathymetry and so on).

Compared to MPAs, IMMAs are non-political and often straddle the borders of 2 or more countries as well as national EEZ and high seas waters. As a result, IMMAs, along with MPAs, arranged in networks could have a high strategic role in improving understanding and cooperation between countries and including the high seas regarding marine mammal and ocean conservation.

IMMAs enable the monitoring of threats to marine mammals and biodiversity

IMMAs provide an area-based approach to monitoring biodiversity and the health of the sea through marine mammals which are tethered to the surface by their need to breathe. Marine

mammals thus can be studied by boat, plane, drone, hydrophone, wave glider, even by satellite pictures (with higher resolution pictures able now to distinguish species). Drones can monitor body condition and, together with a marine mammal stranding and carcass recovery program, it is possible to determine wider environmental implications in terms of contaminants and other aspects affecting ecosystems (e.g. Barbieri et al. 2013, Raverty et al. 2020). Hydrophones, wave gliders and satellite pictures can extend the reach of monitoring into the high seas. With base-line data and check-ups every few years, IMMAs become valuable outdoor laboratories for monitoring overall biodiversity and ocean health. The MMPA Task Force is currently engaged in a project to develop a monitoring strategy for IMMAs similar to that developed for monitoring MPAs (Parks et al. 2004).

The monitoring goal for IMMAs is to (1) obtain and chart base-line data against which future monitoring can be measured, (2) develop a standardized form for collecting data so they can be compared and evaluated, (3) establish relationships with communities and stakeholders who will adopt and identify themselves with a particular IMMA.

As part of the monitoring regime there should be consideration of an early warning system for identifying IMMAs in trouble or changing, and which may need attention as has been outlined by Agardy et al. (2019)**.**

Of special note are areas on the IMMA e-Atlas which are identified as candidate IMMAs (cIMMAs) or areas of interest (AoI). These are areas that have gone through the review process. Areas containing the cIMMA label have either been accepted with minor or major changes that have not been completed and yet they remain close to becoming an IMMA. AoI on the e-Atlas (not to be confused with the AoI originally submitted to workshops) are areas with insufficient marine mammal data but with further research and documentation against the IMMA criteria may become IMMAs in the future. Thus, although they are left over from the review process, cIMMAs and AoI on the e-Atlas retain considerable value for monitoring as well as future use.

PREPARING FOR FUTURE IMMA WORKSHOPS IN THE NORTH AND SOUTH ATLANTIC REGIONS

Two regions along the fringes of the Atlantic have already been studied for IMMAs — the Mediterranean and the Southern Ocean at the edge of the far southern South Atlantic. In addition, the Task Force completed all the identifications of Mediterranean monk seal habitat which is mainly in the Mediterranean but also includes two locations off the Atlantic coast of Africa (Fig. 6). Otherwise the North and South Atlantic as well as the Caribbean have yet to be analysed for what will be their considerable contributions to the IMMA work. Of course, the Atlantic, North and South has already a substantial history of creating and managing marine mammal spaces as sanctuaries, MPAs and for tourism (Hoyt 2005, 2011; Hays et al. 2019; there has also been concern expressed about noise in the wake of cetacean strandings (Agardy et al. 2007).

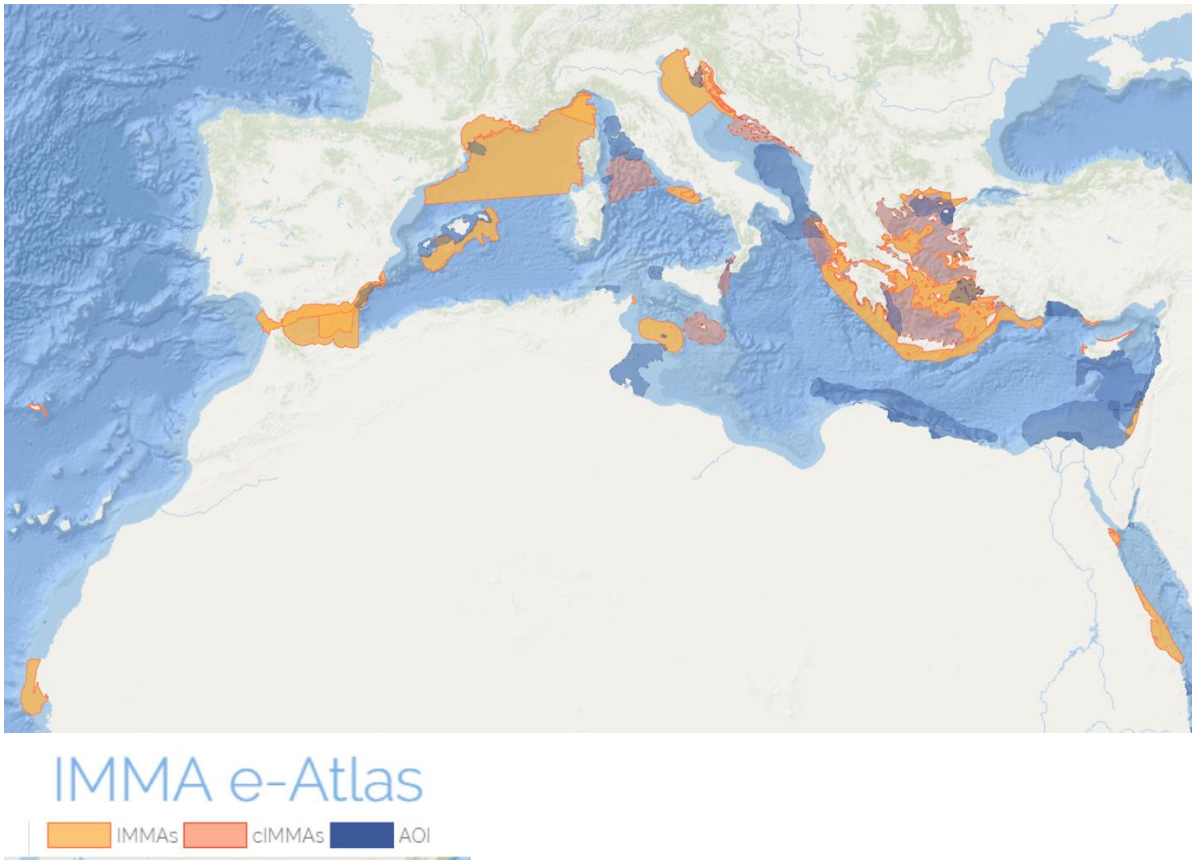

Fig. 6. Map of IMMAs in the Mediterranean & Atlantic (Dec. 2020)

The Task Force is currently planning to identify IMMAs in the North and South Atlantic starting as early as 2022-23 (Fig. 7). There will be five separate regional work plans each with its own expert week-long workshop as part of the year-long process needed in each region to identify the IMMAs, cIMMAs and AoI and to put them on the IMMA e-Atlas. These regions are divided as follows:

1. North East Atlantic IMMA Marine Region,
2. North West Atlantic IMMA Marine Region,
3. Gulf of Mexico and Caribbean Sea IMMA Marine Region,
4. South American Atlantic IMMA Marine Region, and
5. West African Atlantic IMMA Marine Region.

The first two marine regions in the North Atlantic are among the best studied, data-rich marine areas in the world. Duke University's OBIS-SEAMAP has been accumulating sightings of marine mammals, seabirds and marine turtles since 2002. OBIS-SEAMAP is global but most of its sightings are around North America. The US programme, through the Cetacean Density and Distribution Mapping Working Group, identified biologically important areas (BIAs) for 24 cetacean species, stocks, or populations in seven regions including the US East Coast and Gulf of Mexico (Van Parijs et al. 2015). The North East Atlantic has had substantial surveys from the three SCANs surveys (SCANS 1995, SCANS-II 2008, Hammond et al. 2017). The focus on the European Habitats Directive through Natura 2000 to determine bird, marine mammal and other habitats, along with initiatives from national government efforts in western Europe as well as North America, have resulted in a

network of identified habitats that includes coastal and nearshore waters. Even in offshore waters of the northeast Atlantic, the OSPAR Convention has worked to identify areas on the high seas needing protection, although these do not necessarily include marine mammal habitat. There are many NGOs and scientists focusing on marine mammals in the Atlantic region, but the high seas remains a big challenge in terms of identifying marine mammal habitats as IMMAs and eventually MPAs. New techniques for gathering data on the high seas are expected to come into more common usage, including satellite photographic analysis, stationary hydrophone networks and wave gliders.

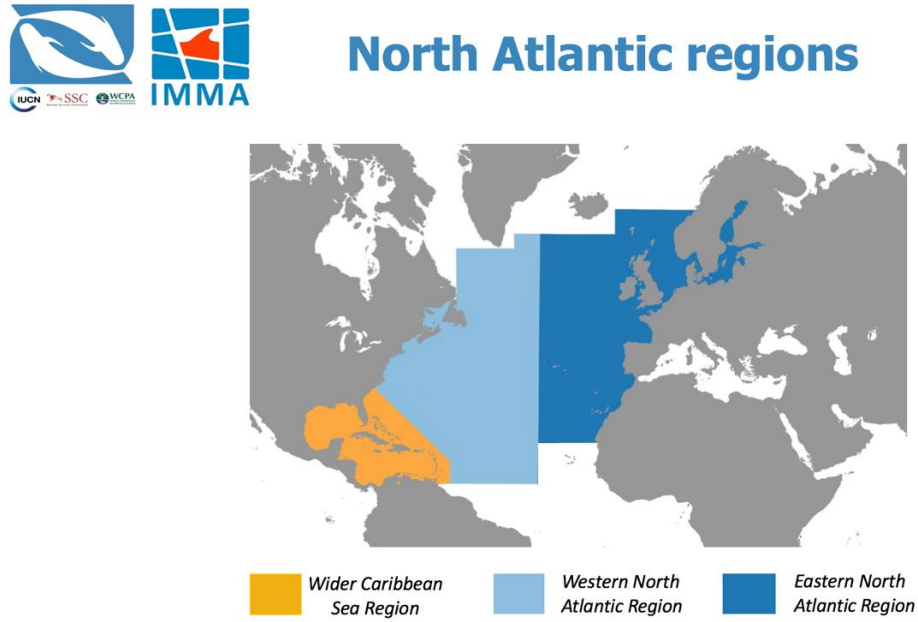

Fig. 7. Potential future expansion of IMMAs into the North Atlantic

The South Atlantic, by comparison, is much less studied but still has solid caches of data available from long time researchers in the two regions. Marine mammal research along the African coast is less well known than the South American work but studies in some countries have occurred over the past few years.

Much can be learned by following the step-by-step data gathering and identification process used in the IMMA workshops, such as the Western Indian Ocean and Arabian Seas or Australia-New Zealand and South East Indian Ocean (IUCN Marine Mammal Protected Aras Task Force 2019, 2020). As with the previous workshops, the challenge will be arriving at a common currency for evaluating disparate data sources with data having been gathered in different seasons, years and overall time scales using various methods from acoustics to boat and aerial transect surveys, photo-ID, sightings. This is often accomplished by a group of scientists working together in or before the workshop to look at raw data, papers, and reports and to tease out and arrive at the best assessment of what is important habitat for the criterion or criteria they select to put forward an AoI to become a cIMMA and, after peer review, hopefully an IMMA.

There is much that can be done to prepare for a future IMMA regional identification process (Box 2).

Box 2: What can researchers, MPA managers, conservation NGOs and others do to prepare for a future IMMA regional identification process and workshop?

• Identify potential AoI and the relevant data supporting one or more criteria to be submitted to the process, once it becomes active, leading up to the workshop.
• Determine knowledge gaps and attempt to fill these gaps with systematic effort-based research. Explore new techniques for gathering data on the high seas including satellite photographic analysis, stationary hydrophone networks and wave gliders.
• Assist the Task Force by preparing a list giving special attention to experts who have an overview and connections and can inspire cooperation with a wide group of researchers, and prepare to suggest them for the IMMA region (invited) workshop, or to be available for consultation.
• Organize data sets to make them accessible; assemble links to published and unpublished data sources to support nominations of Areas of Interest (AoI).
• Become familiar with hands-on mapping programs like SeaSketch, GoogleEarth or the open source QGIS used by the IMMA process at previous IMMA workshops.
• Study the IMMA Guidance document, IMMA Q & As and existing IMMA entries, along with the criteria and supporting examples in order to support the nomination of new AoI toward becoming cIMMAs (all available on marinemammalhabitat.org).

POLICY AND MANAGEMENT RECOMMENDATIONS WHEN IMMAS ARE IN PLACE

Once the IMMAs are announced in a given region such as one of the five regions of the North and South Atlantic, the task list changes dramatically, just as it does when a proposed marine protected area after years of stakeholder meetings and campaigning is finally approved (Box 3). The transition to an accepted IMMA can result in some euphoria followed by let-down and complacency. Really, this is only the start of the process to create something that makes a difference for conservation, both in the case of IMMAs and MPAs.

Of course, the Mediterranean region has been surveyed for IMMAs, as well as EBSAs, and has the benefit of the established MPA network MedPAN. Thus it could be possible to start working with IMMAs in this region. Also the Task Force has completed all the identifications of Mediterranean monk seal habitat which is mainly in the Mediterranean but also includes two locations off the Atlantic coast of Africa. Thus an extended monk seal MPA and IMMA network could be set up possibly as a separate project of MedPAN.

The lessons about working together in different kinds of networks from the experiences of the three Twinning projects provide a substantial legacy to draw upon for utilizing IMMAs. This will also be applicable to the Southeast Asia component of Ocean Governance. Southeast Asia was part of the third IMMA workshop held in 2018, and the IMMAs identified are listed on the marinemammalhabitat.org website on the e-Atlas map and in the searchable database (Fig. 8). It can be possible to work through the regional IMMA coordinators and Task Force network of IMMA regional workshop scientists in the North East Indian Ocean and South East Asian Seas to link with those who will be responsible for

IMMAs in the various Atlantic regions. In this way, it will be possible to build strong links and to share future challenges.

Box 3: What can MPA managers, conservation NGOs and other stakeholders do once the North and South Atlantic IMMAs have been approved?

• As a first call, researchers and stakeholders should work with regional coordinators to integrate and inform the regional Task Force group about their plans.
• Researchers and stakeholders can adopt their particular championed IMMA, publicizing it by informing government and ocean users.
• Researchers and stakeholders can prepare a monitoring plan for their IMMA, initially to set down baseline information against which future monitoring can be judged. This is important whether or not the IMMA becomes an MPA. The Task Force is currently preparing a monitoring "best practice" document with an Exeter University student, to be available late 2021. Until then, a starting point document could be Parks et al (2004) How is your MPA doing? A guidebook of natural and social indicators for evaluating marine protected areas management effectiveness (available for download at https://www.iucn.org/content/how-your-mpa-doing-a-guidebook-natural-and-social-indicators-evaluating-marine-protected-areas-management-effectiveness. Besides English, it is published in French, Spanish, Italian, and Arabic.
• Prepare to expand the MMPA networks beyond only MPAs to include IMMAs, cIMMAs and AoI as well as other potential marine mammal habitats that may qualify as IMMAs in future.
• Prepare and execute systematic research plans to collect data for each cIMMA and AoI. cIMMAs may need only presentation of existing information but AoI can require substantial research to define the area and its potential importance for marine mammals. cIMMAs can move up to IMMAs with a further review at any time, but AoI require an expert workshop to become a cIMMA and then only after review can they become an IMMA.

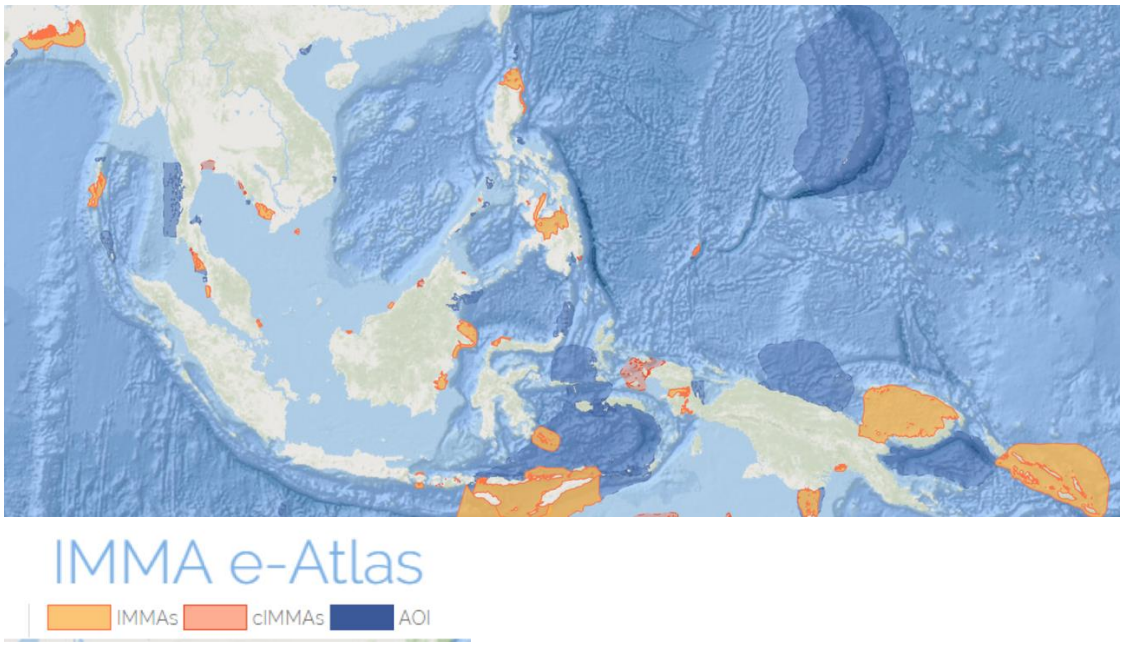

Fig. 8. Map showing IMMAs in Southeast Asia

CONCLUSION

IMMAs present a valuable opportunity to enhance marine mammal networks and to establish valuable monitoring regimes across wider regions and even entire oceans. There is much that can be done to prepare for future IMMA identification workshops in the Atlantic region leading to future implementation activity to support marine mammal and wider biodiversity conservation, whether through MSP, the creation of MPAs, or through the expansion of marine mammal networks.

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Annex 1. Summarizing the IMMA criteria, with qualifying scenarios and examples

IMMA Criterion ***Statement of Requirement***	**Qualifying Scenario**	**Examples that could qualify**
A: Species or Population Vulnerability ***Areas containing habitat important for the survival and recovery of threatened and declining species or population.***	(1) Species or populations listed internationally as CR/EN/VU status under the IUCN Red List. (2) Nationally or regionally listed species or populations under non-Red List authorities.	Sea caves for Mediterranean monk seals (Aguilar and Lowry 2013); Costa Rica Thermal Convection Dome for blue whales (Reilly et al. 2008); land locked Caspian Sea seals (Härkönen 2008); mangroves for Antillean manatee subspecies (Self-Sullivan and Mignucci-Giannoni 2008).
B1: Small and Resident Populations ***Areas supporting at least one resident population, containing an important proportion of that species or population, that are occupied consistently.***	(1) An entire species or subspecies inhabiting a discrete area. (2) One of the very few sites globally where the species or subspecies occurs. (3) Discrete areas occupied year-round by a large proportion of a species. (4) Instances where a population is so small that a single event in a part of its distribution could jeopardize the population's survival.	Vaquitas in the Gulf of California (Rojas-Bracho and Reeves 2013); Galápagos fur seals and sea lions (Wolf et al. 2008); Hector's dolphins in New Zealand (Burkhart and Slooten 2003); Kerguelen Islands Commerson's dolphins (de Bruyn et al. 2006); and Maui dolphins (Hamner et al. 2012); Mediterranean monk seals in Madeira (Pires et al. 2007) and at Cap Blanc, Mauritania (CNROP/SRRC 2000); Hawaiian monk seals in both the Leeward and the main Hawaiian Islands (Chandler et al. 2015).
B2: Aggregations ***Areas with underlying qualities that support important concentrations of a species or population.***	(1) An important proportion of the individuals of a species or population regularly congregate in a specific area during a portion of the year. (2) Individuals of one or more species or populations occur in the same area in observed densities of potential global importance. (3) Aggregations observed in multiple years, either consecutively or episodically due to climatic or oceanic "anomalies". (4) Marine mammals occur regularly and are concentrated to an extent that a single large-scale event could significantly alter the long-term survival of a species or population.	Gray whales off northeastern Sakhalin Island, Russia (Bradford et al. 2008); North Atlantic right whales in Massachusetts Bay and eastern Cape Cod Bay (Nichols et al. 2008); beaked whale species in the Gulf of California (Barlow et al. 2006); Cuvier's beaked whales in the Alborán Sea (Cañadas and Vázquez 2014).
C1: Reproductive Areas ***Areas and conditions that are important for a species or population to mate, give birth, and/or care for young until weaning.***	(1) Haul-out sites used by one or more pinniped populations for giving birth, nursing young and/or mating. (2) Specific sites or systems with favourable conditions for giving birth and caring for young immediately after birth.	Mexican lagoons used by gray whales (Alter et al. 2008); bays along the coasts of Patagonia, Argentina (Vermeulen 2013) and South Africa used by southern right whales (Brandão et al. 2010); coastal areas in the south-eastern United States used by North Atlantic right whales (Kraus et al. 2001).
C2: Feeding Areas ***Areas and conditions that provide an important***	(1) Oceanic features that drive processes supporting important biological productivity.	Upwellings in Humboldt Current System off Chile and Peru (Molina-Schiller et al. 2005); in the Gulf of St. Lawrence near

nutritional base on which a species or population depends.	(2) Bathymetric features and the hydrodynamic processes around them which often act to concentrate prey for marine mammals. (3) River mouths and larger estuarine habitats promoting the stable presence of prey aggregations.	the mouth of Saguenay Fiord, Canada (Lavoie et al. 2000); Mexico's Gulf of California (Barlow and Forney 2007); frontal systems such as the Sub-tropical Convergence off southern Africa (Best and Shell 1996) and the Sub-Antarctic Front and the Antarctic Polar Front (Bost et al. 2009); shelf breaks around the Grand Banks of Newfoundland (Fuller and Myers 2004); Hanna Shoal Seamount Alaska (Jay et al. 2012).
C3: Migration Routes ***Areas used for important migration or other movements, often connecting distinct reproductive and feeding areas or connecting different parts of the year-round range of a non-migratory population.***	(1) Areas used for (annual) migrations of marine mammals which may be associated with fixed submarine features. (2) Coastal movement zones and corridors. (3) Straits which often act as major thoroughfares for marine mammals. (4) Passages through archipelagos which are critical to the movements of long-distance migrations and for non-migratory species that must undertake more local movements	Mid-ocean rises, ridges or shelf edges used by migrating fin (Silva et al. 2013), sei (Prieto et al. 2014) and common minke whales (Víkingsson and Heide-Jørgensen 2015); gray whales in North America and Russia (Mate et al. 2015); North Atlantic right whales along the eastern United States (Gowan and Ortega-Ortiz 2014); Lesser Sunda Islands in Indonesia (Wilson et al. 2011) and Sape Strait (Kahn et al. 2000); Aleutian Islands in the North Pacific (Zerbini et al. 2006).
D1: Distinctiveness ***Areas which sustain populations with important genetic, behavioural or ecologically distinctive characteristics.***	(1) Populations are genetically and demographically isolated from other populations of the species but have not been described or recognized as sub-species. (2) Populations exhibit behaviour (social, foraging, resting, etc.) or other features suggestive of local adaptation.	Killer whale ecotypes (de Bruyn et al. 2013); common bottlenose dolphins in South Carolina and Georgia, USA (Duffy-Echevarria et al. 2008); killer whale populations in Patagonia, Argentina (Vila et al. 2008) or rub on rocky beaches in British Columbia, Canada (Williams et al. 2006); spinner dolphins that use bays as resting habitat in Hawaii (Tyne et al. 2015) and the Red Sea (Notarbartolo di Sciara et al. 2009).
D2: Diversity ***Areas containing habitat that supports an important diversity of species.***	(1) The species present represent the full richness of marine mammal species diversity in the wider region. (2) Where certain physical structures are observed to attract important diversities of marine mammals in high seas environments.	Northwestern Alborán Sea in the Mediterranean (Hyrenbach et al. 2008; Hoyt 2011); the Southeast Shoal of the Grand Bank of Newfoundland (Fuller and Myers 2004); the Mozambique Channel including the island of Mayotte and Comoros Archipelago (Kiszka et al. 2007); the Eastern Tropical Pacific in particular the areas of the Equatorial Front, Costa Rica Dome and west of Baja California (Ballance et al. 2006); the Patagonian Shelf and Islands in the Southeast Atlantic (White et al. 2000).

Source: IUCN Marine Mammal Protected Areas Task Force 2018 (above references are listed in this document)

Annex 2. Background for the Desk-Study

Important Marine Mammal Areas (IMMAs)
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 are identified in order to prioritise their consideration for conservation measures by governments, intergovernmental organisations, conservation groups, and the general public. More information at https://www.marinemammalhabitat.org/immas/
The work will be integrated into the Marine mammal's platform (creation of a factsheet on the IMMAs). A webinar to present the study may also be organized.

2. Objective & Results
2.1 Scope of the study

The desk study will address the following:
- Why the tool of IMMAs
- What has been done so far in terms of identification and implementation of IMMAs
- How can IMMAs be used particularly in the North Atlantic
- Building networks, resilience, monitoring and effective management through incorporating IMMAs into MPA management
- Preparing for IMMA workshops in the North Atlantic (research, planning, participants) – *note: the possibility of holding IMMA sessions in parallel with the annual workshops of twinning partners will be considered*
- Conclusions